Project report

On

TRENDS AND INSIGHTS: STATISTICAL ANALYSIS OF FACTORS IMPACTING BEAUTY PRODUCT CONSUMPTION

Submitted

in partial fulfilment of the requirements for the degree of
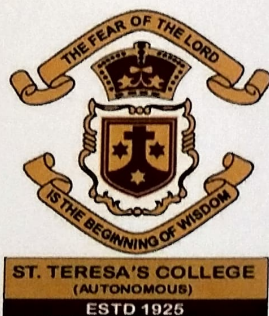
BACHELOR OF SCIENCE

in

MATHEMATICS

by

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ST. TERESA'S COLLEGE (AUTONOMOUS), ERNAKULAM

CERTIFICATE

This is to certify that the dissertation entitled **TRENDS AND INSIGHTS: STATISTICAL ANALYSIS OF FACTORS IMPACTING BEAUTY PRODUCT CONSUMPTON** is a bonafide record of the work done by **Ms. DEVIKA SABU** under my guidance as partial fulfillment of the award of the degree of **Bachelor of Science in Mathematics** at St. Teresa's College (Autonomous), Ernakulam affiliated to Mahatma Gandhi University, Kottayam. No part of this work has been submitted for any other degree elsewhere.

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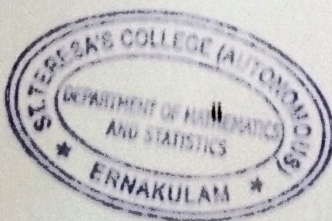St. Teresa's College (Autonomous), Ernakulam.

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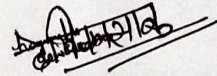1: ....

2: ....

DECLARATION

I hereby declare that the work presented in this project is based on the original work done by me under the guidance of **Dr.Ursala Paul,** Assistant Professor, Department of Mathematics, St. Teresa's College (Autonomous), Ernakulam and has not been included in any other project submitted previously for the award of any degree.
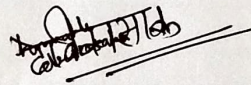
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Chapter 1

INTRODUCTION

In an era characterized by a multifaceted understanding of beauty, the global beauty industry stands as a testament to the diverse preferences and evolving standards shaping our perceptions of self-image and aesthetics. This industry's consumption patterns are complex, shaped by a multitude of elements that go beyond the functional aspects of products to include socioeconomic, cultural, and psychological aspects. This statistics study sets out on a thorough trip to uncover the statistical subtleties of the factors influencing the consumption of beauty products, taking into account the dynamic character of the beauty sector. Recognizing the dynamic nature of the beauty market, this statistics project embarks on a comprehensive journey to unravel the statistical intricacies of the factors impacting beauty product consumption.

In recent times, the beauty sector has experienced a significant shift, encompassing a wider range of products such as skincare, cosmetics, and personal care items that suit diverse personal preferences and lifestyles. At the heart of this investigation lies the recognition that beauty consumption is not a monolithic phenomenon; rather, it is a complex interplay of various factors. Demographic variables, such as age, gender, and income, undoubtedly play a role, but so too do cultural influences, societal norms, and individual perceptions of beauty. By employing advanced statistical techniques such as correlation studies and hypothesis testing, this project aims to dissect these variables, unraveling the patterns and relationships that define beauty product consumption.

The results of this project can help firms navigate the competitive landscape of the beauty sector, as trends and customer expectations are subject to quick change. Understanding the statistical landscape of beauty consumption provides stakeholders with the knowledge needed to adapt and survive in a constantly changing environment, from marketing strategies to product creation and policy issues. As we embark on this statistical exploration, the goal is not only to unveil the factors influencing beauty product consumption but also to contribute to a broader discourse on beauty, consumer culture, and the evolving nature of personal expression. Through rigorous data analysis and a holistic approach to understanding consumer behavior, this project aspires to offer a nuanced perspective on the statistical intricacies that underpin the fascinating world of beauty consumption.

1.1 OBJECTIVES

The study aims to identify the key determinants that significantly impact consumer behavior in the beauty product market. By examining demographic variables, consumer preferences, and social trends, the project seeks to provide valuable insights into the patterns and trends governing beauty product consumption. In the present study the following objectives are considered:

1. To analyze the factors that influence the frequency and the types of beauty products used.

2. To determine the purchasing behavior among the consumers.

3. To analyze the relationship between societal beauty ideals and consumer preferences to use certain beauty products.

4. To analyze the effectiveness of different advertising channels in promoting beauty products.

5. To analyze the concern among consumers regarding health risks associated with certain beauty product ingredients.

6. To determine whether foreign beauty products have a stronger influence in India compared to Indian beauty products.

1.2 DATA SOURCE

The data was collected by conducting an online survey among people from both rural and urban areas.

1.3 DATA DESCRIPTION

The data is primary data which includes the individual's preference about the beauty product consumption which includes mode of purchase, beauty trends, advertising channels and the origin of beauty products. The questionnaire was circulated using a google form.

1.3.1 PRIMARY DATA

The data was collected by circulating a google form. A google form containing 23 questions was designed to obtain information from the respondents. The questions include age, gender, place of residence, personal preferences about beauty product consumption and factors influencing purchasing behavior.

1.4 LITERATURE REVIEW

In 2019, Kishore Bhattacharjee [2] conducted a survey on the topic "Brand awareness and purchase intention of organic personal and beauty care products among rural and urban segments". This paper's primary goal is to assess how customer purchasing decisions are influenced by brand knowledge of organic personal and cosmetic care goods. In order to assess any differences in consumer intention, the purchase intentions of rural and urban consumers were also compared. Methodology: The research that was done was primarily descriptive. The responses from 664 rural and 332 urban customers were used to compile the results. Results: Detailed statistical research has revealed that, compared to the urban sector in India, the rural segment is more aware of (and intends to purchase) organic personal and beauty care goods. The result indicates the necessity of more strategic efforts by the marketers to generate maximum awareness among the urban customers about such organic brands. By considering the limitations, the result of the study indicates further scope for some detailed research in wider geographic area with a greater number of factors under consideration.

Ameerah Amure and Abdulafis Toliat [3] conducted a survey based on the topic "Influencer marketing and consumer buying behavior of beauty products amongst women in selected local government in LAGOS state. This study looks at how women in Lagos State, Nigeria, use influencer marketing to affect their purchasing decisions when it comes to cosmetic items...influencer marketing is on the rise because of the widespread use of social media, and it's a potent weapon for product promotion and customer behavior modification. Nevertheless, much of the research that has already been done on influencer marketing and the purchasing habits of consumers for beauty products comes from regional or global viewpoints, ignoring the unique circumstances of Lagos State, a thriving metropolis with a diverse population. This study, which employs a survey approach, makes use of quantitative data from a structured survey that was given to 250 women in particular Lagos Local Government Areas.

An integrated mixed-methods approach is the data analysis strategy selected for this study. This approach integrates both qualitative and quantitative data analysis in a well-balanced manner to thoroughly investigate the study goals. Descriptive statistics are used in the study of the quantitative component to give an overview of the characteristics and important factors of the respondents. ANOVA or t-tests, two types of inferential statistical tests, will be used to find significant correlations between variables connected to influencer marketing and demographic characteristics. The degree to which variables are correlated will be revealed by correlation analysis, which will concentrate on the role of influencer exposure on consumer behavior. The study affirms that social media influencer marketing plays a pivotal role in influencing the buying behavior of women in Lagos State regarding beauty products. Furthermore, the study concludes that factors such as discount codes and promos contribute to the purchasing behavior of consumers with regards to the purchase of beauty products.

Wayan Weda Asmara Dewi, Fitria Avicenna and Astried Ayu Pervita Sari Prasetyo [4] conducted a survey on the topic "The effect of social influence on green purchasing behavior on the purchase of love beauty and planet brand products". The goal of this study is to determine whether social influence has an impact on green purchasing behavior based on factors including the frequency of conversations with friends and family, the information they provide, and the knowledge they impart. This study employed a quantitative explanatory methodology, collecting data from 272 respondents who had either purchased or used Love Beauty and Planet brand products through online surveys. This study's sample strategy employed non-probability sampling, which was subsequently examined using basic linear regression analysis to see how the two variables under investigation affected each other. The results showed that the regression coefficient was 38.6% on green purchasing behavior, which means that social influence has a positive effect on green purchasing behavior. The dominant indicator in influencing consumer respondents and users of Love Beauty and Planet brand products was the frequency of discussions with friends and learning that comes from family.

1.5 SIGNIFICANCE OF STUDY

The project might offer important insights into customer behavior by scientifically examining variables impacting the use of beauty products. Businesses need to know this information in order to comprehend consumer patterns, preferences, and possible growth areas. Businesses can better match customer requests by customizing their products and promotional activities by having a

deeper understanding of the elements impacting consumption. Product development is guided by statistical research, which finds market gaps and emphasizes potential areas for innovation. Companies can take advantage of new trends and produce goods that suit customer preferences.

1.6 LIMITATIONS OF STUDY

Due to time constraints, 309 people participated in this survey. Since the responses received were the personal choices of the respondents there is a chance that the data may or may not be biased. Furthermore, outside factors like unforeseen occurrences, cultural upheavals, and economic fluctuations can affect consumption trends, making it difficult to precisely forecast long-term patterns. Remember that the beauty business is dynamic, and that current data is necessary for thorough research.

Chapter 2

METHODOLOGY

2.1 CHI-SQUARE TEST

The Chi-Square test is a statistical test used to compare observed and expected results. The method was developed by Karl Pearson in 1990. The value of the Chi-squared test can be formulated using the formula below: -

$$X^2 = \sum \frac{(O - E)^2}{E}$$

O – observed value

E – expected value

C – degrees of freedom

Steps:

- Define your null and alternative hypothesis before collecting your data.
- Decide on the α value. This involves deciding the risk you are willing to take of drawing the wrong conclusion. For example, suppose you set α=0.05 when testing for independence. Here, you have decided on a 5% risk of concluding the two variables are independent when in reality they are not.
- Check the data for errors.
- Check the assumptions for the test.
- Perform the test and draw your conclusion.

The basic idea behind the test is that you compare the actual data values with what would be expected if the null hypothesis is true. The test statistics involve finding the squared difference between actual and expected data values and dividing that difference by the expected data values. You do this for each data point and add up the values. Then, you compare the test statistic to a theoretical value from the Chi-square distribution. The theoretical value depends on both the alpha value and the degrees of freedom for your data. To calculate the Degree of freedom

DF = no: of frequency – no: of independent constraints in them.

In other terms,

DF =(r-1) (c-1)

Where r = number of rows

c = number of columns

2.2 CORRELATION

Correlation refers to the relationship between two variables in a bivariate distribution. The correlation expresses the relationship or interdependence of two variables upon each other, in such a way that, changes in the values of one variable are sympathetic with the changes in the values of the other. Depending up on the nature of the relationship between the variables, correlation can be classified into:

1. Positive correlation: Variables move in the same direction

2. Negative correlation: Variables move in opposite directions

3. No correlation or Zero correlation: No correlation between the variables

The most widely used method in practice is Karl Pearson's Coefficient of Correlation. It is usually denoted by 'r'.

Karl Pearson's Coefficient of Correlation between the variables X and Y is given by:

$$r(x,y) = \frac{covariance\ between\ x\ and\ y}{(standard\ deviation\ of\ x)(standard\ deviation\ of\ y)}$$

The value of coefficient of correlation (r) always takes values from -1 to +1.

If r = 0, then the correlation is zero.

If 0 < r < +1, then the correlation is positive.

If -1 < r < 0, then the correlation is negative.

2.3 ANOVA TEST

ANOVA is a statistical method to test the significant difference of several means.

One-way Classification Model

The term one-factor analysis of variance refers to the fact that a single variable or factor of interest is controlled and its effect on the elementary units is observed. In other words, in one-way classification the data are classified according to only one criterion. Suppose we have independent samples of $n_1, n_2, \ldots n_k$ observations from k populations. The population means are denoted by $\mu_1, \mu_{2\ldots} \mu_k$. The one-way analysis of variance is designed to test the null hypothesis:

$$H_0: \mu_1 = \mu_2 = \mu_3 = \ldots = \mu_k$$

That is, the arithmetic means of population from which the k samples are randomly drawn are equal to one another. The steps involved in carrying out the analysis are:

1. Calculate the Variance between the Samples

Sum of squares is a measure of variation. The sum of squares between samples is denoted by SSC. For calculating variance between samples, we take the total of the square of the variations of the means of various samples from the grand average and divide this total by the degrees of freedom. Thus, the steps in calculating variance between samples will be:

a. Calculate the mean of each sample, i.e. $\bar{X}_1, \bar{X}_2, \ldots, \bar{X}_k$;

b. Calculate the grand average $\bar{\bar{X}}$. Its value is obtained as follows:

$$\bar{\bar{X}} = \frac{\overline{X_1} + \overline{X_2} + \cdots + \overline{X_k}}{N_1 + N_2 + \cdots + N_k}$$

c. Take the difference between the means of the various samples and the grand average:

d. Square these deviations and obtain the total which will give sum of squares between the samples, and divide the total obtained by the degrees of freedom. The degrees of freedom will be one less than the number of samples, i.e. If there are 4 samples the degrees of freedom will be $4 - 1 = 3$ or in general $v = k - 1$, where k = number of samples.

2. Calculate the Variance within the Samples

The variance (sum of squares) within samples measures those inter-sample difference that arise due to chance only. It denoted by SSE. For calculating the variance within the samples, we take the total of the sum of squares of the deviation of various items from the mean values of the respective samples and divide this total by the degrees of freedom. Thus, the steps in calculating variance within the samples will be:

a. Calculate the mean value of each sample, i.e. $\bar{X}_1$, $\bar{X}_2$, …, $\bar{X}_k$.

b. Take the deviations of the various items in a sample from the mean values of the respective samples.

c. Square these deviations and obtain the total which gives the sum of squares within the samples.

d. Divide this total obtained in step (c) by the degrees of freedom.

3. Calculate the F-ratio

Calculate the F-ratio as follows:

F^*= Variance between the samples Variance within the samples or F

4. Compare the calculated value of F

Compare the value of F with the table value of F for the given degrees of freedom at a certain critical level (generally we take 5% level of significance). If the calculated value of F is greater than the table value of F, it indicates that the difference in sample means is significance, that is it could not have arisen due to fluctuation of random sampling or in other words the samples do not come from the same population. On other hand, if the calculated value of F is less than the table value, the difference is not significant and hence could have arisen due to fluctuation of random sampling.

The Analysis of Variance Table

Since there are several steps involved in the computation of both the between and within sample variances, the entire set of results may be organized into an analysis of variance (ANOVA) table. This table is summarized and shown below.

Source of variation	Sum of Squares SS	Degrees of Freedom	Mean Square MS	Variance Ratio F
Between Samples	SSC	$c - 1$	$MSC = \dfrac{SSC}{c - 1}$	$F = \dfrac{MSC}{MSE}$
Within Samples	SSE	$n - c$	$MSE = \dfrac{SSE}{n - c}$	
Total	SST	$n - 1$		

2.4 PROPORTION TEST

A proportion test will assess whether a population sample represents the entire population's true proportion. To be able to use the two-sample z-test, the following conditions must be met:

• The two populations must be normal or approximately normal.

• The two samples must be randomly sampled from the two populations.

• The two proportions must be independent.

If any of the above conditions are not met, the two-sample z-test cannot be used and another test must be selected. The two-sample z-test is advantageous because it does not require any knowledge of the population standard deviation.

There are two steps in conducting a two-sample z-test for proportions.

• The first step is to calculate the standard error of the difference between the two population proportions.

• The second step is to calculate the z-test statistic. This is done by dividing the difference between the two population proportions by the standard error of the difference.

Once the z-test statistic is calculated, the Z-table can be used to determine whether the two population proportions are different. If the z-statistic is greater than or equal to the critical value or level of significance, then it can be concluded that there is enough evidence that there exists a difference between the two population proportions. And, the null hypothesis can thus be rejected.

The formula for two-sample Z-test for proportions:

$$\frac{(p_1 - p_2) - (P_1 - P_2)}{\sqrt{p(1-p)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

p_1 is the proportion of the 1st sample

p_2 is the proportion of the 2nd sample

n_1 is the number of data samples in the 1st sample

n_2 is the number of data samples in the 2nd sample

Chapter 3
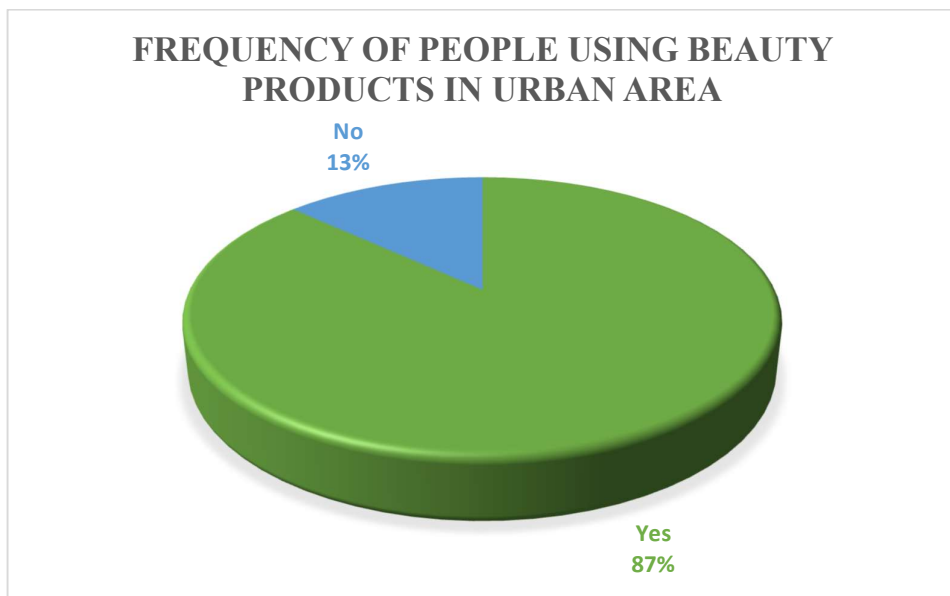
DATA ANALYSIS

3.1 FREQUENCY ANALYSIS
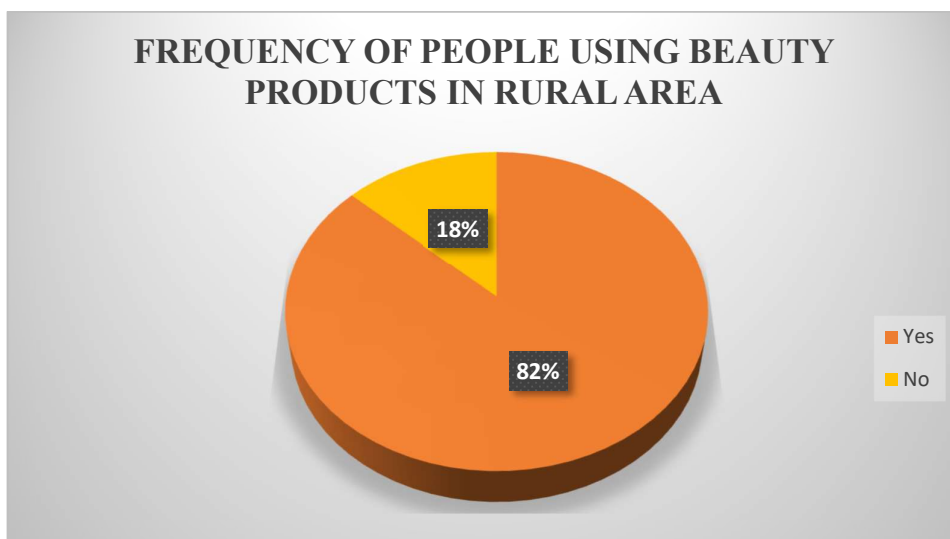
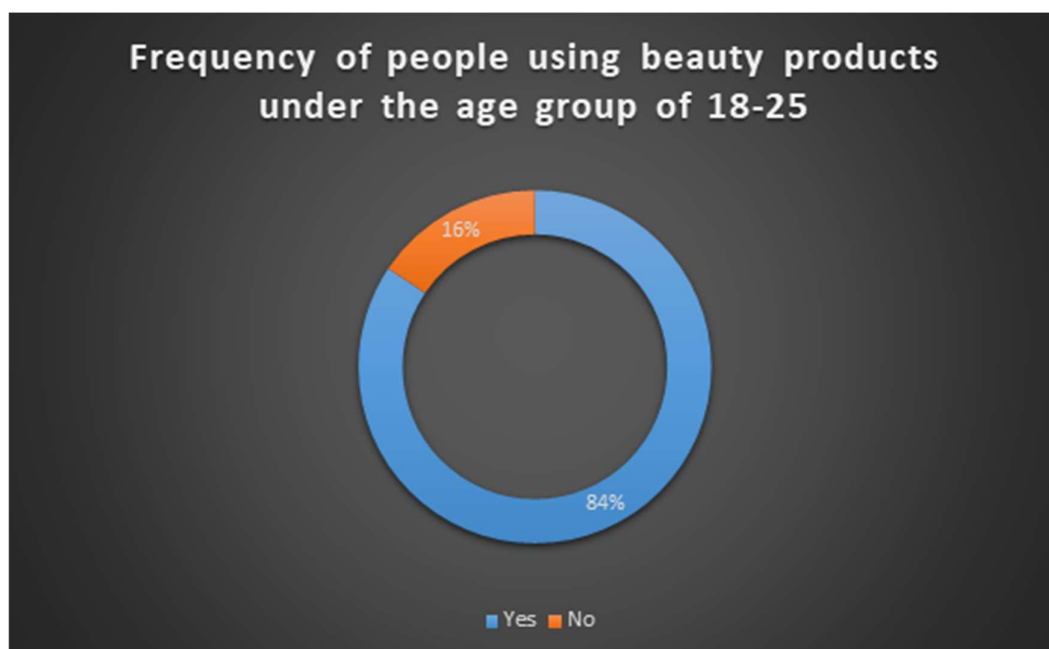

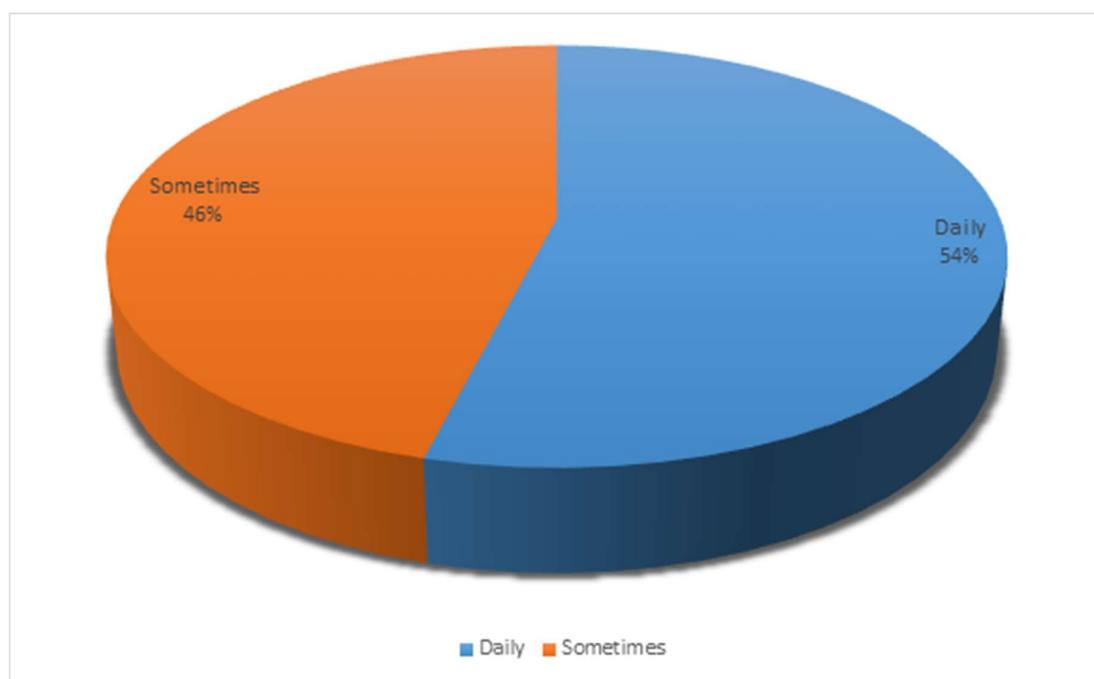Figure 3.1

Figure 3.2

Figure 3.3

Figure 3.4: Pie chart representation of the usage of beauty products (daily/sometimes) among the age group of 18-25
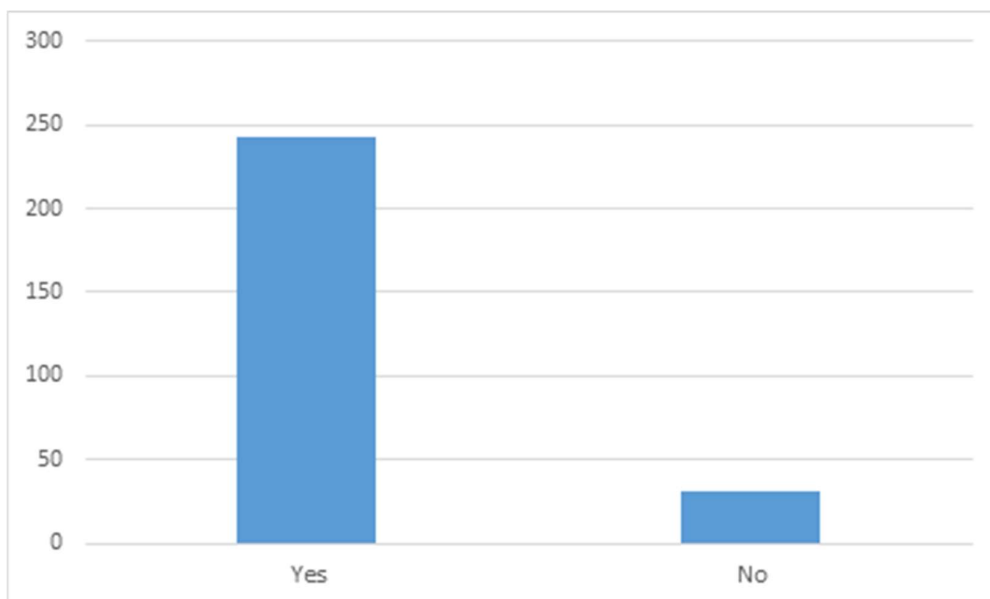
Figure 3.5: Bar graph comparing the frequency of females using the beauty products to the frequency of females not using the beauty products.
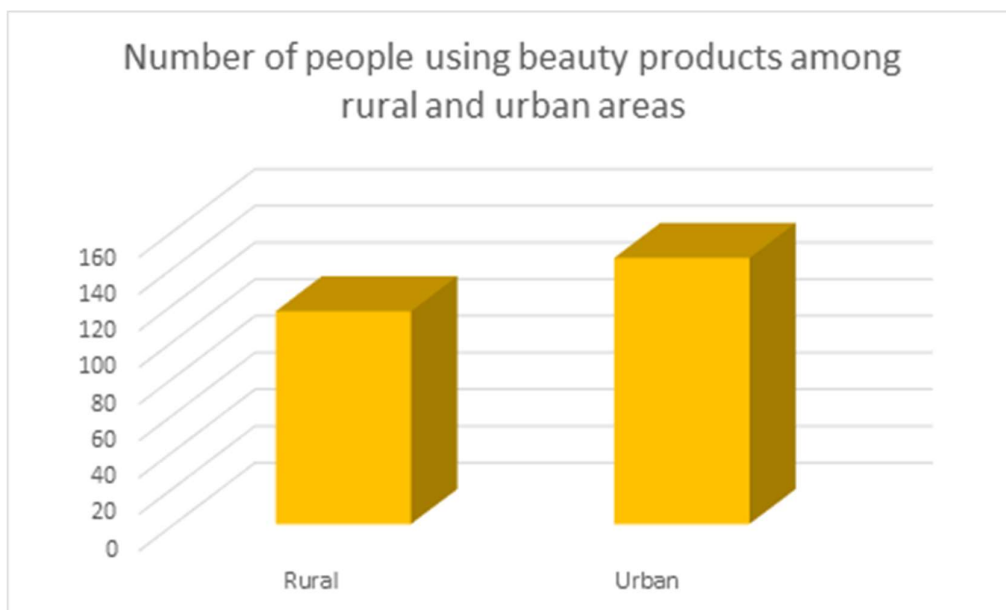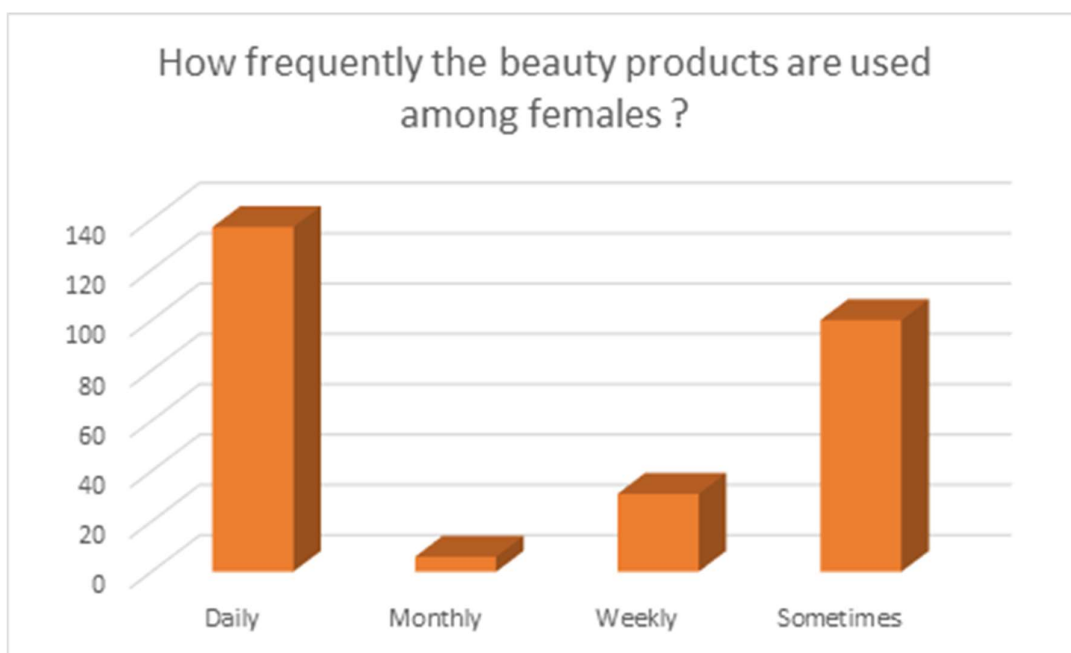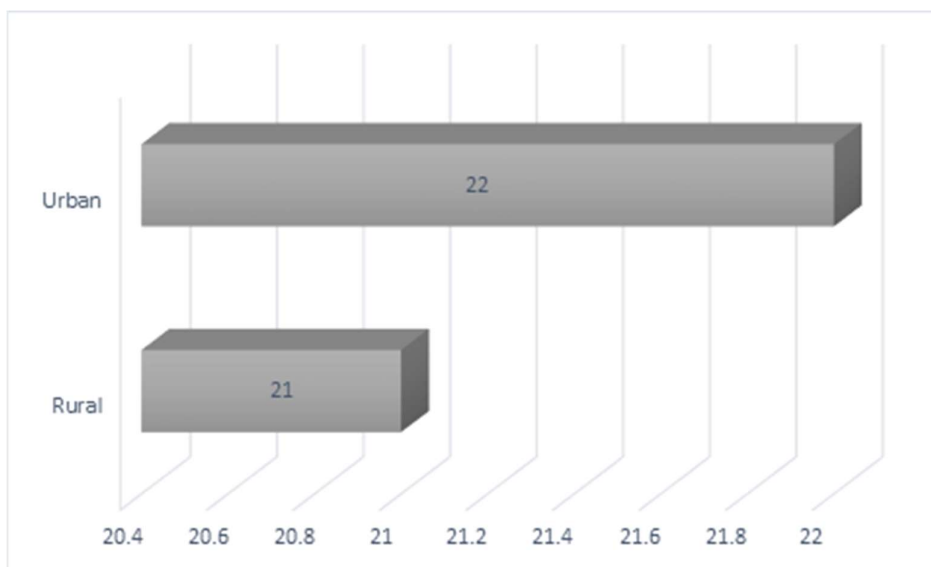

Figure 3.6

Figure 3.7

Figure 3.8

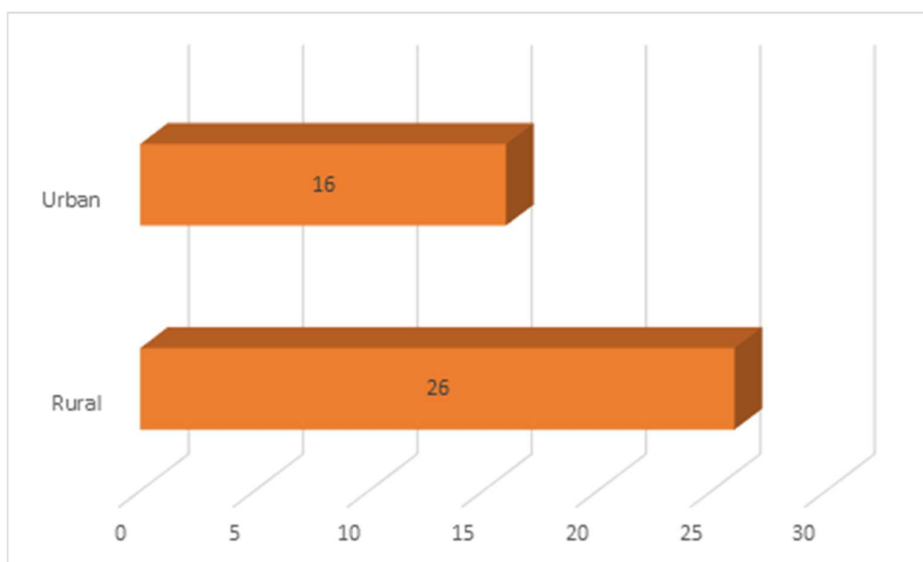Figure 3.9: Bar graph comparing the makeup preference of people between the urban and rural areas.

Figure 3.10: Bar graph comparing the haircare preference of people between the urban and rural areas.

3.2 CHI-SQUARE TEST

TEST 1

H_0: There is no significant association between the mode of purchase(online/offline) and satisfaction.

H_1: There is a significant association between the mode of purchase(online/offline) and satisfaction.

Where do you typically purchase the beauty products? * Are you satisfied with your mode of purchase? Crosstabulation

			Are you satisfied with your mode of purchase?		Total
			No, I am not that much satisfied	Yes, I am satisfied	
Where do you typically purchase the beauty products?	Offline	Count	25	143	168
		Expected Count	20.1	147.9	168.0
	Online	Count	12	129	141
		Expected Count	16.9	124.1	141.0
Total		Count	37	272	309
		Expected Count	37.0	272.0	309.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.951[a]	1	.086		
Continuity Correction[b]	2.378	1	.123		
Likelihood Ratio	3.025	1	.082		
Fisher's Exact Test				.113	.060
N of Valid Cases	309				

P VALUE = 0.086

Since the P value is greater than 0.05, we will accept the null hypothesis. Hence, we can conclude that there is no significant association between the mode of purchase(online/offline) and satisfaction.

TEST 2

H_0: There is no significant difference between the online and offline shoppers regarding the factors influencing their purchase decisions

H_1: There is significant difference between the online and offline shoppers regarding the factors influencing their purchase decisions

Where do you typically purchase the beauty products? * What factors influence you more in your purchase decision? (You can choose a maximum of two options) Crosstabulation

			What factors influence you more in your purchase decision? (You can choose a maximum of two options)			Total
			Affordable	Affordable, Quality	Quality	
Where do you typically purchase the beauty products?	Offline	Count	11	72	62	145
		Expected Count	23.6	76.4	45.0	145.0
	Online	Count	34	74	24	132
		Expected Count	21.4	69.6	41.0	132.0
Total		Count	45	146	86	277
		Expected Count	45.0	146.0	86.0	277.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	28.025[a]	2	.000
Likelihood Ratio	29.132	2	.000
N of Valid Cases	277		

P VALUE = 0.000

Since the P value is less than 0.05, we will reject the null hypothesis. Hence, we can conclude that there is a significant difference between the online and offline shoppers regarding the factors influencing their purchase decisions.

TEST 3

H_0: There is no association between preference for buying beauty products and inclusivity in representing various beauty aspects (like skin tone, hair textures, etc.)

H_1: There is an association between preference for buying beauty products and inclusivity in representing various beauty aspects (like skin tone, hair textures, etc.)

Do you tend to change your preference in purchasing certain beauty products according to the beauty trends? * Do you prefer buying beauty products that include all kinds of beauty like various skin tones, hair textures, etc.? Crosstabulation

			Do you prefer buying beauty products that include all kinds of beauty like various skin tones, hair textures, etc.?		Total
			No	Yes	
Do you tend to change your preference in purchasing certain beauty products according to the beauty trends?	No	Count	82	103	185
		Expected Count	67.7	117.3	185.0
	Yes	Count	31	93	124
		Expected Count	45.3	78.7	124.0
Total		Count	113	196	309
		Expected Count	113.0	196.0	309.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.952[a]	1	.001		
Continuity Correction[b]	11.133	1	.001		
Likelihood Ratio	12.260	1	.000		
Fisher's Exact Test				.001	.000
N of Valid Cases	309				

P VALUE = 0.001

Since the P value is less than 0.05, we will reject the null hypothesis. Hence, we can conclude that there is an association between preference for buying beauty products and inclusivity in representing various beauty aspects (like skin tone, hair textures, etc.)

TEST 4

H_0: There is no significant association between the consumer concerns about health risks associated with beauty product ingredients and their preference for natural, organic or cruelty free products.

H_1: There is significant association between the consumer concerns about health risks associated with beauty product ingredients and their preference for natural, organic or cruelty free products.

Are you concerned about health risks associated with certain beauty product ingredients? * Do you prefer buying beauty products labeled as "natural", "organic" or "cruelty-free" products than ordinary beauty products? Crosstabulation

			Do you prefer buying beauty products labeled as "natural", "organic" or "cruelty-free" products than ordinary beauty products?		Total
			No	Yes	
Are you concerned about health risks associated with certain beauty product ingredients?	No	Count	6	16	22
		Expected Count	5.2	16.8	22.0
	Yes	Count	67	220	287
		Expected Count	67.8	219.2	287.0
Total		Count	73	236	309
		Expected Count	73.0	236.0	309.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.175[a]	1	.676		
Continuity Correction[b]	.025	1	.875		
Likelihood Ratio	.169	1	.681		
Fisher's Exact Test				.613	.422
N of Valid Cases	309				

P VALUE = 0.676

Since the P value is greater than 0.05, we will accept the null hypothesis. Hence, we can conclude that there is no significant association between the consumer concerns about health risks associated with beauty product ingredients and their preference for natural, organic or cruelty free products.

3.3 CORRELATION

Here we check whether there is a correlation between individual preferences in beauty product purchasing and the influence of beauty trends

	Do you follow beauty trends?	Do you tend to change your preference in purchasing certain beauty products according to the beauty trends?
Do you follow beauty trends?	1	
Do you tend to change your preference in purchasing certain beauty products according to the beauty trends?	0.577614	1

There exists a positive correlation between individuals changing their preference in purchasing beauty products and following beauty trends. As beauty trends evolve, there appears to be a corresponding shift in consumer preferences for beauty products. This alignment underscores the influence of trends on consumer choices, emphasizing the interconnected nature of evolving beauty standards and purchasing behaviors.

3.4 ANOVA TEST

H_0: There is no significant difference in preferences between foreign and Indian groups regarding affordability, availability, quality, and effectiveness.

H_1: There is significant difference in preferences between foreign and Indian groups regarding affordability, availability, quality, and effectiveness.

Anova:
Single
Factor

SUMMARY

Groups	Count	Sum	Average	Variance
Column 1	138	214	1.550725	0.77478
Column 2	171	325	1.900585	1.195941

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	9.34772	1	9.34772	9.273566	0.002526	3.871927
Within Groups	309.4549	307	1.007996			
Total	318.8026	308				

Since the calculated value F > F critical, we reject the null hypothesis. That is, there is no significant difference in preferences between foreign and Indian groups regarding affordability, availability, quality, and effectiveness.

3.5 PROPORTION TEST

TEST 1

H_0: Proportion of people preferring beauty products labeled as "natural", "organic" or "cruelty-free" products than ordinary beauty products among rural and urban area are the same.

H_1: Proportion of people preferring beauty products labeled as "natural", "organic" or "cruelty-free" products than ordinary beauty products among rural and urban area are not the same.

$n_1 = 141$

$n_2 = 168$

$p_1 = \dfrac{118}{141} = 0.837$

$p_2 = \dfrac{118}{168} = 0.702$

$P = \dfrac{(n_1)(p_1)+(n_2)(p_2)}{n_1+n_2}$

$P = \dfrac{(141)\left(\frac{118}{141}\right)+(168)\left(\frac{118}{168}\right)}{141+1}$

$P = 0.764$

$Z = \dfrac{(p_1-p_2)-(P_1-P_2)}{\sqrt{p(1-p)\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$

$$Z= \frac{(0.837-0.702)-(0)}{\sqrt{0.764(1-0.764)\left(\frac{1}{141}+\frac{1}{168}\right)}}$$

$Z=$ 2.79

Test statistic= 2.79

Table value of Z at 5% level of significance is 1.96.

The calculated value of Z (2.79) is greater than the table value numerically.

Therefore, we reject H_0 and conclude that the proportion of people preferring beauty products labeled as "natural", "organic" or "cruelty-free" products than ordinary beauty products among rural and urban area are not the same.

Chapter 4

RESULTS AND CONCLUSIONS

4.1 OBSERVATIONS

We've nearly received 309 responses from the Google Form. 88% of the respondents in the research are female and 11% are male. Approximately 54% of responses came from urban areas and rest 46% from rural ones. The majority of the respondents are under the age group 18-25. Almost 84% of the respondents use some kind of beauty product in their daily life. For almost 46% of the respondents, online is the frequent mode of purchase whereas for the rest 54%, it is offline.

The survey also indicated that skincare products (63%) are the most commonly used, followed by haircare (14%), makeup (14%) and body care (9%) products. It was observed that 36% of the respondents follow beauty trends and among that 78% tend to change their preference in purchasing certain beauty products according to the beauty trends. Almost 55% of the people find influencer recommendations the most effective advertisement channel followed by online advertisements (35%) and television commercials (10%). Our survey also indicated that almost 93% of people are concerned about health risks associated with certain beauty product ingredients. In addition to that, 76% of respondents prefer beauty products labeled as "natural," "organic" or "cruelty-free" products than ordinary beauty products. Also, almost 55% prefer Indian beauty products whereas the rest 45% prefer foreign beauty products.

4.2 FINDINGS

In conclusion, our analysis aimed to understand the factors influencing the frequency and types of beauty products used among respondents. Gender, age, and place of residence were identified as key variables. The findings indicate that a significant portion of respondents use beauty products, with usage frequency varying from daily to occasionally. Skincare products were the most frequently used, followed by haircare, makeup, and body care products. These preferences may be influenced by factors such as gender, age, and urban or rural residence. Our study also aimed to

analyze consumer purchasing behavior regarding beauty products. The findings reveal that a considerable number of consumers typically purchase beauty products online, with satisfaction levels varying among respondents. Quality emerged as the most influential factor in purchase decisions, followed by affordability and attractiveness. It was also found that a significant portion of respondents doesn't follow beauty trends . Also, a significant portion are influenced by it when making purchasing decisions. Furthermore, a notable number of individuals feel pressured to conform to societal beauty standards. However, there is a preference among consumers for beauty products that embrace diversity, including various skin tones and hair textures.

Our analysis also aimed to evaluate the effectiveness of different advertising channels in promoting beauty products. The findings indicate that a considerable number of respondents have made purchases influenced by advertisements they saw or heard, suggesting the impact of advertising on consumer behavior. Among the advertising channels, online advertisements and influencer recommendations were perceived as the most effective in influencing beauty product purchases. Additionally, most respondents believe that advertising and marketing channels significantly impact the popularity and usage of beauty products. This highlights the importance of strategic marketing efforts in the beauty industry to effectively reach and engage consumers.

The results of every chi square test that was performed is as follows:

TEST 1: We concluded that there is no significant association between the mode of purchase (online/offline) and satisfaction. It suggests that whether someone buys a product online or offline doesn't have a significant impact on their satisfaction level with the purchase.

TEST 2: We concluded that there is a significant difference between the online and offline shoppers regarding the factors influencing their purchase decision. This means that the factors that influence someone's decision to make a purchase vary depending on whether they are shopping online or in a physical store.

TEST 3: We also aimed to analyze the preference of people to buy beauty products that include all kinds of beauty like various skin tones, hair textures, etc. After applying chi square test, we got a conclusion that there is a significant association between preferences for buying beauty products and inclusivity in representing various beauty aspects. This suggests that there is a notable connection between people's preferences for purchasing beauty products and their desire for those products to represent diverse aspects of beauty.

TEST 4: We concluded that there is no significant association between the consumer concerns about health risks associated with beauty product ingredients and their preference for natural,

organic or cruelty free products. This statement suggests that consumer's concerns about health risks related to beauty product ingredients do not strongly influence their preference for natural, organic, or cruelty-free products.

We also checked whether there is a correlation between individual preferences in beauty product purchasing and the influence of beauty trends. We concluded that there exists a positive correlation between individuals changing their preference in purchasing beauty products and following beauty trends. As beauty trends evolve, there appears to be a corresponding shift in consumer preferences for beauty products.

We applied ANOVA test to check whether there is a significant difference in preferences between foreign and Indian groups regarding affordability, availability, quality, and effectiveness. From this, we got a conclusion that there is no significant difference in preferences between foreign and Indian groups regarding affordability, availability, quality, and effectiveness. This suggests that both foreign and Indian groups have similar preferences when it comes to factors like affordability, availability, quality, and effectiveness.

We conducted proportionality test to check whether the proportion of people preferring beauty products labeled as "natural", "organic" or "cruelty-free" products than ordinary beauty products among rural and urban areas are the same. From the test conducted, we got the calculated value as 2.79 which is greater than the table value 1.96. Therefore, we concluded that the proportion of people preferring beauty products labeled as "natural", "organic" or "cruelty-free" products than ordinary beauty products among rural and urban areas are not the same.

4.3 CONCLUSION

Based on the observations, it is evident that most respondents are young females under the age group 18-25. People living in rural areas might have different preferences for various types of beauty products compared to those living in urban areas. This difference could stem from various factors such as lifestyle, access to information, environmental concerns, or cultural influences. Most people have a significant interest in beauty products, particularly skincare. Online channels play a crucial role in their purchasing decisions, with influencer recommendations being highly influential. Health consciousness is prevalent, as seen in the preference for natural and organic

products. Additionally, there's a notable preference for Indian beauty products. Overall, the data suggests a strong market potential for online beauty products and "natural", "organic" or "cruelty-free" products. Overall, these findings highlight the diverse preferences and concerns within the beauty consumer market, indicating opportunities for brands to cater to specific demographics and preferences.

We conducted various tests such as chi-square, ANOVA, Proportionality test for the analysis and the following conclusions were made: We learned that regardless of how someone buys a product (online/offline), they are equally likely to be satisfied or dissatisfied with it. We also learned that the factors influencing the purchase decisions of online shoppers differ significantly from those influencing offline shoppers. Also, consumers are more inclined to buy beauty products from brands that embrace and showcase a wide range of beauty standards, which includes different skin tones, hair types etc. Despite consumer concerns about health risks associated with beauty product ingredients, these concerns do not strongly drive their preference for natural, organic, or cruelty-free products. Beauty trends and consumer preferences often go hand in hand. As new trends emerge, consumers tend to seek out products that align with those trends, whether it's skincare, makeup, haircare, or other beauty products. There is no significant difference in preferences between foreign and Indian groups regarding affordability, availability, quality, and effectiveness. People from both groups prioritize these aspects similarly when making decisions. A larger proportion of rural people prefer beauty products labeled as "natural", "organic", or "cruelty-free" compared to the urban group. Ultimately, these insights underscore the need for beauty brands to adapt and tailor their offerings to meet the diverse needs and desires of consumers in an ever-evolving market landscape.

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ANNEXURE

STATISTICAL ANALYSIS OF FACTORS IMPACTING BEAUTY PRODUCT CONSUMPTION

We, the students of 3rd BSc Mathematics, St. Teresa's college(Autonomous)Ernakulam, are conducting a statistical survey on the factors impacting beauty product consumption.

Gender *

○ Male

○ Female

Age *

○ 10-18

○ 18-25

○ 25-40

○ Above 40

Place of residence *

○ Urban

○ Rural

Where do you typically purchase the beauty products? *

○ Online

○ Offline

How far effective is the mode of purchase? *

○ Yes, it is effective

○ No, it is not that much effective

How did you made your purchase decision? *

○ Quality

○ Quantity

○ Affordable

○ Attractive

How frequently do you use beauty products? *

○ Daily

○ Weekly

○ Monthly

○ Sometimes

Which type of beauty products do you frequently use? *

○ Skincare

○ Haircare

○ Makeup

○ Bodycare

Do you tend to change your *
preference in purchasing certain
beauty products according to the
beauty trends?

○ Yes

○ No

Do you follow beauty trends? *

○ Yes

○ No

Do you prefer buying beauty *
products that show and celebrate
diverse kinds of beauty?

○ Yes

○ No

Do you often feel pressured to *
conform to societal beauty
standards?

○ Yes

○ No

Have you ever made any *
purchase on beauty products by
the impact of an advertisement
you saw or heard?

○ Yes

○ No

Which advertising channels do *
you find most effective in
influencing your beauty product
purchases?

○ Television commercials

○ Online advertisements

○ Influencer's recommendations

In your opinion, how much does an advertising and marketing impact the popularity and usage of beauty products? *

○ Significantly

○ Moderately

○ Slightly

○ Not at all

Are you concerned about health risks associated with certain beauty product ingredients? *

○ Yes

○ No

How likely are you to choose beauty products labeled as 'natural', 'organic' or 'cruelty-free'? *

○ Most likely

○ Likely

○ Not likely

Have you used both foreign and Indian beauty products? *

○ Only foreign products

○ Only Indian products

○ Both

Which origin of beauty products do you prefer? *

○ Foreign

○ Indian

What is the key to your preference? *

◯ More affordable

◯ Easily available

◯ Quality

◯ More effective

Are you satisfied with your current beauty products? *

◯ Yes

◯ No

If no, on what basis do you prefer your ideal beauty product to be improved?

○ More affordable

○ Easily available

○ More concentration on natural ingredients

○ More quantity

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