Level of Satisfaction on "Freshmen": A Mouthwash Using Rosemary and Peppermint Extracts Among Selected STI College Lucena Senior Highschool Students

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PRACTICAL RESEARCH 2

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CHAPTER I

THE PROBLEM AND ITS BACKGROUND

Introduction

Rosmarinus officinalis L. or popularly known as Rosemary is a type of bushy shrub which grows along the Mediterranean Sea, and sub-Himalayan areas. It is also a popular houseplant found in various parts around the globe. It is widely used in folk medicine as an antispasmodic, mild analgesic, and as a treatment to headaches, migraines, insomnia, and depression. (de Oliveira et al., 2019).

Meanwhile, many mouth rinses contain alcoholic concentrations between 5 - 27%. This is usually used as a solubilizer, stabilizer, preservative, anti-plaque efficacy enhancer and as a way to obtain a distinctive flavor. Mouthwashes with alcoholic concentrations between 18 - 27% also potentiate the effect of the essential oils to achieve a high penetration in soft tissues (Ustrell-Borràs et al., 2020). Additionally, while alcohol-based mouthwash products may kill germs within the short term, the high alcohol content reduces the quantity of saliva in your mouth, which ultimately makes bad breath worse, as having a lack of adequate saliva is crucial for oral health, and could increase the risk of developing gum disease and cavities significantly (Gandhi et al., 2020). To add further, regular or excessive use of alcohol-based mouthwashes can dry out your mouth, which can lead to tooth sensitivity, bad breath, and even cavities (Richard Rifkin, DMD, MAGD, n.d.).

The rosemary plant is commonly known for its many health benefits which helps heal the human body and treat illnesses. Other rosemary benefits include antimicrobial and antioxidant effects. Antioxidants being naturally occurring compounds that help protect our cells from the damaging effects of free radicals. Free radicals are highly reactive molecules that can cause cellular damage and inflammation, which can contribute to the development of various diseases, including cancer, heart disease, and diabetes. In the context of oral health,

antioxidants have been found to play a crucial role in preventing and treating a variety of oral diseases, including periodontal disease, oral cancer, and tooth decay. (Manna, A., & Khan, T. (2024).

Rosemary is rich in Carnosic acid (C20H28O4), a major phenolic compound isolated from the leaves of rosemary, which has been reported to have remarkable antioxidative, anti-inflammatory, and antimicrobial properties (Birtić et al., 2015). Furthermore, Rosmarinic acid, commonly found in Rosemary also has antioxidant, anti-inflammatory, and antimicrobial activities, used to reduce the risk of various types of cancer (Jasemi et al., 2024). Given these properties of both Alcohol-based mouthwash and the beneficial properties of rosemary, A rosemary-based mouthwash may prove effective in positively effecting consumers oral health without the side-effects such as xerostomia, and also whilst having additional benefits accounted to the unique properties of Rosemary.

Background of the study

According to a study by Comizio (2024), the 5 leading brands of therapeutic mouthwashes are Listerine, Crest, and Colgate. All are chemical-based mouthwashes with high alcoholic content which are proven to negatively affect the oral care of consumers, by causing xerostomia and also damaging the soft tissues in the mouth area as stated by Ustrell-Borràs et al., (2020), and Gandhi et al., (2020). While keeping these factors in mind it is imperative to create a natural and non-chemical-based mouthwash. Whilst other natural ingredients can be used as a substitute for oral cleansing, rosemary has significantly more factors that particularly effects the oral health of consumers: such as its gingival based care and properties that remineralize enamel in the teeth. As it effects the oral care, rosemary can also have a greater effect towards the overall health of the human body given its antimicrobial, and anticancer properties that is stated in many studies.

Considering the components of rosemary that may prove beneficial to oral health, the researchers proposed a rosemary extract-based mouthwash named “Freshmen.” This study aims to identify the level of satisfaction on using rosemary extract as a mouthwash ingredient among randomly selected STI College Lucena Students.

Statement of the Problem

This study aims to determine the level of satisfaction on the proposed product “Freshmen” an alternative mouthwash using rosemary extract among selected students at STI College Lucena.

Specifically, this study aims to answer the following questions:

1. Determine the student's demographic profile in terms of:

    1.1 Age

    1.2 Sex

2) What is the assessment of the consumer about Freshmen in terms of:

    2.1 Flavor;

    2.2 Scent;

    2.3 Packaging;

    2.4 Color;

    2.5 Cost-effectivity

3) What are the factors that influence the students’ level of satisfaction towards Freshmen?

4) Can the rosemary extract be a viable alternative to mouthwash?

5) What recommendations can be made according to the results?

Hypothesis

H0: Students would not be satisfied with Freshmen as a natural alternative mouthwash.

H1: Students would be satisfied with Freshmen as a natural alternative mouthwash.

Scope and Limitations

The scope of the study refers to the specific area of investigation covered by the research. In the context of this study, it aims to determine the level of satisfaction of STI College Lucena students on using rosemary and peppermint as mouthwash ingredients. The study focuses of the perceptions of students on Freshmen in terms of its flavor, scent, packaging, oral health benefits, and cost-effectivity.

In addition, the study will identify the factors that influence the students' satisfaction towards Freshmen, and if Freshmen would be a viable natural alternative mouthwash. One limitation of the study is that it will only focus on Freshmen's main ingredients: rosemary and peppermint specifically. Findings may not be applicable to other herbal plants due to the differences in chemical properties, growth conditions, etc.

Another limitation of the study is that the findings will be purely based on numbers as the researchers will apply a quantitative data analysis. This means that qualitative aspects of the satisfaction on Freshmen such as the respondent's exact perspectives on the product may not be covered.

Significance of the Study

The objective of this study is to displace the alcohol-based mouthwash with “Freshmen”, a rosemary-based mouthwash, the component of a standard mouthwash that causes Xerostomia is commonly found in alcohol-based mouthwash. By doing this, consumers can have greater health benefits due to the application of rosemary in mouthwash.

The **students** will be the beneficiary of this product, by incorporating rosemary-based mouthwash into their daily schedule, assisting them in academic performance and overall well-being.

The **Mouthwash Industry** will gain knowledge that rosemary-based mouthwash can be an alternative mouthwash for alcohol-based mouthwash to avoid negative side effects for the consumers.

The **Consumers** will also benefit from this product, where in the “Freshmen” mouthwash will serve as their alternative mouthwash for their daily oral hygiene.

Lastly, the **Future Researchers** will also benefit from this study, as this study will provide and give reference and ideas. If they succeed, this study can be used for other future studies and also future businesses.

Theoretical Framework

Doctrine of Signatures Theory

The Doctrine of Signatures suggests a plant's form recapitulates its function—where physical or sensory characteristics of plants (shape, color, taste, and smell) reveal their potential therapeutic value and use (Bennett 2007; Leonti et al. 2002). In this context, specific plant characteristics are used in the identification of species' potential medicinal qualities. For example, the presence of antimicrobial and hemostatic red quinones found in some species of red plants potentially reflect their common use and ethnomedical application for healing a variety of epidermal disorders (Etkin 1988). This theory indicates and reinforces how plants such as rosemary provide therapeutic and medicinal benefits based on the characteristics that rosemary possesses in its physical state. By extracting the essence of rosemary, several benefits can be gathered and aimed towards medicinal treatment to help heal and improve the overall state of the human body. By taking rosemary's physical form and extracting its inner therapeutic properties to be used in a mouthwash, the researchers are able to apply this theory and provide evidence of these theoretical properties while also implementing the many benefits rosemary is capable of in healing a human body.

Conceptual Framework

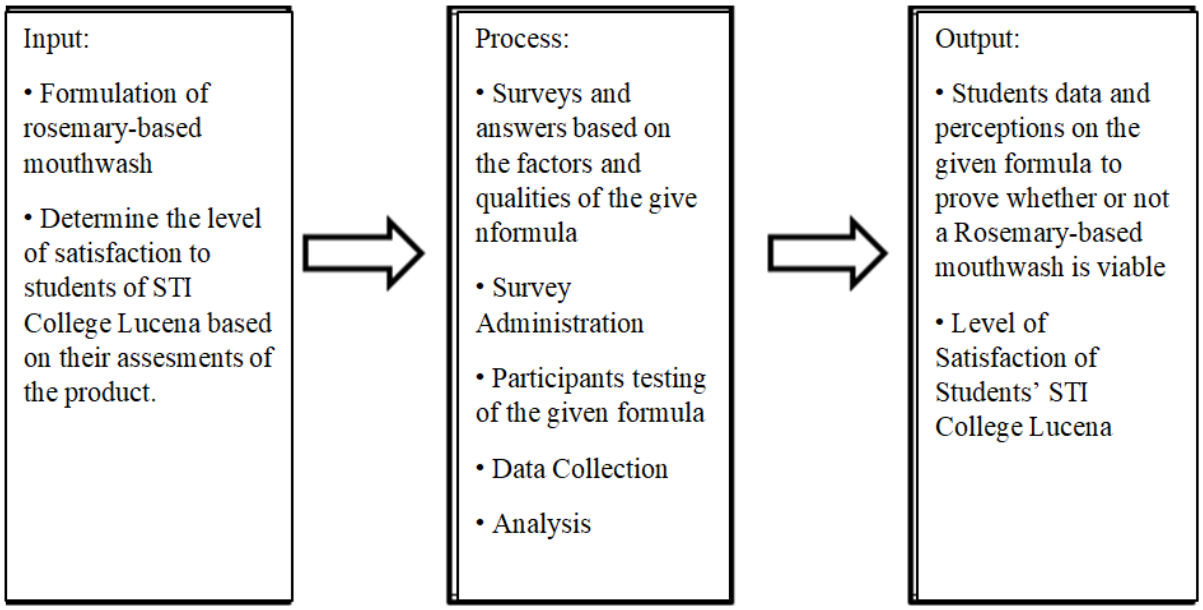

Diagram I. Graph of the Conceptual Framework used in the study

The researchers aim to formulate a rosemary-based mouthwash. To achieve this, surveys will be conducted to gather insights on the students' perspectives of the factors and qualities of the proposed formula. Researchers will then administer the surveys and guide the participants to test the mouthwash. Data collected from these surveys and tests will be analyzed to determine the viability of a rosemary-based mouthwash, based on student perceptions and data.

Definition of Terms

In order for readers to have a clearer understanding of the present study, the following terms were defined operationally:

Antioxidants. This term refers to the compounds that are responsible for preventing various oral diseases. These compounds are utilized through the use of rosemary leaves in the proposed product.

Color. The sensory impression that results from the visual perception of an object through the eyes, it is used as a major indicator to the level of satisfaction of "Freshmen" among Senior Highschool Students of STI College Lucena.

Flavor. The sensory impression that results from the consumption of an object through the mouth, it is used as a major indicator to the level of satisfaction of "Freshmen" among Senior Highschool Students of STI College Lucena.

Freshmen. This term refers to the name of the proposed rosemary and peppermint extract-based mouthwash.

Gingival. Refers to the oral area of the human body, specifically the gum area. A significant area of the human body aimed to be cleansed and improved using "Freshmen".

Rosemary. The herb that serves as the main ingredient of the product "Freshmen." The extraction process is done through boiling rosemary leaves in hot water.

Scent. The sensory impression that results from the smell of an object through the nose, it is used as a major indicator to the level of satisfaction of "Freshmen" among Senior Highschool Students of STI College Lucena

Xerostomia. This refers to the condition of dry mouth due to the use of Alcohol-based mouthwashes, it is a condition that is aimed to be avoided by "Freshmen" mouthwash.

CHAPTER II

REVIEW OF RELATED LITERATURE AND STUDIES

This chapter deals with the related literature and studies that were of significant value to strengthen the issues presented in this research. Sources were carefully selected and reviewed to present a more direct and clearer point of emphasis.

The Cons of using Alcohol-Based Mouthwash

"Many mouth rinses contain alcoholic concentrations between 5 - 27%. This is usually used as a solubilizer, stabilizer, preservative, anti-plaque efficacy enhancer and as a way to obtain a distinctive flavor. Mouthwashes with alcoholic concentrations between 18 - 27% also potentiate the effect of the essential oils to achieve a high penetration in soft tissues" (Ustrell-Borràs et al., 2020).

Although mouthwashes can be used to clean various parts of your mouth such as plaque reduction, Ustrell-Borràs et al.'s study found that the typical industry-made mouth rinses' alcohol content contains risks of penetrating soft tissues within an individual's mouth through regular use.

However, Gandhi et al. (2020) found that the high alcohol content in mouthwashes reduces the quantity of saliva in your mouth which makes bad breath worse, as saliva's primary job is to flush out potentially harmful bacteria making it difficult for the bacteria to stay in your teeth and gums. In addition, a study by Susanto (2015) found that dry mouth/xerostomia may be a potential side effect of alcohol-containing mouthwash. Both studies shows that the average alcoholic content of mouthwashes can cause harm to the tissues in the mouth, which urges for a non-alcoholic based mouthwash.

Rao et al. (2024) stated that there is growing evidence linking the use of alcohol-containing mouthwash to the potential risk of developing oral cavity carcinoma. This association is particularly concerning given the widespread use of these products.

Saliva is critical to oral health. While alcohol-based mouthwash products may prevent germs and bad breath from occurring within one's mouth in the short term, the side effects caused by the alcohol content may cause harm in the long term such as decreased saliva quantity and xerostomia leading to bad breath, therefore defeating mouthwashes' main purpose.

Health Benefits of Rosemary

A study by Günther et al. (2022) shows how Rosemary extracts have been studied as potential therapeutic agents against various diseases. Several studies showed that R. officinalis exhibits hepatoprotective, anti-hyperglycemic, antifungal, antitumor, and anti-ulcerogenic effects.

Additionally, a study by Nieto et al. (2018) found that rosemary extracts exhibit various biological activities, including hepatoprotective, antifungal, insecticide, antioxidant, and antibacterial properties. These properties may have potential applications in medicine, agriculture, and food preservation.

Singletary (2016) also suggests that rosemary exhibits potent antioxidant, anti-inflammatory, and neurological activities. These properties may contribute to its potential health benefits, including reduced risk of chronic diseases and improved cognitive function.

An additional report by Alavi et al. (2021) states that the protective effects of rosemary and its components are primarily mediated through mechanisms such as the inhibition of oxidative stress, reduction of inflammatory mediators, modulation of apoptosis, and regulation of MAPK signaling pathways. These mechanisms contribute to rosemary's antioxidant, anti-inflammatory, and anti-cancer properties.

Moss et al. (2018) also observed in a study that during cognitive task performance, individuals who consumed rosemary water had significantly higher levels of deoxygenated hemoglobin in their cerebrovascular system. This suggests that rosemary may improve blood flow to the brain and enhance cognitive function.

Another study by Dixon (2023) highlighted that rosemary is a versatile herb with numerous health benefits, including natural pain relief, reduced headaches, prevention of memory loss, and alleviation of arthritis symptoms. Rosemary may also boost the immune system and protect against heart disease.

In addition, Rosemary extract can be used in many aspects such as the applications in cosmetics, considering derivatives of rosemary are formulated in essential oils for massages and aromatherapy, rosemary alcohol, gels, shampoos, soaps, rosemary water, cleansing milk, deodorant, anti-wrinkle cream, aftershave lotion, hydrating facial cream, cream for the eye contour area, etc., dealing with various aspects of rosemary. The latest reviews demonstrate its phytochemical, biological, and nutritional properties and its anti-inflammatory ability (González-Minero et al., 2020).

These studies benefit our research through additional information and benefits of rosemary, which pertains to the overall health of an individuals who consume rosemary-based products. With these benefits in mind, mouthwash can be utilized as a medium to positively affect oral health but also act on various aspects of the body such as: disease prevention, microbial resistance, antioxidant effects and several other benefits.

The Oral Health Benefits of Rosemary

Rosemary has several properties and chemical components that may be beneficial to a person’s oral health. For instance, Rosemary is rich in Carnosic acid, a major phenolic compound isolated from the leaves of rosemary, which has been reported to have remarkable antioxidative, anti-inflammatory, and antimicrobial properties (Birtić et al., 2015). Rosemary extracts contain a wide range of compounds including rosmarinic acid and ursolic acid, which

have antioxidant and antimicrobial properties. Antioxidants help to prevent cell damage caused by free radicals, while antimicrobial substances prevent the growth of bacteria, fungi and viruses (Jamshidi et al., 2024).

Moreover, Rosmarinic acid, commonly found in Rosemary also has antioxidant, anti-inflammatory, and antimicrobial activities, used to reduce the risk of various types of cancer (Jasemi et al., 2024).

Also stated in Manna and Khan (2024), antioxidants play a crucial role in maintaining good oral health as they reduce inflammation in the gums, protect against harmful effects of carcinogens that can cause oral cancer, and prevent tooth decay by neutralizing the acids produced by bacteria in the mouth.

A mouthwash may be recommended for its efficacy in preventing dental caries and other oral conditions due to its antimicrobial, anti-inflammatory and analgesic properties. Therefore, it is essential to raise awareness in selecting an appropriate mouthwash that is safe to be applied to the oral cavity and its natural microflora (Nafea et al., 2020).

Taking these properties of rosemary into consideration, the researchers propose a mouthwash product based on rosemary extract, which aims to replace the alcohol content of commercial mouthwashes. Rosemary's chemical components that prove beneficial to oral health such as antioxidants, Carnosic acid, and Rosmarinic acid may allow it to serve as an efficient replacement for alcohol in mouthwashes, giving it similar cleaning properties without the oral health risks taken from alcohol.

The Anti-cancer and Anti-microbial Effects of Rosemary

More studies state that Rosemary extract nanoparticles show promise as a potential anti-cancer agent. They have been shown to induce cell death, arrest cell growth, and increase reactive oxygen species in cancer cells (Ellithy et al., 2022).

The rosemary leaf extract showed the highest level but carnosol was the lowest. Among the rosemary extract compound, carnosic acid has better antioxidant activity and oxidation stability than carnosol (Choi et al., 2019).

Another study by Kumar et al. (2022) states that the derivatives of rosemary are, in some conditions, capable of inducing a cytotoxic effect precisely through the release of reactive oxygen species (ROS).

Several studies have demonstrated that RE and its polyphenols carnosic acid and rosmarinic acid would have potent anti-cancer effects. Additionally, specific compositions of rosemary extract have been demonstrated to be safe for human consumption, suggesting its potential for use as a complementary cancer therapy (Gonzales et al., 2015).

Moreover, the antimicrobial activity of the oil as well as of its major constituents was tested against the following microorganisms: Streptococcus mutans, Streptococcus mitis, Streptococcus sanguinis, Streptococcus salivarius, Streptococcus sobrinus, and Enterococcus faecalis, which are potentially responsible for the formation of dental caries in humans. This states the many microorganisms that damage the dental and oral region of the mouth that Rosemary is capable of fighting against. (Bernardes et al. 2010)

Yasmine et al. (2022) also states that Rosemary and Bougainvillea glabra essential oils offer potential benefits for oral health. These natural substances have been shown to have anti-inflammatory and antioxidant properties, which can help address gum diseases and other oral health issues. Their ability to reduce inflammation and fight bacteria suggests that they may be effective natural alternatives to synthetic oral care products.

Another study by Nakagawa et al. (2020) shows that Rosmarinus officinalis does indeed have inhibitory effects on harmful bacteria and possible diseases one may encounter in the oral

region of the body, fighting bacterial pathogens and having potent antimicrobial and anti-virulence compounds which help hinder harmful effects of microorganisms.

In particular, the compounds contained in rosemary, such as carnosic acid and rosmarinic acid, prevent the growth of cancer cells and the formation of tumors. In addition, rosemary extract has been shown to induce apoptosis (programmed cell death) in cancer cells, which may help prevent the spread of cancer. While more research is needed to fully understand the potential benefits of rosemary in cancer prevention and treatment. (Mokaramiyan & Yousefi, 2024).

These studies show the many anti-microbial effects and components of rosemary and how they can be used in order to clear harmful cells and also the anti-cancer effects which prove to be helpful in oral health, which are main factors in why rosemary is the primary ingredient for the study's natural-based mouthwash.

The Gingival and Dental Benefits of Rosemary

A study by Gulcin et al. (2016) shows that Ginger + honey, and rosemary can enhance remineralization of enamel caries lesions. This study found that these herbal remedies were more effective than a fluoride dentifrice control, particularly the honey + ginger combination. Valones et al. (2019) also conducted a study to investigate the clinical effectiveness of a rosemary-containing toothpaste on gingival bleeding and bacterial plaque. Rosemary has known anti-inflammatory and antimicrobial properties, making it a potential natural alternative for oral health treatments. The study found that the rosemary toothpaste was effective in reducing both gingival bleeding and bacterial plaque, demonstrating its potential as a promising addition to dental care regimens. However, it's important to note that a few individuals experienced allergic reactions to the toothpaste, highlighting the need for further research to assess its safety and efficacy for a wider population.

Another study by Kumar et al. (2021) demonstrates the effectiveness of rosemary essential oil in preventing plaque formation and reducing gingival bleeding. Previous studies regarding rosemary's essential oil characteristics have verified its antioxidative and antimicrobial properties. Santoyo et al. also studied the antimicrobial nature of rosemary and reported that successive 5 essential oil constituents are responsible: verbenone, α-pinene, borneol, 1,8-cineole, and camphor.

Borneol provides a good response as compared to verbenone and camphor. This concludes that toothpaste based on rosemary was able to decrease biofilm and bleeding of the gingival area of the mouth (Rani et al., 2022).

Taking these studies into account, several evidences and results show how helpful and beneficial rosemary can be into mineralizing and helping the gingival and dental care of respondents who consume rosemary as a mouthwash product. These studies also show similar effectiveness in rosemary in care of oral health compared to mouthwash which contain chemically based substances.

Beneficial and Physical Properties of Rosemary

R. officinalis L. is an aromatic plant commonly used as condiment and for medicinal purposes (De Oliveira et al., 2017). Aswell according to the American Diabetes Association (2024), fresh rosemary has a more vibrant and aromatic flavor compared to dried rosemary. Its herbal and pine-like notes make it ideal for dishes where its taste and fragrance can shine through. Additionally, rosemary has been shown to improve blood sugar control in individuals with diabetes.

According to the study of Safavi et al. (2024). The compounds that found in rosemary (carnosol and ursolic acid) have been successfully used as anti-inflammatory agents in most inflammation causes, so far, no side effects have been associated with the rosemary plant has

been reported, and various studies have suggested replacing chemical pharmaceuticals with this plant Considering the benefits of the rosemary plant researchers were motivated to investigate the anti-inflammatory effects of this agent. Participants were divided into three groups after tracheal intubation sore throat and, concurrently, obtaining the research permit from the Committee of discovered the most suitable method to treat the post- Healthcare Ethics of the Isfahan University of Medical intubation sore throat and avoid the side effects of alcohol components in mouthwashes.

Effects of Natural-based Mouthwash

More et al. (2024) suggested that mouthwashes made with natural ingredients could be a viable option for improving overall dental health, as they can be easily prepared and used safely at home. These natural mouthwashes may also reduce the risk of antibiotic resistance compared to traditional chemical-based products.

Balafif et al. (2024) concluded that the effects of mouthwash on the oral microbiome are both short-term and long-term, influencing supragingival plaque microbiome, promoting a return to healthier microbial levels, increasing the abundance of common oral opportunistic bacteria, and reducing the oral pathogenic microbial load in healthy individuals. These findings emphasize the importance of oral hygiene in maintaining overall health whilst using alternative natural ingredients.

The Use of Peppermint as a Flavoring Agent

Using the Gas chromatography-flame ionization detection (GC-FID) method, Marjanović-Balaban et. al (2018) identified that menthol is a major component of peppermint, making up 43.66% of its composition. Menthol exhibits unique sensory effects which when applied to the skin or mucous membranes at low doses, gives a cooling sensation (Li et al., 2022). Through the use of peppermint within Freshmen, it would be responsible for the cooling

effect of the mouthwash as accompanied by rosemary, as rosemary by itself poses no specific flavor.

The Use of Red Cabbage as a Coloring Agent

Red cabbage is a natural pigment used mainly as a food color, as a class of compounds called anthocyanins attributes to this color (Chigurupati et. al, 2002). It is further found in Chigurupati et. Al (2002)'s study that red cabbage could be used as a pH indicator. In acidic condition, it has its original red color but at a basic pH its color changes to deep blue. During the experiment, applying red cabbage turned the liquid into a deep blue color, thus indicating Freshmen's non-acidic nature.

The Use of Honey as a Preservative

According to Himanshu & Khangwal (2024), honey has the potential to restrict the growth of various food spoilage bacteria such as Escherichia coli, Clostridium perfringens, and Salmonella species, thereby preventing contamination. Considering these properties of honey, it would be used as a preservative agent for Freshmen in order to maintain it in good condition for a significant amount of time.

Factors that Affect Students' Level of Satisfaction

A study by the University of Leeds (2018) "A consumer might infer something about the efficacy of a mouthwash based upon its color. Or a consumer might infer that a dark color washing-up liquid might have greater efficacy than a light one (and a yellow liquid may smell of lemons whereas a green one may smell of apples). Given this, it is important to have a satisfactory color that may contribute to the consumers' preferences which can allow the consumer to perceive a positive view towards "Freshmen" mouthwash based firstly from its outward color.

Also, a report by the National Institute of Aging (2024) states how “As you age, your sense of smell and taste may fade.” by taking this into consideration, it is important to learn the age of the students as it may personally affect their response and perception to the presented product. Same applies to a study by the National Institutes of Health (2023) which states in their results that “The overall taste and individual tastant function were better in females than in males, the results show that taste function is affected by both age and gender.”

Moreover, a case study by Rundh (2016) demonstrated that packaging has become an important tool in marketing of different products either for end-consumers, or customers in a supply chain, as it shows that the packaging can be used together with the product concept in order to create a competitive offering in the market. Taking these findings into consideration, the researchers aim to assess consumers’ perceptions on Freshmen in terms of its packaging in order to evaluate whether or not it pertains to the consumers’ standards and overall level of satisfaction on the proposed product.

Chapter III

METHODOLOGY

Research Design

The study utilizes the Quasi-Experimental Design. The Quasi-experimental design aims to evaluate interventions that do not use randomization (National Library of Medicine, 2006). This research design aligns with the nature of the proposed product “Freshmen.” As Freshmen, pertains to no particular group, but there are restrictions with certain respondents such as allergic reactions to certain ingredients and oral sensitivity to substances such as mint and rosemary which may cause harm to the random respondents.

Population

The total population of SHS students is 1394 at STI College Lucena, and a margin of error of 0.1. Using this formula, we were able to determine the sample size of to conduct this research.

Formula:

n= N/1+N(e)^2

Where:

n=sample size

N =total population

e = margin of error

Solution:

n = 1394/1+1394(0.1) ^2

n = 1,394/14.94

n = 93.31

Using this formula, we were able to determine our sample size of 93.31 or 93 students in total.

Sampling Method

The sample of the population of STI College Lucena will be conducted using purposive sampling which according to Etikan et al. (2015) The purposive sampling technique, also called judgment sampling, is the deliberate choice of a participant due to the qualities the participant possesses. By deliberately choosing participants with, and without the qualities that is convenient to properly test Freshmen, there will be little chance of bias due to the lack any conditions that may affect the participants judgement.

Data Collection Procedure

Firstly, the researchers will provide a letter to the authorized registrar of the school to get the following population of Senior Highschool students in STI College Lucena, then to be followed by a statistician of the school to be given a formula to compute the sample size of the population in order to ensure no-bias in responses. Then a permit to conduct the study to the dean of the school, wherein the researchers will ask permission from a randomly selected student from STI College Lucena to be a respondent to test the satisfaction of using "Freshmen". Lastly, the researchers will provide a questionnaire and a waiver which will consist of the consent form of their guardian that will allow the selected student to test the

“Freshmen” mouthwash. To which a questionnaire will be provided and will serve as the instrument for conducting the respondents’ evaluation and reactions to the executed product. Which will then be used to serve as the output of the research study to gain new knowledge about the product and the ideas presented in the study.

Statistical Treatment of Data

After collecting the gathered data of the questionnaires of respondents, all the data will be organized and computed through the method of calculating the weighted mean of all responses to each question stated on the given questionnaire. The weighted average being the average of the values of a set of items to each of which is accorded a weight indicative of its frequency or relative importance (Merriam Webster, n.d.). With each question of parts A-E being answered through a 1 – 4 Likert Scale, where 1 signifies very dissatisfied, 2 signifies dissatisfied, 3 signifies satisfied, and 4 signifies very satisfied. Once calculated, each question will be determined by each statement’s weighted average then interpreted by the researchers to give the significant results and findings aimed to learn and discover throughout the study. By using the weighted average as the main source of interpretation, weighted averages take into account the relative importance of each data point (Ganti, 2024). This is done to answer the questions of the study and to be treated as significant points of knowledge to further improve the researchers' goal of the study.

Data Analysis

The analysis of the raw data given will be interpreted by taking the results of all questionnaires gathered and analyzing results to form the weighted average of all respondents and use the highest points of interest which will answer our statements of the problem. By gathering these results, the researchers will interpret the data gathered as the collective answers of each respondent to the statements on the questionnaire. By doing this, the results of all respondents will be interpreted much clearly by using only the weighted mean of all collective respondent questionnaires. This will give clear answers to the statement of the problem and provide sufficient results to answer each goal of the study.

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