



# Awareness and Use of Cosmeceuticals among Female Students of Tertiary Institutions in Northeastern Nigeria

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## Abstract

**Introduction:** The word cosmeceutical was first conceived in 1961 by Raymond Reed. The term was further popularized by Dr. Albert Kligman in 1984 and by 1996 the cosmeceuticals products made their first appearance in the world market. The word “cosmeceutical” continues to evolve since then to date. However, most people are either ignorant of it or confused it with cosmetics generally. It lacks a proper definition and its difference from individual cosmetics and pharmaceutical agents seem to be incomplete. There are regulatory issues around the products in most countries of the world because of poor awareness among most groups. **Objectives:** To demonstrate the awareness of the term cosmeceutical as well as the use of the products among students of tertiary institutions in the Northeastern part of Nigeria. **Methods:** It was a cross-sectional descriptive study. **Results:** None among the respondents ever heard of the term cosmeceuticals talk less about knowing its meaning while the majority of them obtained and used cosmeceutical products. By studying the ingredients of the personal products the respondents were applying on their bodies, it was found that 48 (68.6%) of the 70 respondents actually were using cosmeceuticals products. The word cosmeceutical was not mentioned in the regulatory policies by the main regulatory body, the National Agency for Food and Drug Administration and Control (NAFDAC) across the region or any place in Nigeria. **Conclusion:** Knowledge of cosme-

ceuticals is very poor in the northeastern region of Nigeria among users and staff of regulatory agencies while regulation of cosmeceuticals is not explicitly addressed. Government was highly recommended to take the necessary steps to enlighten the people including users and stakeholders in the regulatory sector.

## Subject Areas

Drugs & Devices, Women's Health

## Keywords

Cosmeceuticals, Knowledge, Northeastern Nigeria, Regulation

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## 1. Introduction

The word “cosmeceutical” came into being in 1984 when a dermatologist known as Dr. Albert Kligman introduced it. [1] Another record showed that in 1961 the term cosmeceutical was conceived by Raymond Reed, a pioneer member of the United States Society of Cosmetic Chemists (USSCC). [2] [3] Dr. Albert Kligman described as the father of cosmeceuticals actually popularized the term cosmeceuticals when he described it in 1984. The cosmeceutical products made an appearance in the world market in 1996. The term “cosmeceutical” has been evolving and most people were confused with cosmetics generally. Some felt that the term cosmeceuticals lack proper definition and its difference from individual cosmetics and pharmaceutical agents seems to be incomplete. The definition of cosmeceutical has always been controversial. [1] There are regulatory issues around the products because the term cosmeceutical is not in existence in the United States Food and Drug Administration records. [4] Cosmeceuticals are agents that combine the properties of cosmetics as well as pharmaceutical drugs. They can affect skin function as well as modify the appearance and the feel of the skin to promote both looks and health conditions. Currently, cosmeceuticals have dominated over any other personal care products across the globe. [1] The anti-aging cosmeceutical (a one group of cosmeceuticals) was valued at USD38.6 billion in 2021. Its value will increase to about USD 60.3 billion in 6 years' time. [5] A study in 2019 showed that awareness about cosmeceuticals was not adequate, even among community pharmacists in Saudi Arabia let alone ordinary people. [6] A study in Seoul, South Korea, 2017, revealed that total customers' awareness of cosmeceuticals was described as low, therefore, promotion of awareness was considered necessary. [7] Nowadays, toiletries and skin lightening (bleaching) agents are used the world over, especially in Africa and Asia without public awareness about the correct use of topical creams and their adverse effects on the skin. [8]

This study seeks to demonstrate the awareness of the term cosmeceutical as well as the use of these products among students of tertiary institutions in Northeast Nigeria amidst regulatory issues.

## 1.1. Objectives

- To evaluate the level of awareness of cosmeceuticals among the students of tertiary institutions.
- To determine the practice of the respondents regarding the use of cosmeceuticals.
- To describe the attitude of the respondents towards the beautifying, healing, and preventive properties of the same product (cosmeceuticals).
- To determine the level of regulations of cosmeceuticals in the region.

## 1.2. Cosmeceuticals

Cosmeceuticals are made up of agents that elicit both cosmetic and pharmaceutical effects on the skin to provide beauty, healing and preventive effects. [1] [3] They are cosmetic agents with biological ingredients proven to have drug-like effects. This implies cosmeceuticals contain active ingredients that exert effects on the function of the skin cells. These biological effects may be limited to the skin surface or may penetrate the deeper skin tissues. There are cosmeceuticals of herbal origin which are even more preferred by some users to the synthetic of chemical origins because of their less toxic nature and possession of stronger antioxidant activity. [3]

Cosmeceuticals are available “over-the-counter”, OTC (without prescription) and are generally used as part of a regular skincare regime to help improve skin tone and texture, pigmentation and fine lines. Cosmeceuticals are used for the following on the skin; lightening or depigmenting, as sunscreens, moisturizing, anti-wrinkle/aging, scar-reducing, antioxidants, hair strengthening, and address specific disorder-related problems, such as acne, rosacea, melasma, and others.

Some common ingredients in cosmeceuticals include the following: [3] [9]

- Sunscreens—These contain agents that protect against sun damage, photo-aging and skin cancers.
- Antioxidants—Protect from the menace of free radicals damaging the skin tissues by mopping them off. Examples of antioxidants are alpha-lipoic acid, Vitamin C, Nicotinamide (vitamin B3), Vitamin E (alpha-tocopherol), N-Acetyl-Glucosamine (NAG), and Ubiquinone.
- Hydroxy acids—These are divided into alpha hydroxy acids (AHAs), polyhydroxy acids (PHAs) and beta hydroxy acids (BHAs) by their molecular weights.
- Retinoids (vitamin A)—These can be natural or synthetic forms of vitamin A and can partly reverse skin changes caused by exposure to sun.
- Skin lightening agents. Examples include hydroquinone (an agent of choice for skin lightening for many years), ascorbic acid (vitamin C), Kojic acid, Azelaic acid, and Licorice extract (glabridin).
- Botanicals such as soy, curcumin, silymarin, pycnogenol, ginkgo biloba, green tea extract, grape seed extract, aloe vera, witch hazel, allantoin and ferulic acid.

- Peptides and proteins—These are short chains of amino acid sequences serving as stimulators of repair or inhibition of processes that accelerate skin aging.
- Growth factors—They help in wound healing and repair of damaged skin due to sun exposure.
- Moisturizing agent-emollients (oil based), humectants (water based), and occlusive moisturizers.

Awareness and use of cosmeceuticals—There's a paucity of literature in terms of awareness of cosmeceuticals among the youths. While searching, I stumbled on a paper titled "Cosmeceutical awareness among Community Pharmacists in Jeddah", Saudi Arabia: The case of "sunscreens and moisturizers". The finding revealed that about 53% of community pharmacists were aware of the sunscreens, while 62% were aware of moisturizers. [6] A study conducted among female Saudi University Students showed poor knowledge scores for the hazards of cosmeceuticals warranting health education for the students. [10] The students were not aware and did not care about the indications, method of use or possible adverse effects irrespective of their socioeconomic status. Consumers of these brands are at high risk of many diseases, including cancers. Cosmeceuticals are mostly sold as cosmetics but have performance characteristics of pharmaceutical agent. [1] Many buy and use cosmeceuticals in various forms as cosmetics without knowing the difference. So many the respondents confused cosmeceuticals with cosmetics. A study conducted in Sudan 2021 revealed that 52% and 16% of the respondents had average and excellent knowledge about skin whitening products respectively while 32% had poor knowledge. [11]

Use of cosmeceutical—In the study in Saudi Arabia on the prevalence of cosmeceuticals use published in December 2021, it was stated that 81% of participants used cosmeceuticals with all obtaining the products over the counter (OTC). [10] According to a study conducted in Pakistan 33% of respondents were using potent topical steroids, 17% were using other types of whitening creams exclusively, while another 50% were using topical steroids in combined with various skin whitening creams. [8] That same study titled "Personal-Care Cosmetic Practices in Pakistan: Current Perspectives and Management" revealed that looking good and superior to be more acceptable in society has become the main driver for the use of cosmetics (cosmeceuticals) without knowing its implications. [8] The author felt that the users of such products need to be enlightened about the dangerous consequences related to use of such chemicals. A study conducted at Jimma University, Southwest Ethiopia in 2018 revealed that the majority (80.1%) of respondents were using at least a type of cosmetic product. [12] About 86.6% of the respondents were using toothpaste, lotion, lipstick, or eye makeup. About 19.0% of them experienced adverse events mainly on the face and hair.

Attitude towards the use of cosmeceutical—In a study "Knowledge, Attitude and Practice of Skin Whitening Products, among Sudanese Undergraduate Females, 2021", the majority (68%) of the respondents had a negative attitude to-

ward skin whitening. [11] The respondents believed that skin whitening raises their chances of getting married (21.9%) as well as secure jobs (18.6%) faster. About 27.7% and 22.2% believed that skin whitening raises their social acceptance and attractiveness respectively.

Cosmeceutical regulation—Under United States law cosmeceuticals are not recognized. [13] Despite the growing market value of cosmeceuticals the United States maintained same position concerning cosmeceutical regulation. The anti-aging cosmeceutical (a one group of cosmeceuticals) was valued at \$38.6 billion in 2021. It was estimated that the value will be about 60.3 billion in 2026. [5] The cosmetic industry refers to cosmeceuticals as cosmetic products that have medicinal or drug-like effects. A product can be considered a drug, a cosmetic or both. The United States (US) Food, Drug, and Cosmetic (FD & C) Act refers to drugs as those agents or products that cure, treat, mitigate or prevent diseases. Therefore, if a product is presented with claims or the attributes of a drug, it will be regulated as such. [13] The Food and Drug Administration (FDA) of the US has no statutory or regulatory definition for terminologies such as “cosmetic drugs” or “cosmeceuticals” and therefore, no statutory or regulatory definition exists for this terminology. [14] Cosmetic-drug combination products are subject to FDA’s regulations for both cosmetics and drugs depending on the intended use by the manufacturer. The product’s intended use may be established in several ways, such as claims on the label or in advertising or promotional materials, customer perception of the product, and the inclusion of ingredients that cause the product to be considered a drug because of known therapeutic use. For example, if a lipstick (a cosmetic) contains sunscreen (a drug), the mere inclusion of the term “sunscreen” in the product’s labeling requires the product to be regulated as a drug. Its regulatory status as a drug or cosmetic, or both, is determined by objective evidence of the distributor’s intent. [14] In Pakistan efforts are being made towards strengthening institutions like the Pakistan National Accreditation Council, Pakistan Standards and Quality, Control Authority (PSQCA), Drug Regulatory Authority of Pakistan to implement a quality management system for regulation of the manufacture, import, sale, and distribution of all forms cosmetics. The Ministry of Science and Technology has promulgated laws to regulate skin-enhancing creams all over Pakistan through the PSQCA, whereby a special task force will check manufacturing units, markets, and stores to ensure standards and take legal measures. [8] In Nigeria, the situation is similar. No mention was made of cosmeceuticals by any of the regulatory bodies especially the National Agency for Food and Drug Administration and Control (NAFDAC) which has come up with several regulatory provisions such as the prohibition of unfair or misleading advertisement, prohibition of expired cosmetics products, bleaching creams and other harmful products, wrong use of labels among others. [15]

In the European Union (EU), the United States or Japan, cosmeceuticals are not regulated as may be expected. [3] Cosmeceuticals are considered cosmetics in the EU, as drugs in the United States but have not been approved fully by the

U.S. Food and Drug Administration (FDA) while in Japan, cosmeceuticals are regarded as quasi-drugs or quasi pharmaceuticals. Products covered under cosmetics include hair care, oral care, skin care, lipsticks, nail polishes, extenders, deodorants, body powder, aerosols and quasi-pharmaceuticals. [16] A recognized legal definition of cosmeceutical unlike in the case of ordinary cosmetics is currently inexistent anywhere across the globe. [3]

## 2. Methodology

**Study design**—It was a cross-sectional descriptive study.

**Study locale**—The study was conducted in Ramat Polytechnic, one of the tertiary institutes of learning located in Maiduguri, the capital city of the state in northeastern Nigeria. It was established in January 1973 by the government of the defunct North-Eastern State as Technical College. Currently, the institute has one Campus with six Schools, and 34 departments offering 52 different programs.

The Polytechnic offers full and part-time courses of instruction and training leading to National Diploma (ND), Higher National Diploma (HND), Nigeria Certificate in Education (NCE Tech and Bus) and other Certificates of distinctions in Scientific, Technological, Management and Engineering courses to cater for the manpower requirements of the State and the nation. The students run through their programs by staying on or off campus. The Polytechnic offers Post Graduate Diploma through the Consultancy Unit in Management, Finance, Agronomy and Farm Management, Health Education and Hygiene and Education since 2003 in affiliation to the University of Maiduguri.

**Study population**—The study population was all female students of the institution.

**Study samples**—Participants were drawn from the institution's female students for homogeneity and to enhance the maximum flow of information.

### 2.1. Sample Size

Total of seventy participants were invited for Focus Group Discussions (FGD) in batches of seven persons each. Ten discussions were held to keep the chances of errors at an acceptably low level without making the study too large to minimize cost.

### 2.2. Data Collection

Focus Group Discussions (FGD) were used to gather the necessary information to cater to the objectives as outlined. Participants' invitations started about a week before the discussions. Each discussion group comprised 7 participants. Ten FGDs were held within the school in one of the teacher's offices. This ensured a very conducive and quiet environment for the discussions. In each session of the discussions, the moderator ensured that the participants were seated in a circular arrangement to ensure eye contact and proper and equal participa-

tion by all in the discussions. Languages chosen for discussions were Hausa and English understood by all students and mimicked normal communication method while in school. A moderator introduced the discussions in each of the sessions. A note taker was ever ready for a job well done. The moderator used a pretested set of questions to guide the discussions. The questions guide was aimed at respondents' knowledge of cosmeceuticals and to find out the details of the type of cosmetics they were using to determine whether drugs were in the ingredients as cosmeceuticals. Emphasis was laid on dermal creams, lotion, gels and oils. Other questions seek to find out about regulations on cosmeceuticals, the source of their products, unwanted effects, and attitudes towards cosmeceuticals. Finally, pieces of advice the respondents could provide on the use of cosmeceuticals were discussed. The discussants were explained the meaning of cosmeceuticals after documenting their levels of knowledge on cosmeceuticals. Each discussion lasted for about an hour. All questions were addressed adequately. Responses were recorded on plain sheets of paper. At the end of each discussion, the participants were entertained with a token of appreciation instead of drinks which were monetized.

Key informant interview (KII)—The Chief Regulation Officer of the State National Agency for Food and Drug Administration and Control (NAFDAC) was interviewed on the list of questions related to cosmeceuticals. The list of questions seeks to find out about the respondent's knowledge of cosmeceuticals, regulation policy for cosmeceuticals and implementation. After understanding his level of knowledge on cosmeceuticals, he was explained the meaning of the word cosmeceuticals on which the remaining questions was based on.

A Study of the ingredients of the products respondents were using was done through leaflets and internet search to differentiate cosmeceuticals from cosmetics.

### 2.3. Data Analysis

The responses recorded were transcribed and data was entered into a worksheet in an excel computer application for easy analysis. Descriptive statistics were used to calculate the frequencies and percentages and tables and graphs were constructed using data obtained through FGD, KII and details of the products used by respondents through an internet search.

## 3. Results

The majority of the respondents were within the age groups of 15 to 19 (18.6%) and 20 to 24 years (64.3%). The mean age was  $22.8 \pm 10.1$  years. Almost all (97.1%) respondents were single. Most (64.3%) of the respondents were Muslims (belonging to the religion of Islam) from different tribal groups. (**Table 1**)

The study showed that none of the respondents ever heard or knew about cosmeceuticals. However, all of them knew about cosmetics. All of them were using cosmetics in form of body creams or lotions at the time of the discussions

**Table 1.** Socio-demographic data.

Description	Frequency	Percent (%)
<b>Age (yrs)</b>		
15 - 19	13	18.6
20 - 24	45	64.3
25 - 29	10	0.1
30 - 34	1	1.4
35 - 39	1	1.4
Total	70	100
<b>Marital status</b>		
Single	68	97.1
Married	2	2.9
Total	70	100.0
<b>Tribe</b>		
Kanuri	14	20
Hausa	2	2.9
Babur/Bura	12	17.1
Marghi	9	12.9
Shuwa Arab	5	7.1
Gwoza	15	21.4
Igbo	2	2.9
Other	11	15.7
Total	70	100
<b>Religion</b>		
Islam	45	64.3
Christianity	25	35.7
Total	70	100.0
<b>Level of study</b>		
Pre-Diploma/Certificate	7	10.0
Diploma	39	55.7
NCE	14	20.0
HND	10	14.3
Total	70	100.0

and all refuted use of cosmeceuticals. However, it was found in this study that Forty-Six (65.7%) of the 70 respondents were found to be using cosmeceuticals through examination of the ingredients of the products they were using which



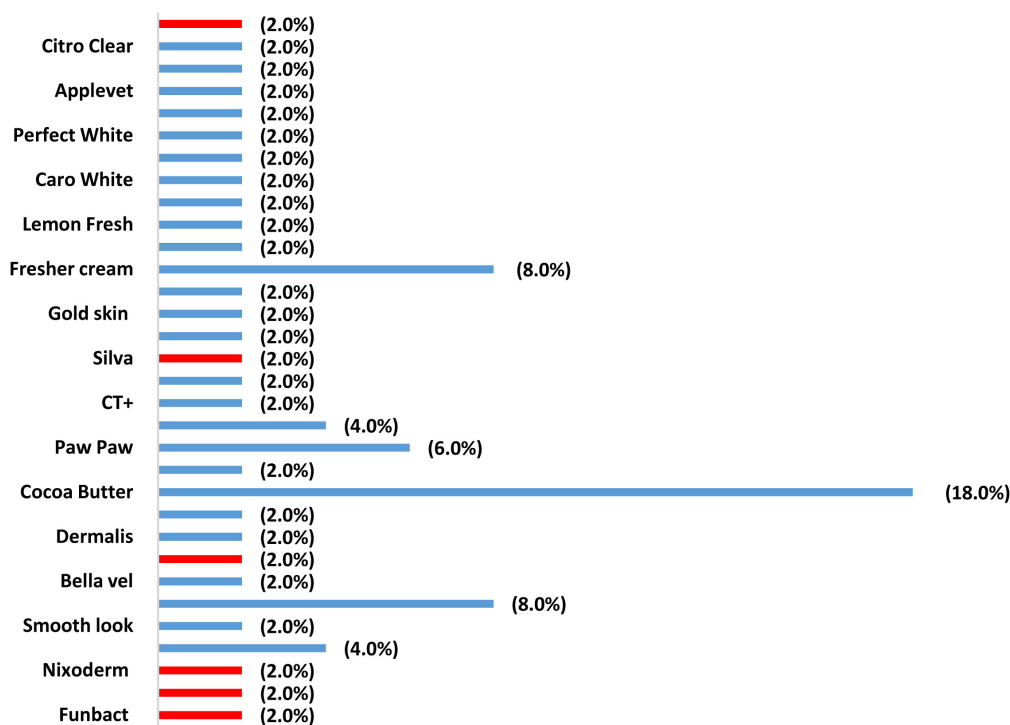
they described as cosmetics. Twenty-Two (31.4%) of the respondents were actually using body cosmetics creams or lotions as they mentioned while 2 (2.9%) were not using any form of product for cosmetic reasons. (Table 2)

Figure 1 shows a range of cosmeceuticals in body creams or lotions used by participants. The majority (18.0%) of respondents use cocoa butter body cream. Six (about 12.5%) persons were using pharmaceutical drugs (Funbact, Epiderm, Nixoderm, Libya and Silva creams in their body creams as cosmetics. Two of the respondents were using two different body creams at the time of the study. One of the respondents was using a combination of cocoa butter and skineal and the other was using cocoa butter and paw paw lotion.

Funbact, Epiderm and skineal contain steroids, antifungal and antibacterial agents as part of their ingredients as can be seen in Table 3 which also shows Libya cream to contain an antifungal agent. Silva cream contains antibiotics to prevent and treat bacterial infections while Nixoderm contains Salicylic Acid 2 g in 100 g, Benzoic acid, Zinc Oxide, and Sulphur.

**Table 2.** Usage of cosmeceutical among the respondents.

Description	Frequency	Percent (%)
Cosmeceuticals	46	65.7
cosmetics creams or lotions	22	31.4
None	2	2.9
Total	70	100.0



**Figure 1.** Range of cosmeceutical cream or lotion used by participants (n = 48).

**Table 3.** Range and ingredients of cosmeceuticals used by respondents.

Type of cream or lotion	Ingredients
Carofresh [17]	Hydroquinone 2%, Stearic Acid, Carrot oil, Vitamin E (0.2%).
Funbact	Clotrimazole USP 1.0% w/w, Betamethasone dipropionate USP equiv. to Betamethasone 0.05% w/w, Neomycin sulphate USP 0.5% w/w.
Epiderm	Betamethasone Dipropionate USP 0.643 mg, Gentamicin Sulphate BP equivalent to Gentamicin base 1 mg, Tolnaftate USP 10 mg, Iodochlorhydroxyquinoline 10 mg.
Nixoderm	Salicylic Acid 2 g in 100 g, Benzoic acid, Zinc Oxide, Sulphur.
Bronz Tone	Stearic Acid, Glycerine, Cocoa Butter, Citric Acid and Honey Extracts
Dermalis [18]	Carrot Extracts, MBS, Salicylic Acid < 1%, Benzoic Acid < 1%, Alcohol, MPG, Antioxidant, Glycerin, Alpha Hydroxy Acid
Cocoa Butter	Theobroma Cacao (Cocoa) Extract, Mineral Oil (Paraffinum Liquidum), Microcrystalline Wax (Cera Microcristallina), Theobroma Cacao (Cocoa) Seed Butter, Dimethicone, Fragrance (Parfum), Tocopheryl Acetate, Beta Carotene (CI 40800), Zea Mays (Corn) Oil, Isopropyl Myristate, Benzyl Benzoate, Benzyl Cinnamate.
Libya cream	Antifungal agent used to treat fungal infections of the skin such as athlete's foot, Dhobie Itch, thrush, ringworm.
Paw Paw	Papaya Extract, Kojic Acid, Citric Acid, Stearic Acid, AHA, IPM, Glycerin, White Oil, Petroleum Jelly, Stearyl.
Bold and beauty	Aloe Barbadosensis Leaf (Aloe Vera Gel) Juice, Isopropyl Palmitate, Glyceryl Stearate, PEG-100 Stearate, Polyacrylamide, C13 - 14 Isoparaffin, Laureth-7, Propylene Glycol, Dimethicone, Prunus Amygdalus Dulcis (Sweet Almond) Oil, Butylene Glycol, Saxifraga Sarmientosa Extract, Vitis.
CT +	Hydroquinone, Glycerin, Allantoin, Glutathione, Vitamin C, Honey, Kojic Acid, Stearic Acid, Fruit Acid, Carrot Oil, Argan Oil.
Kiss beauty cream	Dimethicone. Emollient, Glycerol. Solvent, Moisturizer, 0; Cetyl Stearyl Alcohol. Surfactant.
Silva cream	micronized silver sulfadiazine
Precious cream	Kojic Acid, Citric Acid, Stearic Acid, AHA, IPM, Glycerin, White Oil, Petroleum Jelly, Stearyl Alcohol, Propylene Glycol, Sodium Metabisulfite
Gold skin cream	Stearic Acid, Petrolatum, Dimethicone, Cetyl Alcohol, Propyl Paraben, Propylene Glycol, Cetrimonium Bromide

## Continued

Fresher cream	Pentaerythrityl Tetra-Di-T-Butyl Hydroxyhydrocinnamate, Sodium Metabisulfite, Glycyrrhiza Glabra (Licorice) Root Extract, Tocopheryl Acetate
White secret cream	Vaseline Oil, Carrot Oil, Silicone Oil, Petroleum Jelly, Stearic Acid, Vitamin E and A, AHA, BHT, Isopropyl Myristate, Lorol c16, Lorol c18
Lemon fresh	Menerol Castor Oil, Cocamide, Stearic Acid, Cetyl Alcohol, Shea Butter, Propyl Paraben, Paraffin Oil, Sodium Lactate, Methyl Paraben, Rose Water, Laurine Sulphate, Lanolin Petroleum, Phenillus Linctus
Caro White	Hydroquinone 2%, Mineral Oil, Petrolatum, Stearic Acid, Glycerin, Sodium Metasulphite, Cetearyl Alcohol, Isopropyl Myristate, Methyl & Propyl Paraben, Carrot oil, Vitamin E (0.2%)
Gold Olive	<b>Olive</b> Oil and Ozonated Oxygen. It also contains many super charged vitamins including; Vitamin A Vitamin C, Vitamin D, Vitamin E
Perfect White	Huile De Vaseline, Acide Stearique, Glycerine, Acides De Fruits (AHA), EAU, Acide Kojique, Allantoine, Huille De Silicone, BHT, Lorol C16 et C18 and Parfum
Neoskin	Clotrimazole 1.0%, Betamethasone dipropionate 0.05%, Neomycin sulfata 0.5%.
Apple vet	vitamin C, vitamin E, hyaluronic acid, sea water and algae
White Now [19]	Paraffin, Glutathione, Vitamin E, Ginseng, Fruits Acids, Plants Extracts, Argan Oil, Lanolin, Goji Berry, Glycerol, Carotene Oil
Citro Clear [20]	Propylene Glycol, Lemon Extracts, Glycerin, Sodium Metabisulfite, Vitamin E, Ascorbic Acid, Kojic acid
Skineal	Ketoconazole 10 mg, Clobetasol Propionate 0.25 mg, and Neomycin Sulfate 5000 IU.

Source: Labels of products, internet.

The discussants (100.0%) purchased cosmeceuticals over the counter at markets. Four discussants (8.3%) obtain the products from pharmacies. About 58.3% of the respondents felt the products were easy to get and have never experienced any form of regulation at the point of buying. About 29.2% and 4.2% either had difficulty in obtaining the product due to financial and supply issues respectively while the remaining 8.3% had a combination of both financial and supply issues.

**Table 4** shows that beautification accounted for the most (53.0%) reasons for cosmeceuticals use by respondents followed by skin lightening accounting for 15.7%. Skin lightening was also mentioned by some of the respondents to account for 10.4% of the unwanted effects of cosmeceuticals. The table shows

**Table 4.** Reasons, unwanted effects, attitude and advice related to use of cosmeceuticals.

	Frequency	Percent (%)
<b>Attitude towards cosmeceutical</b>		
The products are good	23	41.8
The products are good but involves lot spending	6	10.9
Stigmatization	6	10.9
Takes over natural beauty	6	10.9
Very important and helpful	6	10.9
<b>Advice from participants</b>		
User should beware of forgery	2	7.7
No fake and damaged products from manufacturers	1	3.8
User should be patient for change to occur	1	3.8
User should be regular in the using the products	1	3.8
Girls should not bleaching agents	6	23.1
User should be careful in selecting the one that suits her well.	2	7.7
Check on the expiry date before use	1	3.8
All girls to start using the products	12	46.2
<b>Reason for use cosmeceutical use</b>		
Pimples	3	3.6
Beauty	44	53.0
Rash	9	10.8
Skin softening	4	4.8
Lightening	13	15.7
Skin smoothening	1	1.2
Deodorant	8	9.6
Reduce sweating	1	1.2
<b>Unwanted effects of cosmeceuticals</b>		
Excessive sweat	11	22.9
Itching	1	2.1
Sun burn	8	16.7
Body odor	7	14.6
Discoloration	3	6.3
Skin lightening	5	10.4
Rebounce of poor skin quality	4	8.3

excessive sweating as one of the most frequently mentioned unwanted effects accounting for 22.9%. The attitudes of the respondent as shown in **Table 4** include feelings of stigmatization due to the use of body creams and lotions as beautifying agents or for any of the reasons shown in **Table 4**. The respondents generally felt that the products are good (41.8%) though they felt that the beautifying agents take over the natural beauty a lady has as mentioned by some (10.9%). This means that the user will have to always rely on the product to maintain her beauty. Many pieces of advice were given to users of cosmeceuticals. The advice includes encouragement of all girls to start using cosmeceuticals (46.2%). However, girls were advised not to use skin bleaching agents (23.1%).

In the KII the informant the State Chief Regulation Officer of the National Agency for Food and Drug Administration and Control (NAFDAC) showed an incomplete understanding of the term cosmeceuticals. However, he affirmed that there is a policy regulation for cosmetics and other related products in the country. The regulation is aimed at controlling manufacturing practices to ensure standards and contents testing, labels, supplies, and adverts. He feels that the policy needs to be reviewed because of the advancement in the field of cosmetics. He advised that the review should be done more frequently by the government. He also advised users ensure using genuine unexpired products by carefully selecting what they buy. The Staff of NAFDAC occasionally visit retailing points to ensure quality and check against forgery and expired products. Defaulters are held to account for their shortcomings.

#### 4. Discussions

The majority of the respondents fell into the age group 15 to 19 and 20 to 24 years contributing to 18.6% and 64.3% respectively as in **Table 1**. These groups were the ones that like enhancing their beauty and appearance more than the other groups as stated in research on cosmetics usage and its relation to sex, age and marital status which mentions that the age range of 19 - 23 like cosmetics more than the other age groups. [21] Single females like cosmetics more than married ones. Almost all (97.1%) were singles belonging to the group that liked cosmetics more but decrease that tendency after marriage. [21] Most (64.3%) of the respondents were Muslims compared to the Christians (35.7%).

The awareness of cosmeceuticals was zero among the respondents. This was worse than the findings of the studies the researcher came across. In Seoul, Korea in 2017 which revealed that total customers' awareness of cosmeceuticals was described as low. [7] The awareness about cosmeceuticals was described as inadequate even among community pharmacists in Saudi Arabia according to a study conducted in 2020. [6] Among the community pharmacist 53% knew about sunscreens, 62% knew about moisturizers while the rest of them were not aware. Another study among tertiary students in Saudi Arabia showed poor knowledge of hazards about cosmeceuticals. A study in Sudan among students showed 16%, 52% and 32% had excellent, average and poor knowledge about

cosmeceuticals respectively. [11]

About 68.6% of the respondents were using cosmeceuticals without being aware. They thought they were using ordinary cosmetics. A prevalence study of the usage of cosmeceuticals among University students in Saudi Arabia showed a usage rate of 81%. [10] That was much higher than the 68.6% usage rate found in this study. Some of the respondents used medicines (Epiderm, Funbact, Nix-oderm, Skineal, Silva and Libya cream) as cosmetics to enhance their appearance and skin condition (see in **Figure 1**). About 16.6% of the cosmetics mentioned by the respondents contained steroid out of which 6.2% (carowhite, carofresh and CT+) contain hydroquinone (**Figure 1** and **Table 2**). It was obvious that the discussants were using products they do not know much about to enhance their skin conditions. The main reason for the use of cosmeceutical products was to enhance their beauty (53.0%) followed by skin lightening (15.7%). Other reasons given for the use of cosmeceuticals include treatment of pimples/acne (3.6%), rashes (10.8%), deodorant (9.6%), skin softening (4.8%) and reduce sweating (1.2%). The unwanted side effects mentioned by the discussants related to the products they were using include excessive sweating (22.9%), sun burn (16.7%) body odor (14.6%) and skin discoloration (6.3%). It was testified that about 30% of the adverse effects are termed as serious or severe, while the remaining 70 percent were considered mild. [22] Some (10.4%) actually viewed skin lightening as an unwanted effect. After discontinuing the beauty product, the gains in the skin quality will be lost leading to the return of poor skin quality (8.3%). That may lead to getting addicted to the product as believed by some in a study conducted in northeastern Nigeria which mentioned that about 50.5% believe that addiction to use of skin whitening agents can occur. [23] About 10.9% of the respondents asserted that the use of beauty products may lead to stigmatization. This is similar to previous findings in the same region which stated that about 24.7% of respondents thought that stigmatization was an issue in the use of skin whitening agents. [23] However, the discussants in this study felt that cosmetics or cosmeceuticals were good (41.8%) and while some (10.9%) thought that the products were very useful and helpful. Many (46.2%) of the discussants advised all girls to start using cosmeceuticals but to avoid the use of skin whitening agents (23.1%) and other pieces of advice as in **Table 2**.

There was no indication of regulatory policy and implementation in the manufacturing process, content testing, labeling, advertisements and supply of the cosmeceuticals as well as retail in the state where the study was conducted as mentioned by the key informant. The same thing happens in Pakistan where the Ministry of Science and Technology has promulgated laws to regulate skin-enhancing creams through the PSQCA. A special task force checks manufacturing units, markets, and stores to ensure standards and takes legal measures against defaulters was the case in the study locale. In the European Union cosmetics are subjected to expert safety assessment before being cleared for marketing. [22] However, in the U.S., the FDA only investigate product that has evidence of harm or complaint after being introduced to the market. The EU

considers cosmeceuticals as cosmetics with the same laws applied for both, in the US, the FDA considers cosmeceuticals as drugs but not fully recognized, while in Japan cosmeceuticals are considered as quasi-drugs. [3] However, A legally accepted definition of cosmeceutical unlike in the case of ordinary cosmetics is currently inexistent the world over. So far, respondents in this study buy a range of products OTC all forms of cosmeceuticals without any form of restriction.

## 5. Conclusion

Inappropriate use of cosmeceuticals due to poor knowledge in the northeastern region of Nigeria was noted among students and staff of regulatory agencies while regulation of cosmeceuticals was specifically not addressed.

## 6. Recommendations

Organize an enlightenment program to empower the students in the tertiary institution to enable them to take informed decisions concerning such products as cosmeceuticals. Similar empowerment program should be extended to the students of other levels within the region. All the stakeholders relevant to the regulation of such cosmeceuticals should be educated on these agents. The government of Nigeria formulates policies with the aim of regulating the use of cosmeceuticals.

## Conflicts of Interest

The authors declare no conflicts of interest.

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