



Exploratory Data Analysis on Consumer Acceptance Post Covid 19 Pandemic for Herbal Antimicrobial Sheets

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Abstract : The rise in the disposable incomes are driving an increase in the demand for luxury home textiles. In India, factors such as the rise in the number of households and the expansion of home textile companies are also contributing to the market's expansion. Functional Home furnishing represents one of the most globalized industries. It has gained significant research attention in the field of home textiles and technology innovations. To make our production and consumption systems more sustainable, there is a need to further explore and support innovative home linen with higher sustainability potential.

The purpose of this study was to investigate the demand, perception, awareness, and preferences of consumers regarding the usage of herbal antimicrobial bedsheets following the COVID-19 epidemic. Using a structured questionnaire that elicited both open-ended and closed-ended replies, 251 respondents were sampled using a purposive sampling technique. The questionnaire was pretested and revised, and additional information was gathered through conversations with consumers. After the COVID-19 pandemic, the findings of this study provided useful insights into the market potential for herbal antimicrobial bedsheets. According to the findings, consumers, particularly those with higher incomes and younger age groups, have a strong demand for these products. In addition, the study emphasises the significance of awareness and perception in affecting the preferences and purchase decisions of consumers. In the post-pandemic period, the findings of the study can help manufacturers and retailers build effective marketing strategies and product developments to meet the changing needs of consumers.

IndexTerms - Antibacterial, Antifungal, Antiviral, Bedsheets, Commercial viability, Home textiles.

1.0 INTRODUCTION

Since the COVID-19 epidemic, people everywhere have realised how critical it is to practise good hygiene to stop the spread of disease. Considering growing evidence that it harbours bacteria, viruses, and other germs, bed linen has come under closer investigation. The production of antimicrobial bedsheets by corporations has helped to lessen the spread of bacteria. As a direct result of the epidemic, there has been a dramatic increase in the demand for antimicrobial bedsheets. Silver, Copper, Neem Tulsi etc. are all examples of compounds that have antimicrobial characteristics, meaning they may kill or stop the growth of bacteria and viruses. These sheets are antimicrobial, eliminate odours, and last for a long time, all of which contribute to a healthier sleeping environment and reduced likelihood of disease. Notwithstanding these benefits, antimicrobial bedsheets have drawn criticism for safety, effectiveness, and expense. This study focusses on the latest developments in antimicrobial sheeting technology and how they stack up against consumer desires in the wake of COVID-19.

1.1 OBJECTIVES OF THE STUDY.

- To explore whether consumers prefer antimicrobial sheets.
- To comprehend reasons for the use of antimicrobial bed linens.
- To investigate the role of income, in shaping consumers' spending habits.
- To assess the consumers' knowledge about fabric finishes

2.0 Research Design and Methodology

To obtain the data, a structured questionnaire was distributed using a technique of purposive sampling. The survey was initially tested and subsequently modified. Several questions were amended, while others were added. Interactions with consumers assisted in generating extra information. Standardized questionnaires were used to obtain the data. In the present study, a questionnaire was used

to gather data since it is efficient, all participants were given an equal opportunity to express their opinions, and it is most suitable for the intended market. Respondents were informed of the goal of the survey, and their participation was entirely voluntary. So that respondents may respond at their convenience, the poll was administered online. Regarding facts and opinions, the questionnaire was designed to elicit both open-ended and closed-ended responses. A cross-sectional study was conducted utilising an online survey to collect the responses of 251 participants. After the COVID-19 pandemic, it was undertaken to determine the amount of demand and acceptance for herbal antimicrobial bedsheets, as well as customers' perceptions, knowledge, and preferences regarding their use. Analysis was performed using SPSS software for Windows (version 25, 2007, IBM Corporation, Armonk, New York, United States). The primary characteristics of the data were customer demographics such as gender, socioeconomic status, level of education, preference for functional finish, and choice for finish type.

3.0 RESULTS AND DISCUSSION

3.1 Demographic data

From the 251 participants, 34 were males and 217 were females. From the 251 participants, 143 had annual income of < 10 lakh rupees whereas 108 had annual income of 10 lakhs or more. More study participants were graduates or more. Minimum age of study participants was 18 years and maximum age was 74 years. Mean age of study participants was 37.5 ± 13.8 years. From 251, 149 were ≤ 40 years whereas 102 were ≥ 41 years.

3.2 Preferred mode for buying bedsheets:

Out of the 251 people who took part in the survey, 8 (3.2%) chose to buy bedsheets online, 120 (47.8%) liked to buy bedsheets offline, and 123 (49%) wanted to buy bedsheets both offline and online. As a result, we can say that customers of today appreciate the omni channel strategy more since it better meets their needs and requirements.

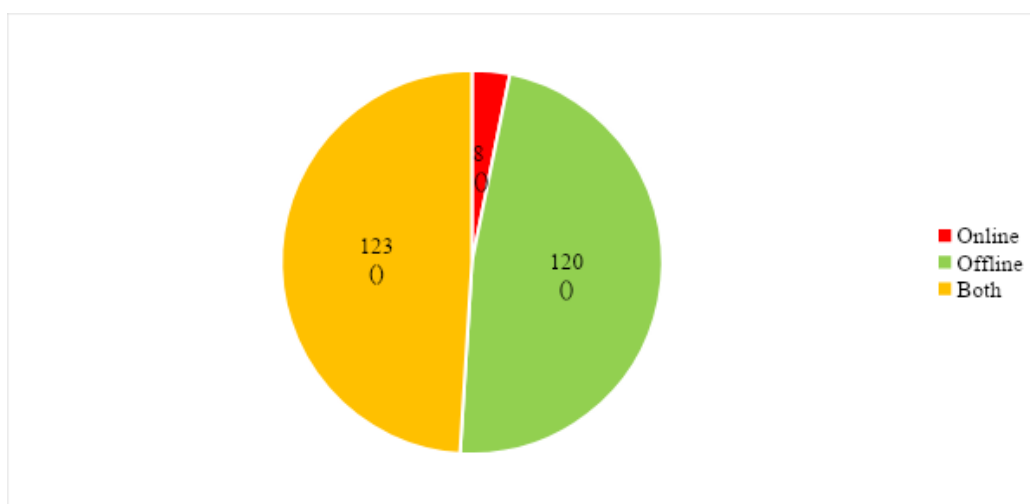


Figure 1: Preferred mode of buying bedsheets

Data presented as frequency (percentage)

Between income groups: There was a significant association of income and preference of buying online ($p < 0.05$). Significantly higher percentage participants with income of 10 lakhs or more preferred to shop both offline and online whereas significantly higher percentage of participants with income less than 10 lakhs preferred to shop offline as compared to the other group. This indicates that participants with higher income preferred both methods of shopping whereas those with lesser income preferred to shop offline more.

Between age groups: When classified according to age, there was no significant difference in preference of shopping between participants aged ≤ 40 years and those aged ≥ 41 years ($p > 0.05$). This indicates shopping preferences were similar in participants of both age groups.

3.3 Brands of bedsheets used

Figure 2 indicates the brands of bedsheets that respondents usually bought. The most purchased brand of bedsheets was Bombay Dyeing (66.9%) whereas the least common brand purchased was Century (13.1%). About 18 reported to buying other brands than those listed in the form such as Jaipuri prints, Huseland, Flamingo, Westside, Chumbak, Kutch Block Prints, Eurotex, Blocks of India, IKEA, Godrej and DMart. Even though numerous new brands have entered the market, Bombay dyeing has maintained its market position. This may be the result of brand loyalty. Occasional product innovation could be another factor for customers' high demand.

Between income groups: Significantly higher percentage of participants with income of 10 Lakhs or more used bedsheets from Bombay Dyeing, Welspun, D'décor, Century and Spaces as compared to participants with income less than 10 lakhs ($p < 0.05$). On the other hand, significantly higher percentage of participants with income of less than 10 lakhs used bedsheets from Reliance as compared to participants with income of 10 Lakhs or more ($p < 0.05$). This indicates that higher percentage of participants with 10 lakhs or more preferred bedsheets from Bombay Dyeing, Welspun, D'décor, Century and Spaces whereas higher percentage of participants with income of 10 lakhs or less preferred bedsheets from Reliance.

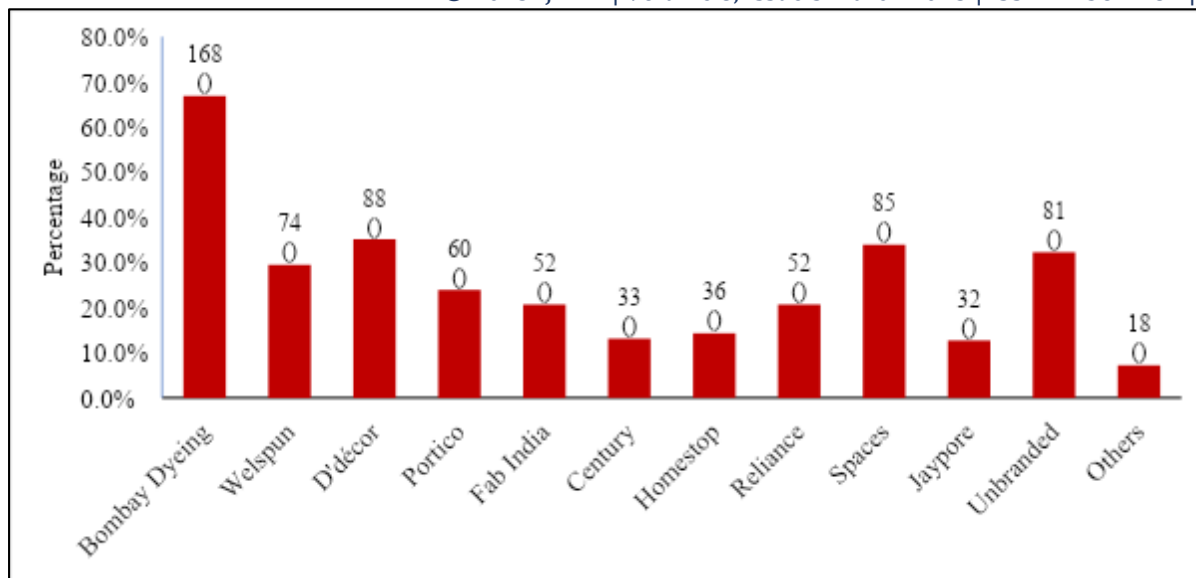


Figure 2: Brands of bedsheets used participants

Data presented as frequency (percentage)

Between age groups:

When compared to individuals aged 40 years, people aged ≥ 41 years utilised bedsheets manufactured by Welspun, Portico, and Century at a much larger percentage than participants aged ≤ 40 years. On the other hand, a considerably larger percentage of participants aged ≤ 40 years used bedsheets from D'décor, Fab India, and Reliance than participants aged ≥ 41 years ($p < 0.05$). This was the case when comparing the two age groups. This suggests that a greater number of the younger respondents liked D'décor, Fab India, and Reliance bedsheets, whilst a greater percentage of senior people selected Welspun, Portico, and Century bedsheets.

3. 4 Awareness about anti-microbial bedsheets:

Participants were asked to rate their level of awareness regarding anti-microbial bedsheets on a scale of 1 to 5 where 1 meant very little awareness whereas 5 meant complete awareness. Figure 3 gives details about awareness about anti-microbial bedsheets amongst the study participants. From the 251 participants, 89 reported 1 or very little for awareness level regarding anti-microbial bedsheets i.e., 89 had very little awareness, 45 reported 2 or little as level of awareness, 63 reported 3 or average as level of awareness, 34 reported 4 or good as level of awareness and 20 reported 5 or complete as their level of awareness regarding anti-microbial bedsheets i.e. 20 had complete awareness. The mean awareness level was 2.4 ± 1.3 on the maximum score of 5 indicating an average awareness amongst study participants. Data presented as frequency (percentage)

Table 1 indicates level of awareness when classified according to income or age.

Between income groups: There was no significant correlation between degree of knowledge about anti-microbial bedsheets and income ($p > 0.05$), meaning that a similar proportion of participants in both income groups rated their level of awareness similarly. The mean degree of knowledge was comparable across both income categories (less than 10 lakhs had a mean level of awareness of 2.71.3, whereas 10 lakhs or more had a mean level of 2.51.4) ($t = -0.693$, $p = 0.489$).

Between age groups: In contrast, when participants were categorised according to age, a greater proportion of participants 41 years old assessed 1 (i.e. very little) as their degree of knowledge of anti-microbial bed sheets than participants 40 years old; nevertheless, the cross tabulation p value was not significant ($p > 0.05$). However, when the mean score of awareness was compared between the two groups, participants aged 40 years had a significantly higher mean value than participants aged 41 years ($t = 2.633$, $p = 0.009$), indicating that younger participants were more aware of antimicrobial bed sheets than their elder counterparts.

Table 1: Level of awareness when classified according to income or age

| | Less than 10 lakhs | | 10 lakhs or more | | P value |
|-----------------|-------------------------|------|-------------------------|------|---------|
| | Freq. | % | Freq. | % | |
| 1 (Very Little) | 50 | 35 | 39 | 36.1 | 0.534 |
| 2 (Little) | 30 | 21 | 15 | 13.9 | |
| 3 (Average) | 36 | 25.2 | 27 | 25 | |
| 4 (Good) | 16 | 11.2 | 18 | 16.7 | |
| 5 (Complete) | 11 | 7.7 | 9 | 8.3 | |
| | ≤ 40 years (n=149) | | ≥ 41 years (n=102) | | P value |
| | Freq. | % | Freq. | % | |
| 1 (Very Little) | 43 | 28.9 | 46 | 45.1 | 0.099 |
| 2 (Little) | 27 | 18.1 | 18 | 17.6 | |
| 3 (Average) | 42 | 28.2 | 21 | 20.6 | |
| 4 (Good) | 23 | 15.4 | 11 | 10.8 | |
| 5 (Complete) | 14 | 9.4 | 6 | 5.9 | |

There was a significant difference ($F = 3.33$, $p < 0.05$) in the mean score for awareness of antimicrobial bed sheets based on educational level. The awareness of postgraduates on anti-microbial bedsheets was substantially greater than that of graduates ($p < 0.05$). No additional significant differences in mean degree of awareness were identified based on education level. This suggests that education influences awareness of antimicrobial bedsheets, with postgraduates having the highest levels of awareness.

Table 2: Association of participants' qualification with awareness regarding anti-microbial bedsheets

| | N | Mean±SD | P value |
|---------------|-----|---------|---------|
| Undergraduate | 28 | 2.3±1.1 | 0.020 |
| Graduate | 101 | 2.1±1.2 | |
| Post graduate | 107 | 2.7±1.4 | |
| Any other | 15 | 2.5±1.4 | |

3.5 Source of information about anti-microbial finish bedsheets:

The many places where one may find information on anti-microbial coatings on bedsheets are outlined in Figure 4. Participants who learned about anti-microbial bedsheets via friends made up the largest proportion of the sample (43.8%), while those who learned about them from Facebook made up the smallest proportion (9.6%). About 37 people said that they learned about anti-microbial bedsheets from other sources, such as the syllabus of a course at their institution, commercials on television, articles on the internet, family members, or store owners when they went to buy bedsheets.

Comparing participants with different levels of income, we found that a significantly larger percentage of those with incomes of less than Rs.10 lakhs learned about anti-microbial finish through Instagram compared to those with incomes of Rs.10 lakhs or more ($p < 0.05$). When individuals were divided into groups according to their wealth, researchers found no additional significant variations in the sources of knowledge regarding anti-microbial finishes ($p > 0.05$). This suggests that participants with incomes of less than 10 lakhs use Instagram more frequently and consider it a source of information, whereas participants with higher incomes use all other methods to the same extent as a source of information regardless of their level of wealth.

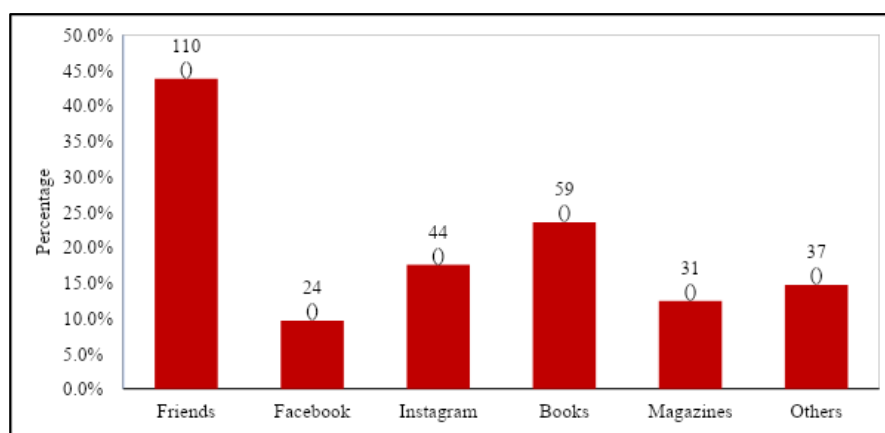


Figure 3: Source of information about anti-microbial finish

Data presented as frequency (percentage)

When the participants were grouped according to their ages, a substantially larger percentage of participants aged 41 years claimed that they learned about anti-microbial finishes through Facebook in comparison to individuals aged ≤ 40 years ($p < 0.05$). This was the case across all age groups. On the other hand, as compared to participants aged ≥ 41 years, those participants aged 40 years reported a considerably larger proportion that they learned about anti-microbial finishes from Instagram and books ($p < 0.05$). We could not find any additional changes that were dependent on age ($p > 0.05$). This suggests that younger individuals are more likely to rely on Instagram and books as sources of knowledge, whereas older participants were more likely to rely on Facebook.

3.6 Need bedsheets with anti-microbial finish bedsheets:

Table 3 displays the percentage of participants who reported that they needed anti-microbial bedsheets. From 251, 204 needed anti-microbial bedsheets. The results revealed that there was not a significant difference in the percentage of participants who needed anti-microbial finish bedsheets when the participants' income was categorised ($p > 0.05$). When participants' ages were compared, there was no discernible difference in the proportion of people who required bedsheets with an anti-microbial finish ($p > 0.05$).

Table 3: Percentage of participants who need anti-microbial finish bedsheets when classified according to income or age

| | Less than 10 lakhs | | 10 lakhs or more | | P value |
|-----|--------------------|------|-------------------|------|---------|
| | Freq. | % | Freq. | % | |
| Yes | 117 | 81.8 | 87 | 80.6 | 0.871 |
| No | 26 | 18.2 | 21 | 19.4 | |
| | ≤40 years (n=149) | | ≥41 years (n=102) | | P value |
| | Freq. | % | Freq. | % | |
| Yes | 121 | 81.2 | 83 | 81.4 | 0.999 |
| No | 28 | 18.8 | 19 | 18.6 | |

3.7 Reason for purchasing a bedsheet with anti-microbial finish:

Figure 4 illustrates the many motivations that drive participants to purchase bedsheets with an anti-microbial coating. The health and hygiene of the family was the most frequent reason given for purchasing a bedsheet with an anti-microbial finish (67.7%), while the desire to minimise the number of times a bedsheet has to be changed was the least common reason given (10.4%).

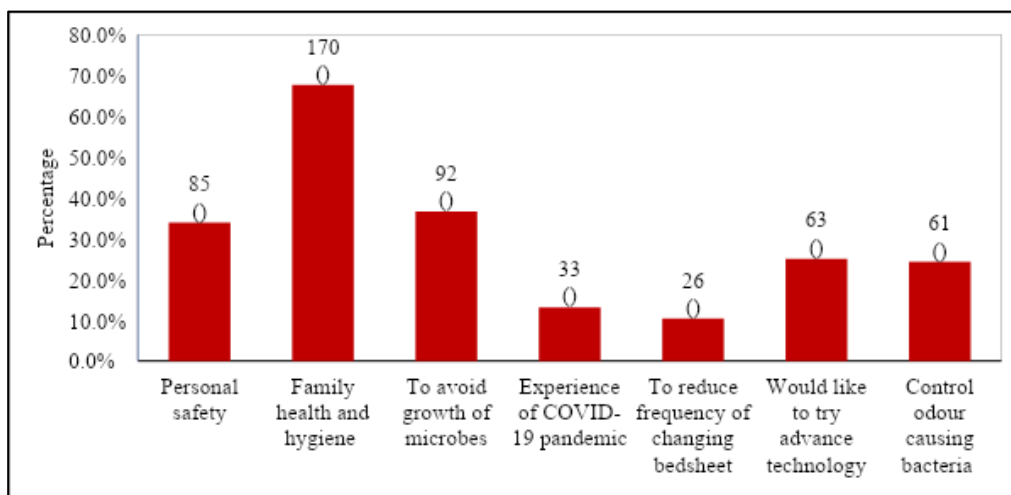


Figure 4: Reasons to purchase bedsheets with anti-microbial finish

Data presented as frequency (percentage)

The reasons why participants purchased bedsheets with an anti-microbial finish are outlined in Figure 4 and categorised according to the respondents' age and income.

Between different income brackets: When the numerous reasons to purchase anti-microbial bedsheets were categorised according to income, there was not a significant difference detected between the various reasons to acquire anti-microbial bedsheets ($p > 0.05$). This suggests that the reasons why individuals in both income categories need anti-microbial bedsheets were comparable.

Between age groups: When the participants were categorised according to their ages, a substantially larger percentage of participants aged ≤ 40 years who claimed personal safety and experience of the COVID-19 pandemic as reasons to purchase bedsheets with an anti-microbial finish than individuals aged ≥ 41 years ($p < 0.05$)

Substantially larger percentage of participants aged ≥ 41 years reported reduced frequency of changing bedsheets as a reason to purchase bedsheets with an anti-microbial finish ($p < 0.05$). We could not find any additional differences that were very important. According to the findings, a greater proportion of younger participants believed they required anti-microbial bedsheets due to concerns about personal safety and previous exposure to the COVID-19 pandemic. On the other hand, a greater proportion of older participants favoured anti-microbial bedsheets since it reduces the amount of effort required to change the sheets.

3.8 Reason for purchasing herbal bedsheet:

Figure 5 illustrates why participants purchased herbal bedsheets. The most common purpose reported for purchasing herbal bedsheets was that they are 100% organic (57%) whereas the least common reason was latest trend (6%).

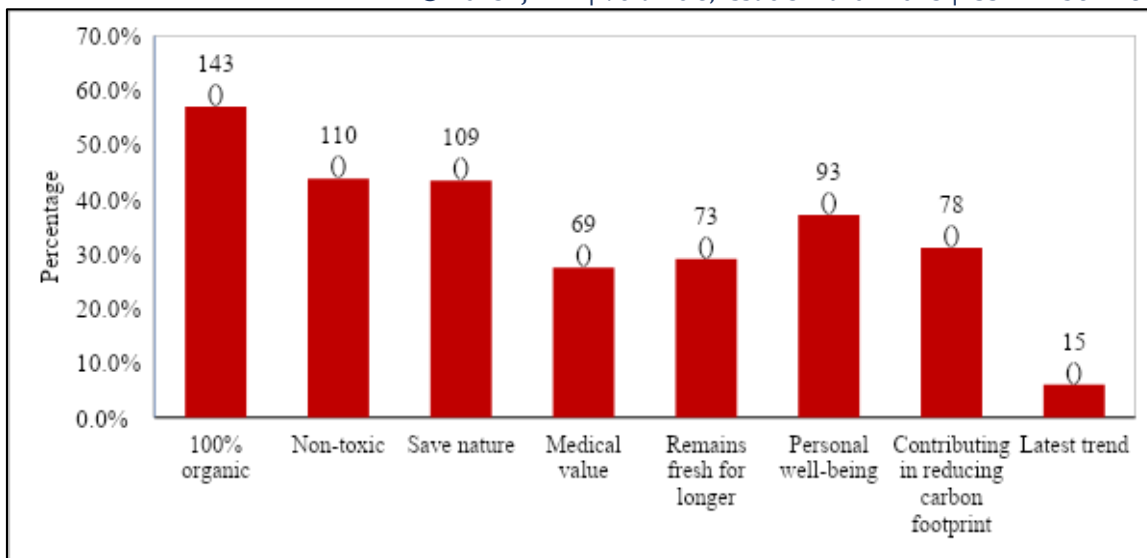


Figure 5: Reasons for purchasing herbal bedsheets

Data presented as frequency (percentage)

When participants are categorised by age or income

Between economic classes: When categorised by income, there was no significant difference between the various reasons indicated for purchasing herbal bedsheets ($p>0.05$). Thus, regardless of wealth, individuals brought herbal bedsheets for comparable reasons.

Between age groups: Statistically substantially more participants aged ≤ 40 years than those aged ≥ 41 years purchased herbal bedsheets because they are 100 percent organic and protect the environment ($p0.05$). There were no other noteworthy changes noted. This indicates that a greater proportion of younger people cared about the environment and desired organic and natural bedsheets than older ones.

3.9 Prefer herbal bedsheets over normal bedsheets

On a scale from 1 to 5, with 1 indicating not at all and 5 indicating very strongly, participants were asked to indicate how much they prefer herbal bedsheets versus standard bedsheets. (Figure 8). 20 individuals rated their preference for herbal bedsheets over standard bedsheets as 1 or not at all, 23 individuals rated their preference as 2 or somewhat, 77 individuals rated their preference as 3 or neutral, 78 individuals rated their preference as 4 or strongly, and 53 individuals rated their preference as 5 or extremely strongly. The mean preference for herbal bedsheets over conventional bedsheets was 3.5 ± 1.2 , demonstrating a substantial preference for herbal bedsheets.

3.10 Buying preferences for herbal anti-microbial bedsheets:

From the 251 participants, 226 reported that they would buy herbal anti-microbial bedsheets if it was available in market (Figure 6)

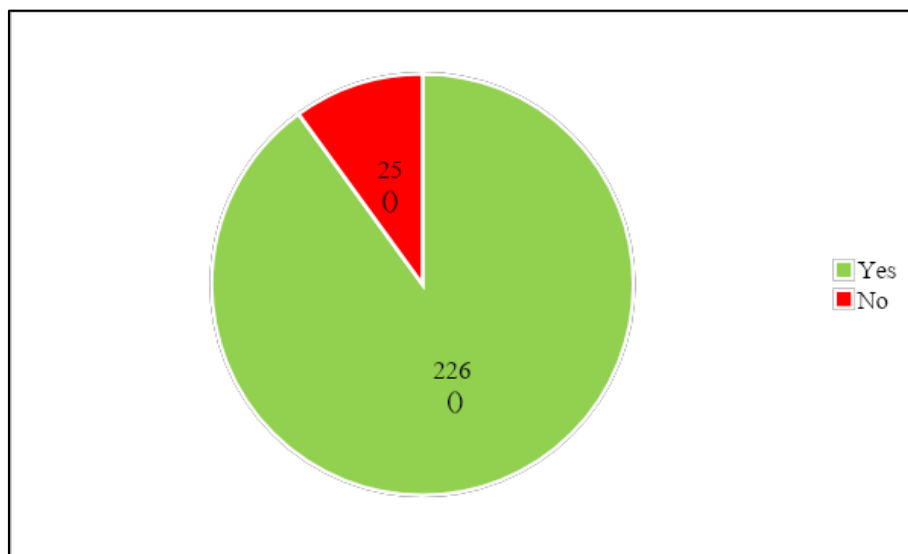


Figure 6: Buying preferences for herbal anti-microbial bedsheets

Data presented as frequency (percentage)

Figure 6 gives percentage of participants who reported they would purchase herbal anti-microbial bedsheets when classified according to income or age.

Between income groups: No significant differences were observed in percentage of participants who would buy herbal anti-microbial bedsheets when classified according to income ($p>0.05$).

Between age groups: No significant differences were observed in percentage of participants who would buy herbal anti-microbial bedsheets when classified according to age ($p>0.05$).

3.11 Willingness to pay extra for herbal anti-microbial bedsheets

Figure 10 gives the amount of money participants would be ready to pay for herbal anti-microbial finish bedsheets. Most participants are ready to pay 5 to 10% extra for herbal anti-microbial finish bedsheets. Between economic classes: When participants were categorised according to their income, a significant correlation was found between their income and the proportion of extra money they were willing to pay ($p < 0.05$). A greater proportion of participants with incomes of 10 lakhs or more were willing to pay a higher price for herbal anti-microbial bedsheets than those with incomes of less than 10 lakhs.

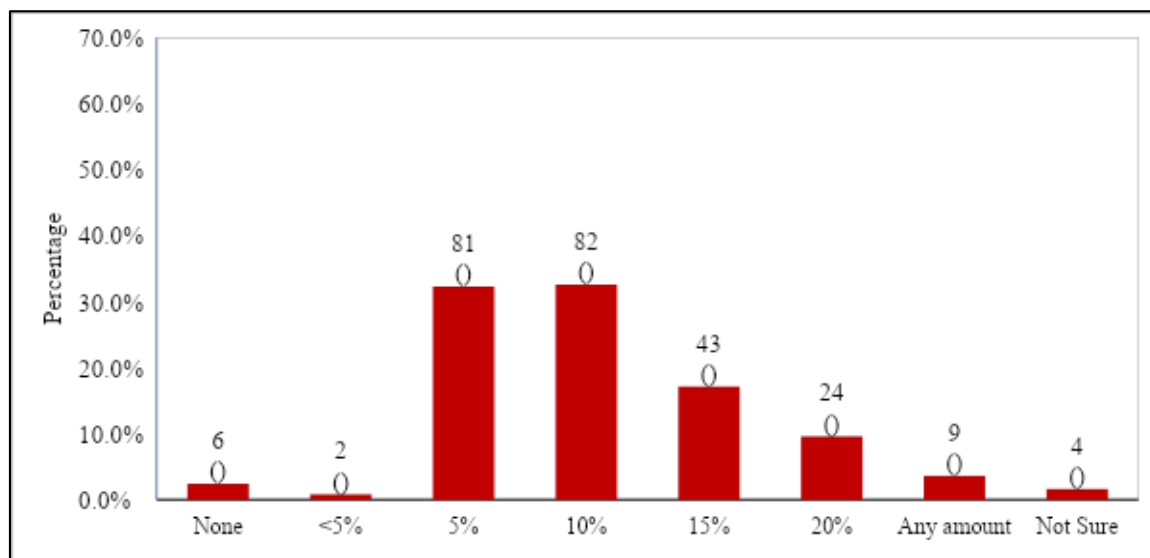


Figure 10: Willingness to pay extra for herbal anti-microbial bedsheets

Data presented as frequency (percentage)

Thus, the participant's willingness to pay for a natural antimicrobial finish is proportional to their income. The cost that participants are willing to spend for a herbal anti-microbial finish did not differ significantly between age groups ($p > 0.05$).

4.0 Conclusion:

We are able to draw the following conclusion from the research that was carried out: A sizeable proportion of respondents would rather purchase online. Ninety percent of them stated that they would purchase antimicrobial bedsheets if it were to become commercially accessible. It was discovered that Bombay Dyeing was the brand that sold the most among the respondents, and century was the brand that sold the least. The individuals aged ≤ 40 years had a substantially higher mean value for awareness in comparison to the participants aged ≥ 41 years ($t = 2.633$, $p = 0.009$), showing that younger people had greater awareness regarding antimicrobial bedsheets in comparison to older participants. Instagram was the social media platform that was utilised as a source of information by participants with incomes of less than 10 lakhs rupees the most frequently. Instagram and books are more reliable sources of knowledge for younger people, whereas older participants depend more on Facebook as a source of information. The family's health and hygiene (67.7%), as well as personal safety, was shown to be the most frequent cause, while reducing the number of times a bedsheets needs to be changed was found to be the least common reason (10.4%). The majority of respondents indicated a strong demand for anti-microbial bedding, particularly in light of their personal experiences with the COVID-19 epidemic. They were also prepared to invest an additional 5 to 10% of their budget for the additional benefit.

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