

PERCEPTION OF SUNSCREENS AMONG FSKM UiTM SHAH ALAM CITIZENS USING THE FUZZY CONJOINT METHOD

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ABSTRACT

Sun's rays carry ultraviolet that are harmful to our health. Hence, sunscreens were formulated in order to hinder the harmful effect by absorbing or reflecting the radiations. However, without having proper knowledge about sunscreen, they are actually ruining their health to various diseases such as sunburn and melanoma cancer. Thus, main aim of this research is to investigate students' and lecturers' perception towards sunscreen using the fuzzy conjoint method. A total of 209 respondents consist of students and lecturers in the Faculty of Computer and Mathematical Sciences (FSKM) at MARA University of Technology (UiTM) Shah Alam were given a set of questionnaires. The results were analysed using Fuzzy Conjoint Method. The majority of the respondents 'Strongly Agree' that women use sunscreen more frequently than men (similarity degree = 0.79798) and they always apply sunscreen before going out as it is beneficial to their skin (similarity degree = 0.78411). There are respondents who also 'Strongly Disagree' that applying sunscreen is time consuming (similarity degree = 0.29061, rank = 12). The result shows that majority of the students and lecturers in the Faculty of Computer and Mathematical Sciences are aware on the important of sunscreen in order to protect skin cells from ageing, sunburn and reduces the risk of having skin cancer. For further study, the researchers can expand the sample by using different background economic, rural or urban or education or gender as we may get better and comprehensive results.

Keywords: Fuzzy Conjoint, Skin, Sunscreen, UV

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1. Introduction

Malaysia has high temperatures due to the position of this country where it lies in tropical latitude. Throughout the year, the temperature is consistently high (Lockard et al., 2021). Moreover, Malaysia has recorded the highest temperature in Chuping, Perlis which is 40.1-degree Celsius in the year of 1998 and second highest on 18 May 2014 with 38.9 degree Celsius at the same place (Rashiqah, 2015). Due to the fact that Malaysians live in countries with high temperatures throughout the year, they need to be aware that the sun's rays carry ultraviolet radiation that can be harmful to our health.

There are three forms of ultraviolet which are Ultraviolet A (UVA), Ultraviolet B (UVB) and Ultraviolet C (UVC). UVA promotes the premature ageing of the skin due to the fact that UVA radiation has the ability to penetrate into the deeper layer of the skin. The majority of

skin damage is caused by UVB such as pyrimidine dimers and sunburn. Meanwhile for UVC's, it is filtered out by the atmosphere before reaching the earth (Mbanga et al., 2014).

Since the ultraviolet radiation that happen has become a great issue for the whole world, the Global Solar UV Index (UVI) was introduced to ensure that people know about the amount of UV radiation entering earth. The index was needed to gain public awareness about the danger of surplus UV radiation towards their health and they need to take precautions as when the UVI increases, the chances of the skins getting damaged increases. To hinder those harmful sun effects, scientists formulated lotions and body creams where they added active ingredients to protect peoples through scattering, absorbing or reflecting radiation (Mbanga et al., 2014).

People nowadays mostly use sunscreens for beauty purposes only. Some of them even do not use them when going to places that are exposed to sunlight such as the beach. Besides, there are few individuals do not know about the SPF level and they just thought that any SPF level is suitable for their skin. Without having proper knowledge, they are actually ruining their health to various diseases such as melanoma cancer.

There are about one million people who were diagnosed with skin cancer and 10,000 die from malignant melanoma every year. Most skin cancers occur in the areas of the body that are most frequently exposed to the sun, such as the face, neck, head and the back of the hands (Mbanga et al., 2014). Dr Aminuddin Rahman, a Specialist Consultant of Oncology and Radiotherapy said that the common type of skin cancer in Malaysia is basal cell carcinoma, with 34.9% patients having basal cell carcinoma (Fatin, 2018). Followed by lymphoma (25.7%) and squamous cell carcinoma (20.6%), and as for the most invasive skin cancer which is melanoma only 5.4% patients in Malaysia (Fatin, 2018).

Sunscreens are needed to avoid our skin against UV exposure and protect our skin cells from ageing quickly. However, the use of sunscreens is still low even though people have been warned about the UV radiation and also skin cancer. Studies showed that individuals who rarely use sunscreens are men and people with lower education levels and using unrecommended SPF levels (Sajincic et al., 2021). Hence, the research shows that the awareness of Sunscreen is still low. Majority of the researchers always use databases and search engines, questionnaires, cross-sectional method and statistical analysis to conduct their experiment. They also use software such as IBM SPSS Statistic to construct the probability and the results of the experiment.

2.0 Literature Review

A study was conducted by Autier et al. (1999) in the University of Lyon and the University of Lausanne to investigate the relationship between the sunscreen use and the duration of sun exposure. Eighty-seven participants were divided into two groups and each group was given unidentifiable sunscreens with SPF 10 and SPF 30 respectively. The results showed participants with SPF 30 have been exposed to sun 25% longer than participants with SPF 10. 39 participants reported they have sunburns and 70 participants reported having skin-reddening. Thus, the higher the Sunscreen Protection Factor (SPF), the longer the duration of sun exposure.

In different research, Mbanga et al. (2014) mentioned the calculated values for SPF 40, 50+ and 60 and the labelled values in supermarkets for SPF 40, 50+ and SPF 60 are different in values. They conducted an experiment to make inquiries about ten labelled (Sample A – Sample J) SPF from Kinshasa market. They found out sunscreens with labelled SPF 15 are almost the same as the calculated SPF 15, which is 15.24 ± 0.05 , 14.65 ± 0.06 , 14.92 ± 0.03 and 15.12 ± 0.04 for Sample A, B, C and D respectively. For sunscreens labelled SPF 40, 50+ and 60, the calculated values are 21.43 ± 0.07 , 24.14 ± 0.04 and 23.12 ± 0.05 respectively. This could bring some implications and problems as these sunscreens are used for babies, people who work outdoors and people who have skin diseases that cannot let them be exposed to sunlight directly.

Other research by, Saridi et al. (2009) mentioned that young adults in Korinthos, Greece have a little knowledge about sun exposure and their attitude towards sun exposure were quite dangerous. They spread questionnaires to five high schools in Korinthos (813 students in total) during summer and found out that 447 participants went to the beach from 1000 to 1600 hours, which is a crucial time for sun exposure as the sun has a high Ultraviolet Radiation (UVR) during that time. They also reported only half of the candidates (55%) using sunscreen with enough SPF and only 44.4% of them did not have sunburn last summer.

Additionally, Low et al. (2021) distributed questionnaires to doctors and pharmacists in Hospital Sultanah Nora Ismail, Batu Pahat, Johor, Malaysia to study knowledge, attitude, practice and perception on sunscreen and skin cancer among doctors and pharmacists. With a total of 323 doctors and 61 pharmacists, only 28% of doctors and 51% of pharmacists practice daily use of sunscreen, and no major differences between male (67.5%) and females (57.9%) who do not practice daily sunscreen use. We can see that the doctors have lesser knowledge regarding sunscreens and sun exposure compared to pharmacists since pharmacists' and doctors' median scores are 12 and 11 respectively, but 56.7% of the doctors and 57% of the pharmacists do not know that skin cancers are caused by UVB. These show that people are not aware about the effects of sun exposure towards their health.

From a journal by Saridi, Bourdaki and Rekleiti (2014), children and young adults have the highest risks of skin cancers as 50%-80% of the UV radiations will be piled up during that time. Every year, there will be 45 000 - 70 000 individuals discovered with skin cancers in New Zealand and 300 people die there due to skin cancers. Saridi et al. (2014) stated that individuals below age 65 in the United States of America will have a higher chance in creating a few types of skin cancer. This is because teenagers take the solar radiation issues lightly and most of them love to tan, especially at the beach from 10 o'clock in the morning to 4 o'clock in the evening since they think that they will become more beautiful after tanning.

Despite of having sunscreens to protect our skin from UV radiation, Sajincic et al. (2021) argued that UV filters with chemical ingredients could disrupt the ecosystems and we need to have alternative ways to prevent that such as replacing the chemical ingredients with lignin-based sunscreens. It is said that lignin polymers could actually filter both UVA and UVB from passing through the skin. Sajincic et al. (2021) conducted a survey of respondents' knowledge towards lignin-based sunscreens products. From 230 respondents, only 15% and 6% of them always use sunscreens on their face and body respectively even though the majority of them knew sunscreens can prevent sunburn, skin cancer and skin ageing. This showed that people do not care for their skin health as more than 34.5% of respondents who use sunscreens also do not know which UV radiation is prevented from entering their skin.

Research by Redhwan et al. (2011) on perception and opinions towards skin cancer prevention in Malaysia involving 33 medical sciences students from Management and Science University (MSU), Shah Alam, Malaysia, where the facilitator wrote down the discussion to obtained the data and analysed manually. From this research, majority of the students voiced out that the most common cause of skin cancer is over exposure to ultra violate (UV) and the best prevention for skin cancer is by using sunscreen. Hardly any of them considered that skin cancer, dry skin, sun burn, dehydration, discolouring of the skin and global warming as harmful effect of sun exposure. This study made clear that there is a lack of knowledge in regard to sunscreen and skin cancer (Redhwan et al., 2011).

Thus, using sunscreen is important in order to protect our skin. But how many of us know about the important of sunscreen. Thus, this study is to find the perceptions on sunscreen among citizens in Faculty of Computer and Mathematical Sciences, UiTM. Huang and Akagi (2005) stated in human communication, perception and expression are important. Human nature is unclear but with the precise mathematical or analytical approach the vagueness of human nature can be seen. Huang and Akagi (2005) use a three-layer fuzzy logical model to survey speech perception. They used a three-layer model (emotional speech, primitive features and acoustic features) instead of two-layer model (emotional speech and acoustic features)

because humans' perception of phenomenon is described by vague linguistic form and not precise values. They carried out a test with five categories of emotional speech (neutral, joy, cold anger, sadness and hot anger) and the results they got were reasonable. The joy speech has a bright sound (0.101), but not quite (-0.039) whereas a sad speech has a weak sound (0.065) and quiet (0.057). Thus, a fuzzy logical model can be used for carrying out tests or experiments towards linguistic variables.

This is supported by Chen (2000) that defined decision-making problems is a step to find the greatest choice from all the given options or alternatives. Usually, decision makers expressed the problem in matrix format, in which the ratings and weight of the subject are known correctly. Not only that, the matrix that has been expressed can be converted into a fuzzy decision matrix and also can be constructed into a weighted normalised fuzzy decision matrix.

The popularity of using fuzzy conjoint method is increasing among researchers who conduct a survey for linguistic terms. Mukhtar and Sulaiman (2021) did an investigation to find the elements of students who successfully completed their undergraduate degree in choosing a program for advanced level. They constructed questionnaires with 10 prearranged factors to 51 students from the Faculty of Computer and Mathematical Sciences (FSKM) in the Universiti Teknologi Mara (UiTM) Shah Alam. The factors that they chose are Academic background, Interest towards courses offered by the program, The program reputation, Environment and facilities provided by the universities, Teaching quality, Affordable fees, Scholarship availability, 16 Family support, Peer influence and Career opportunity related to the program. When using the Triangular Fuzzy Number-Based Conjoint Analysis (TFN-CAM) method, they found out that the first factor, Academic background (Strongly Agree - 0.9993), has motivated them the most in choosing a program while Family support (Strongly Agree - 0.9164) has the least role in motivating the students to join the program. Mukhtar and Sulaiman (2021) also stated that in order to investigate the humans' fondness levels, TFN-CAM is the best method.

Furthermore, Sarala and Kavitha (2017) constructed questionnaires with six attributes to 243-degree students and six attributes to 27 professors in Thiruvavur district, Tamilnadu. The questionnaires were given to study their assumptions and faiths towards studying mathematics. Sarala and Kavitha (2017) also stated that when using a fuzzy conjoint model, the assumptions and faiths will be transformed into degree of similarity and level of agreement respectively. From the model, students mostly 'Very Strongly Agree' (Maximum Similarity Degree = 0.55673) that 'Conceptual understanding of learning mathematics' (Ranking = 1) were needed to learn mathematics, followed by 'Syllabus covered' (Ranking = 2), where students 'Strongly agree' (Maximum Similarity Degree = 0.53471) that all mathematics' syllabus in a university must be fully covered.

This can be supported by Gopal et al. (2020) who organised the same study to construct a survey among senior high school students from 32 national schools in Malaysia using a fuzzy conjoint model. The survey is to research about the students' anxiety and self-efficacy about mathematics. In general, these students have a very high amount of anxiety levels but low in their self-efficacy. They were very panicked in acquiring excellent grades in mathematics and thus, increasing their anxiety since they do not believe themselves capable of learning the subject (Gopal et.al, 2020). By using fuzzy conjoint models, the natural language such as preferences can be expressed without vagueness. From the experiment, the majority of students (83.8%) chose 'Disagree' in believing that they can study mathematics very well ($s = 0.831058$) and 91.2% chose 'Agree' that they do not think they could get excellent marks for the subject. Thus, by using fuzzy conjoint model, this can be one of the ways to find a student's learning ability in mathematics, especially in the future.

Additionally, fuzzy conjoint model can also be used in finding perceptions towards Computer Algebra System (CAS). Fuzzy conjoint model was created by Turksen and Willson in 1994 (Gopal et.al, 2020). With this model, Abdullah et al. (2011) carried out an experiment

to find out the students' insights when using CAS. 164 students aged 16 from east coast Peninsular Malaysia were participated in this study. Before answering the survey, all students had thought of using CAS to find the maximum and minimum values of quadratic functions for almost two hours (Abdullah et al., 2011). The questionnaire has 11 attributes with a 7-likert scale (very strongly agree, strongly agree, agree, undecided, disagree, strongly disagree, very strongly disagree). After all questionnaires were answered, they found out that the degree of similarity of 'Attribute 2' (general outlook of teaching CAS) is the highest and degree of similarity of 'Attribute 4' is the lowest amount (0.69). Hence, it is proven that fuzzy conjoint model can be used in solving human's natural language and this model has been used in various fields (Sarala and Kavitha, 2017).

The previous studies have shown the importance of using sunscreen to protect from skin cancer and the method of fuzzy conjoint is more suitable to study perception. Thus, this study is to investigate students' and lecturers' perceptions towards sunscreens using the fuzzy conjoint method.

3. Methodology

The set of the criteria on the perception towards sunscreen is adapted from the previous studies. A set of questionnaires are constructed based on the above criteria and this questionnaire is distributed to students and lecturers from FSKM UiTM Shah Alam through online platform. The data were collected and analyzed using Fuzzy Conjoint Method which consists of the following 6 steps:

Step 1

The respondent's perception is being measured using basic Likert scale values and its will be classified as the linguistic variables as 1 – Strongly Disagree, 2 – Disagree, 3 – Uncertainty, 4 – Agree and 5 – Strongly Agree.

Step 2

The value of the linguistic variables chosen by the respondents will be sum up for each respondent as

$$\sum_{i=1}^n r_i = r_1 + r_2 + r_3 + \dots + r_n \quad (1)$$

Where: r_i is the weight for the i-th respondent.

Step 3

The score of linguistic values of each respondent is calculated using the following formula:

$$R_i = \frac{r_i}{\sum_{i=1}^n r_i} \quad (2)$$

Where: R_i is the score of linguistic values given i-th respondent.

Step 4

The weight sum is calculated as follow:

$$\mu_S(y_t, A_m) = \sum_{i=1}^t R_i \cdot \mu_{U_i}(x_t, A_m) \quad (3)$$

Where:

μ_S is the weighted sum of the membership of domain elements in each attribute

A_m ; $\mu_S \in [0,1]$

y_t and x_t are domain elements, as t is the number of linguistic terms, $t = 1,2,3,4$ and 5

A_m is a particular attribute where m is the number of attributes

$\mu_{U_i}(x_t, A_m)$ is the membership value of the linguistic rating, U_i at given linguistic level x_t (elements of the standard fuzzy sets U at level x_t)

Step 5

The degree of membership for each linguistic is summed up to obtain the overall degree of membership. The highest value is then ranked.

$$v_t(S, U) = \frac{1}{1 + \sqrt{\sum_{i=1}^n [\mu_S(y_t, A_m) - \mu_U(x_t, L_i)]^2}} \quad (4)$$

Where:

$\mu_S(y_t, A_m)$ is the calculated membership degree from respondent's ratings for attributes
 $\mu_U(x_t, L_i)$ is the element of standard fuzzy set, correspond to linguistic term L_i and with t as the number of linguistic terms $t=1,2,3,4$ and 5 .

Step 6

The maximum degree of similarity ($v^{\max}$) for each attribute is obtained, and rank the attributes in the descending order of the maximum degree of similarity ($v^{\max}$).

4.0 Implementation

A survey has been conducted on 209 respondents through Google Form, an online survey which was distributed through WhatsApp and Telegram to obtain feedback on perceptions of students and lecturers towards sunscreen. The survey is divided to three sections, Section 1 is about respondents' background and Section 2 contains the perception of using sunscreen and Section 3 is about ways to increase awareness of sunscreens among student and lecturers. Students and lecturers from FSKM UiTM Shah Alam were chosen as respondents for our project using convenient sampling. Every calculation was completed by using Google Excel.

The suitable criteria or attributes were adapted from previous studies, for the perceptions and the ways to increase awareness on the important of using sunscreens. For these two sections, the respondents need to answer based on five Likert linguistic values. The 12 attributes or characteristics of students' and lecturers' perception of sunscreen are as listed in Table 1. While 4 attributes on the ways to increase awareness on important of using sunscreens are listed in Table 2.

Table 1. The attributes of students' and lecturers' perception of sunscreen:

Attributes	Statements
A1	Women use sunscreen more frequent than men
A2	Applying sunscreen makes my skin uncomfortable even if I do not have any allergies
A3	The majority of men do not wear sunscreen because it does not make them masculine
A4	I do not like using sunscreen at the beach because I love to tan
A5	I love to apply sunscreen on my face because it makes me look pretty
A6	I do not apply any sunscreen product because the ingredients could bring harm to my skin
A7	I always apply sunscreen before going out because I know it is beneficial for my skin
A8	Applying sunscreen is time consuming
A9	Before purchasing any sunscreen product, I would always check its ingredient
A10	I will consult a specialist doctor before purchasing any sunscreen products
A11	I believe that sunscreen does not fully protect me from UV rays
A12	I prefer sunscreen with chemical ingredients compared to natural ingredients

Table 2. The attributes of ways to increase awareness of sunscreens among student and lecturers:

Attributes	Statements
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A1	Hold talks on the importance of applying sunscreen in the faculty
A2	Students and lecturers should find information about the importance of sunscreen on websites or books
A3	The Ministry of Health Malaysia and any agency in Malaysia should release more information about sunscreen and the effects of not wearing it on social media (Instagram, Twitter, Facebook, and etc.)
A4	Students and lecturers who are skilled in the use of sunscreen should remind their other colleagues to wear sunscreen so that they can get that benefit together

The fuzzy conjoint method explained in the methodology was used to obtain the results. This study uses the following appropriate linguistic variables with 5-likert scale with the linguistic value as listed in Table 3. These linguistic Value is referring the article from Yuhanim and Normaiza (2011).

Table 3. The fuzzy set represent linguistic value:

Linguistic Variable	Linguistic Value
F_1 = Strongly disagree	{ 1(1), 0.75(2), 0.5(3), 0(4), 0(5)}
F_2 = Disagree	{ 0.5(1), 1(2), 0.75(3), 0.25(4), 0(5)}
F_3 = Undecided	{ 0(1), 0.5(2), 1(3), 0.5(4), 0(5)}
F_4 = Agree	{ 0(1), 0.25(2), 0.75(3), 1(4), 0.5(5)}
F_5 = Strongly agree	{ 0(1), 0(2), 0.5(3), 0.75(4), 1(5)}

F is representing $L = L_1, L_2, L_3, L_4, L_5$ or the corresponding linguistic terms, (L = Strongly Disagree, Disagree, Undecided, Agree, Strongly Agree). The notation $a(b)$ in F is defined as a at level b . For example, in F_5 corresponding to L_5 , the first element 0.00(1) means the compatibility of rating '1' with L_5 (strongly agree) is 0.00.

The linguistic variable from 209 respondents is listed and also the sum is calculated for each of the attribute for both sections (1 and 2) as show in Table 4 and Table 5 respectively.

Table 4. The Likert scale choose by respondents for section 2 (perception)

	r_1	r_2	r_3	r_n	r_{209}	$\sum_{i=1}^{209} r_i$
A1	3	5	4	.	5	930
A2	5	3	2	.	4	522
A3	5	2	3	.	3	700
A4	3	1	1	.	1	312
An	.	.	.	.	.	.
A12	3	5	1	.	4	519

Table 5. The Likert scale choose by respondents for section 3 (Ways to increase awareness)

	r_1	r_2	r_3	r_n	r_{209}	$\sum_{i=1}^{209} r_i$
A1	1	4	4	.	4	857
A2	5	4	4	.	3	898
A3	5	4	4	.	5	950
A4	4	5	4	.	4	919

The measurement of the respondent is then divided by a sum of measurement of all respondents, to obtain weight. Table 6 and Table 7 show some calculation on weight for perception and ways to increase awareness respectively.

$$R_i = \frac{r_i}{\sum_{i=1}^n r_i}$$

Table 6. The weight for attribute related to respondents for section 2

	r_1	r_2	r_3	r_n	r_{209}
A1	3/930	5/930	4/930	.	5/930
A2	5/522	3/522	2/522	.	4/522
An	.	.	.	.	.
A12	3/519	5/519	1/519	.	4/519

Table 7. The weight for attribute related to respondents for section 3

	r_1	r_2	r_3	r_n	r_{209}
A1	1/857	4/857	4/857	.	4/857
A2	5/898	4/898	4/898	.	3/898
A3	5/950	4/950	4/950	.	5/950
A4	4/919	5/919	4/919	.	4/919

The weight was then multiplied with every fuzzy set membership value to obtain a membership degree for every respondent as shown in Table 8 and Table 9.

Table 8. The membership degrees of each element fuzzy set corresponding to linguistic for Section 2

	L_1	L_2	L_3	L_4	L_5
R_1	0.00000	0.00161	0.00323	0.00161	0.00000
R_2	0.00000	0.00000	0.00269	0.00403	0.00538
R_n	.	.	.	.	.
R_{209}	0.00000	0.00000	0.00269	0.00403	0.00548

Table 9. The membership degrees of each element fuzzy set corresponding to linguistic for Section 3

	L_1	L_2	L_3	L_4	L_5
R_1	0.00117	0.00088	0.00058	0.00000	0.00000
R_2	0.00000	0.00117	0.00350	0.00467	0.00233
R_n	.	.	.	.	.
R_{209}	0.00000	0.00117	0.00350	0.00467	0.00233

Table 10. The overall summation of membership degree of each element of fuzzy set R corresponding to linguistic values for Section 2

	L_1	L_2	L_3	L_4	L_5
A1	0.00432	0.10697	0.60164	0.79907	0.80026
A2	0.21312	0.50246	0.75686	0.55392	0.27009
An	.	.	.	.	.

A12	0.19686	0.52133	0.80136	0.51535	0.20026
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Table 11. The overall summation of membership degree of each element of fuzzy set R corresponding to linguistic values for Section 3

	L_1	L_2	L_3	L_4	L_5
A1	0.01521	0.16825	0.65069	0.79166	0.68313
A2	0.00111	0.14722	0.64543	0.82653	0.70757
A3	0.00000	0.09195	0.59207	0.80690	0.81569
A4	0.00000	0.12251	0.62302	0.79880	0.75756

The degree of membership for each linguistic is summed up to obtain the overall degree of membership. The highest value of overall degree of membership are listed for each section (2 and 3) as shown in Table 12 and Table 13 respectively.

Table 12. The similarity degree between attributes and linguistic term respondents' perception

	L_1	L_2	L_3	L_4	L_5
A1	0.37859	0.42378	0.49473	0.70624	0.79798
A2	0.48515	0.58695	0.70189	0.62466	0.50839
An	.	.	.	.	.
A12	0.48879	0.60280	0.74351	0.60128	0.48854

Table 13. The similarity degree between attributes and linguistic term for methods suggested by respondents

	L_1	L_2	L_3	L_4	L_5
A1	0.39108	0.43429	0.53037	0.76562	0.71857
A2	0.38433	0.42569	0.51921	0.76470	0.73189
A3	0.37584	0.40976	0.48895	0.69819	0.81124
A4	0.38184	0.41973	0.50670	0.72828	0.76795

The maximum degree of similarity ($v^{\max}$) for each attribute is obtained, and rank the attributes in the descending order of the maximum degree of similarity ($v^{\max}$) are listed in Table 13 for section 2 and Table 14 for section 3.

Table 14. The ranking of maximum similarity degree for respondents' perception (section 2)

	L_1	L_2	L_3	L_4	L_5	$v^{\max}$	$L(v^{\max})$	Rank
A1	0.37859	0.42378	0.49473	0.70624	0.79798	0.79798	L_5	1
A2	0.48515	0.58695	0.70189	0.62466	0.50839	0.70189	L_3	11

A3	0.43191	0.49755	0.62621	0.75397	0.59080	0.75397	L_4	5
An	.	.	.	.	.	.	.	.
A12	0.43087	0.49753	0.62957	0.74144	0.59396	0.74144	L_4	9

Table 15. The ranking of maximum similarity degree on suggestion methods to increase awareness (section 2)

	L_1	L_2	L_3	L_4	L_5	$v^{\max}$	$L(v^{\max})$	Rank
A1	0.39108	0.43429	0.53037	0.76562	0.71857	0.76562	L_4	3
A2	0.38433	0.42569	0.51921	0.76470	0.73189	0.76470	L_4	4
A3	0.37584	0.40976	0.48895	0.69819	0.81124	0.81124	L_5	1
A4	0.38184	0.41973	0.50670	0.72828	0.76795	0.76795	L_5	2

The results were analysed by ranking the attributes of students' and lecturers' perception towards sunscreen.

5.0 Result And Discussion

The majority of the respondents are female (77.5%) while the male is 22.5%. There are 193 respondents are from 20 to 30 years old and 10 respondents are 31 to 40 years old respectively. There are only 3 respondents who are 41 to 50 years old and 3 respondents who are 51 to 60 years old. 84.2% of the respondents said that they use sunscreen while the remaining 15.8% said that they do not use sunscreen.

Table 16. The similarity degree and the rank of the attributes on respondents' perceptions

Attribute	L1	L2	L3	L4	L5	$v^{\max}$	$L(v^{\max})$	Rank
A1	0.37859	0.42378	0.49473	0.70624	0.79798	0.79798	L5	1
A2	0.48515	0.58695	0.70189	0.62466	0.50839	0.70189	L3	11
A3	0.43191	0.49755	0.62621	0.75397	0.59080	0.75397	L4	5
A4	0.65700	0.76429	0.57304	0.46500	0.41235	0.76429	L2	4
A5	0.43087	0.49753	0.62957	0.74144	0.59396	0.74144	L4	9
A6	0.60324	0.74107	0.61330	0.49700	0.43324	0.74107	L2	10
A7	0.38614	0.42227	0.50415	0.70357	0.78411	0.78411	L5	2
A8	0.29061	0.29042	0.25262	0.24200	0.22546	0.29061	L1	12
A9	0.39394	0.43666	0.52970	0.74864	0.72498	0.74864	L4	7
A10	0.49006	0.61053	0.75168	0.59380	0.48217	0.75168	L3	6
A11	0.42209	0.48443	0.60843	0.77659	0.61005	0.77659	L4	3
A12	0.48879	0.60280	0.74351	0.60128	0.48854	0.74351	L3	8

Table 17. The ranking of students' and lecturers' perceptions of sunscreen for overall result

Rank	$L(v^{\max})$	Statements
1	L5	Women use sunscreen more frequent than men
2	L5	I always apply sunscreen before going out because I know it is beneficial for my skin
3	L4	I believe that sunscreen does not fully protect me from UV rays
4	L2	I do not like using sunscreen at the beach because I love to tan
5	L4	The majority of men do not wear sunscreen because it does not make them masculine
6	L3	I will consult a specialist doctor before purchasing any sunscreen products
7	L4	Before purchasing any sunscreen product, I would always check its ingredient
8	L3	I prefer sunscreen with chemical ingredients compared to natural ingredients
9	L4	I love to apply sunscreen on my face because it makes me look pretty
10	L2	I do not apply any sunscreen product because the ingredients could bring harm to my skin
11	L3	Applying sunscreen makes my skin uncomfortable even if I do not have any allergies
12	L1	Applying sunscreen is time consuming

Table 17 shows most of the students and lecturers in FSKM agree on all the listed attributes. For the first top two ranking, most respondents strongly agree that women use sunscreen more frequently than men (similarity degree = 0.79798) and they always apply sunscreen before going out as it is beneficial to their skin (similarity degree = 0.78411). This is actually quite true because in our daily life, most women use sunscreen before going out because they know that it brings benefits to their skin compared to men. However, the majority of the respondents also believe that sunscreen does not fully protect them from UV rays (similarity degree = 0.77659, rank = 3, linguistic variable = agree). This is supported by the United States of Environmental Agency (2006) where it is not safe to stay in the sun for a longer time even if we are using sunscreen as it does not block all the UV rays from entering our body. The World Health Organization (2002) stated that besides applying sunscreen to our skin, sunglasses or hats are also needed to wear since sunscreen only reduces our risk from UV exposure. Nevertheless, some students and lecturers strongly disagree that applying sunscreen is time consuming (similarity degree = 0.29061, rank = 12). This may happen because they made it their daily habit to apply sunscreen. Thus, it will not affect their time to do other activities or work.

Table 18. The similarity degree and the rank of the attributes on methods to increase awareness

Attribute	L1	L2	L3	L4	L5	$v^{\max}$	$L(v^{\max})$	Rank
A1	0.39108	0.43429	0.53037	0.76562	0.71857	0.76562	L4	3
A2	0.38433	0.42569	0.51921	0.76470	0.73189	0.76470	L4	4
A3	0.37584	0.40976	0.48895	0.69819	0.81124	0.81124	L5	1
A4	0.38184	0.41973	0.50670	0.72828	0.76795	0.76795	L5	2

Table 19. Rank of suggestion methods to increase awareness of sunscreens among respondents

Rank	$L(v^{\max})$	Statement
1	L5	The Ministry of Health Malaysia or any health agency in Malaysia should release more information about sunscreen and the effects of not wearing it on social media (Instagram, Twitter, Facebook and etc)

2	L5	Students or lecturers who are skilled in the use of sunscreen should remind their other colleagues to wear sunscreen so that they can have that benefit together.
3	L4	Hold talks on the importance of applying sunscreen in the faculty
4	L4	Students and lecturers should find information about the importance of sunscreen on websites or books

From Table 18 and 19, we can conclude that the majority of the students and lecturers in FSKM strongly agree that the Ministry of Health Malaysia or any health agencies in Malaysia should release more information about sunscreen on social media (similarity degree = 0.81124, rank = 1). Social media like Instagram and Twitter are quite faster in spreading news to citizens compared to other platforms or websites. Thus, the health agencies can take this opportunity to spread the benefits of using sunscreens through there. Besides, students and lecturers who are skilled in the use of sunscreen should remind their other colleagues to wear sunscreen (similarity degree = 0.76795, rank = 2).

Not only that, they also agree that the university should hold talks at the faculty on the importance of applying sunscreen (similarity degree = 0.76562, rank = 3). When holding the talks, they could invite some professional doctors who major in skin cancer or skin health. By inviting them, the students and lecturers will gain more information that is beneficial to them and also improve their skin health lifestyle. Last but not least, there are some students and lecturers who also agree that they also should find the information regarding sunscreen on websites or books by themselves (similarity degree = 0.76470, rank = 4). This is because there are a lot of health books that can be found at the bookstore. Even if the students or lecturers cannot afford the books, they still can read the articles or e-book provided at the websites.

Low et al. (2021) distributed questionnaires to doctors and pharmacists in Hospital Sultanah Nora Ismail, Batu Pahat, Johor, Malaysia to study knowledge, attitude, practice and perception on sunscreen and skin cancer among doctors and pharmacists. With a total of 323 doctors and 61 pharmacists, only 28% of doctors and 51% of pharmacists practice daily use of sunscreen, and no major differences between male (67.5%) and females (57.9%) who do not practice daily sunscreen use. We can see that the doctors have lesser knowledge regarding sunscreens and sun exposure compared to pharmacists since pharmacists' and doctors' median scores are 12 and 11 respectively, but 56.7% of the doctors and 57% of the pharmacists do not know that skin cancers are caused by UVB.

This previous study used statistical methods where the researchers used descriptive analysis to summarise the data obtained from the survey and inferential analysis (Pearson Chi-square test) to calculate the attitude and perception of sunscreen among people.

Nevertheless, the fuzzy conjoint method is a simple yet deeper method compared to statistical methods. With a fuzzy conjoint method, we will find more precise results as we calculate the degree of similarity of the attributes. From our results obtained, 'A8' in Section C obtained the lowest degree of similarity (0.029061) and rated as 'Strongly Disagree', which makes the attribute ranked as the last place of students' and lecturers' perception of sunscreen. However, when using the statistical method by calculating the mode, the rating was 'Disagree'. This proves that the fuzzy conjoint method is much more reliable compared to statistical methods as the difference of degree of similarity between 'Strongly Disagree' and 'Disagree' for 'A8' is only 0.00019.

6.0 Conclusion and Recommendations

Sunscreen is very important for our skin as it maintains our skin cells from ageing, prevents our skin from getting a sunburn and reduces the risk of having skin cancer. Majority of our respondents stated that they use sunscreen as mentioned in figure 4 but there are still few people

who do not know about the SPF inside of sunscreen products. Not only that, people also should wear a sunscreen product not only for outdoor activities only but also for indoor activities. However, we should know that sunscreen will not fully protect us from UV rays and therefore, we will need some extra protection when going outside. We also need to educate ourselves that sunscreen product is a unisex product.

By using fuzzy conjoint method with 5-likert scale represented by 'Strongly Disagree', 'Disagree', 'Uncertainty', 'Agree' and 'Strongly Agree', this study was aimed to identify the students' and lecturers' perception of sunscreen products in FSKM UiTM Shah Alam. From Table 17, the first ranking of students' and lecturers' perceptions for sunscreens which represents 'Strongly Agree' is women use sunscreen more frequent than men and the fifth ranking with the degree of similarity of 0.75397 is that the majority of men do not wear sunscreen because it does not make them masculine. Hence, it is proven that we need to educate ourselves to change our perceptions that sunscreen is actually a unisex product and can be used regardless our gender.

Besides, the fuzzy conjoint method is a helpful method in calculating human perceptions. Sometimes, we usually use simpler methods such as finding the mode, mean or median in representing humans' perceptions. This will be quite difficult when it comes to decision making. For example, Table 19 shows that there are two statements that the respondents strongly agree and agree respectively. Table 17 also shows that there are four statements that respondents agree with and two statements that the respondents strongly agree with. Therefore, without using the fuzzy conjoint method, we might not know which attributes that we need to prioritise to increase the awareness of sunscreen and the highest perceptions of sunscreen among students and lecturers in FSKM UiTM Shah Alam.

Meanwhile, there are some recommendations that can be made based on this study for future references. The future researchers can expand the sample from only students and lecturers in FSKM UiTM Shah Alam to all students and lecturers of UiTM Shah Alam. They also can expand the sample with different background economic, rural or urban or education or gender. By expanding the sample, we can get better and comprehensive results or hypotheses whether different educational backgrounds and income will affect the respondents' perceptions about using sunscreen.

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