

# Research on Hanoi Women's Demand for Sun Protective Clothing

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## Abstract

*Sun protection is an essential need of most women in Hanoi, especially in hot weather and ozone depletion. Sun protective clothing currently meets the needs of covering and protecting against UV rays but does not satisfy all the needs of comfort and aesthetics of the wearer. In order to propose solutions to improve the product, the researcher has designed a questionnaire, conducted a paper-based survey and electronic survey for 400 women living in Hanoi. The results showed that most of the respondents were satisfied with the sun protective ability and the reasonable price was from 200,000 to 500,000VND, however, if the product is improved on the style of clothing (simple, youthful, active), covering the whole body, the construction can be flexible according to the needs of use, integrating the ability of light rain-proof, antimycotic, it will better meet wearer's demand.*

Keywords: Clothing comfort, clothing style, sun-protective clothing, Hanoi women.

## 1. Introduction

Currently, researchers all agree on the concept of sun protection meaning against ultraviolet radiation (UVR). However, some data has shown that visible light (VIS) and infrared A (IRA) radiation can also have harmful effects on human skin causing photochemical and even cancer. Hence, from the point of view of some researchers, modern sun protection should include protecting the human skin from longer wavelengths such as VIS and IRA.[1]. Protecting the skin against the harmful effects of sunlight includes the following acts: avoiding going out during the hottest hours of the day, applying sunscreen, wearing a hat and long sleeves. Nevertheless, sunscreen is expensive, time-limited effects (2-3hours), and cause discomfort sensations (oily, suffocating, ...) to the skin. In addition, there is the fact that most people apply sunscreen too thinly (below 2.0 mg / cm<sup>2</sup> - the level recommended by the FDA for the Asian skin) which leads to sunscreen lost much of its effectiveness [1]-[4]. Consequently, looking for the shade during peak time and using sun-safe clothing are today's typical recommendations [1].

The UV protection function of a garment depends on two criteria: (1) the level of fabric's ultraviolet protection factor (UPF) and (2) the level of exposed body surface area (BSA) of apparel design. The first aspect is determined by the composition of the fabric, the density of weaving, the geometric structure as well as the thickness and weight per unit area and color. Besides, in the fabric finishing process, in order to

increase UVR resistance, chemical compounds such as optical whiteners, and UVR-cutting agents can be added. The level of UVR protection of various fabrics (UPF) has been established by national standards in Australia / New Zealand, the United States, and the European Union, which are clear and easy to understand for consumers[5]. Nevertheless, Kenneth Bielinski and Nolan Bielinski (2014) have indicated that common clothing can also have UVA/UVB protection ability as well as sun-safe clothing [6]. In the second criteria, industry standards have emphasized the need to protect the skin by covering a significant percentage of body surface area and by reducing UVR transmission through the fabric. Downs, Nathan & Harrison, Simone (2018) have developed a new index ranking of sun protection clothing combining BSA coverage of the clothing and UPF of the fabric, called garment protection factor - GPF. GPF increases proportional to BSA of the clothing and UPF of the fabric. Sun protection ability of the garment represented by GPF is divided into 3 levels: garments meet the minimum standard if GPF is below 3; garments with good sun protection if GPF is from 3 to 6; and excellent protection if GPF is equal to or greater than 6. This study systematically has addressed objective guidelines for users on how to evaluate sun protection properties of clothing [5]. In spite of that, there have not been many researches focusing on the aesthetics of sun protection of clothing. In the context of skyrocketing skin cancer rates, fashion in collaboration with the medical

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industry can make a positive difference to protect people from the harmful effects of sunlight [7].

Vietnam is a country with a tropical monsoon climate, lots of sunshine, and high annual UV index (6-12). Under the influence of global warming, abnormal weather changes with prolonged hot weather, sun protection to avoid skin damage and the risk of skin cancer are more important than ever. The market of sun-protective clothing in Vietnam has been considered a potential market but it has been still left open. Sun protection outfits are mostly at affordable prices, designed and manufactured by local small businesses. Corresponding to that, the quality and design have been below average, sloppy, unsightly, messy color and pattern, which can not be a complete product and synchronized with existing outfits of the wearer. Perhaps users still consider sun-safe outfits as a temporary garment then do not invest much for it. Some brands such as Canifa, Format, UV100, Laroma... has met the needs of sun protection and covering with a long coat in basic design and using anti-UV material. The design is simpler in appearance, but from the researcher's point of view, it is possible to make further improvements in terms of aesthetics and clothing comfort.

In order to support the design solutions to improve the aesthetics and comfort of sun-protective clothing, this study conducted a survey on Hanoi women's demand for sun-safe outfits.

## 2. Methods

### 2.1 Questionnaire design

A paper-based, self-reported questionnaire was used to survey the demand of Hanoi women for sun-safe garments. We mixed paper-based survey and electronic survey depending on whether the accessibility was direct or indirect. A multidisciplinary team included a fashion designer, a garment technician, a lecturer in fashion design who was also directly involved in using sun protective clothing, participated in questionnaire design. Basing on referencing research documents, 16 items related to demographic information (age, income), transportation (vehicle type), demand for sun-safe clothing (size, wearing problems, preference choices, price,...) were discussed and selected. In addition, survey participants always have the opportunity to present subjective opinions in sections of demand surveys. For completing, the questionnaire was discussed by the group about the necessity of each item and in order to increase the objectivity, 10 people in the survey group were selected to conduct a trial survey to fix errors such as multi-meaning or unclear questions.

### 2.2 Study subjects

In this research, a survey was conducted for 400 Hanoi women aged 15 to 60 years old about their need for sun protective clothing (size, wearing problems, preference choices, price,...). They were selected for the survey based on "convenience" or "ease of access" according to the subjectivity of the researcher. The questionnaires were distributed in online and offline format and gathered after 2 weeks. The survey only takes a few minutes to complete and no incentives are given to participants.

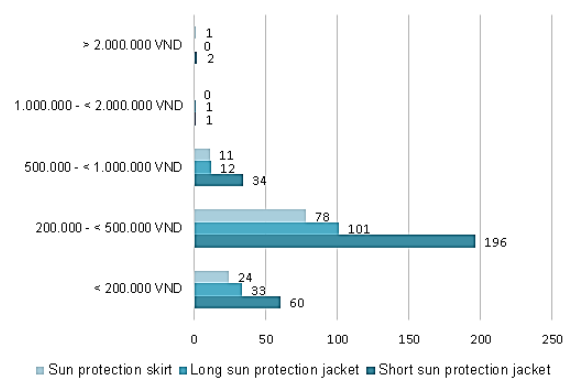
### 2.3. Data analysis

The collected data were processed using IBM SPSS Statistics software, version 23 and statistical analysis was performed. The objective of the survey is to synthesize the needs of Hanoi women for sun-protective clothing so that businesses can improve the product to better satisfy customer's needs.

## 3. Results and Analysis

### 3.1 Respondent characteristics

The majority of respondents were between 20 and 34 years old (81.6%), so the results of the survey reflected the needs of young women. 66.8% of the respondents agreed to pay for sun safe apparel ranging from 200,000 to 500,000 VND. In the survey, all of 400 respondents used sun protection clothing, of which 134 (33,5%) owned at least two or more sun protective clothing for the need to cover the whole body or use them flexibly according to the intended use.



**Fig. 1.** The price that a customer is willing to pay if sun protective clothing is improved with Type of sun-protective clothing.

### 3.2 Consumption Behavior

All women who participated in the survey used at least one sun protection outfit, showing that the women's sun protection demand has been very high, rarely impulse consumption. Therefore, focusing on improving the product is what businesses should bring into focus. However, about half of the respondents

(51.2%) chose no brand products, followed by two branded products which were Uniqlo (27.9%) and Canifa (10%) (Fig.2). These data were reasonable with the majority of price options from 200,000 to 500,000 VND. The data on the average time of using sun protective clothing showed that users replace within 1-2 years, this revealed that the life cycle of current sun protection outfit has been not long, corresponding to the above price (Fig.3). Basically, the product will be old after 1-2 years of use.

In addition, the figure of 27.4% of respondents choosing to replace if they find a better product, indicating that there has been still latent demand for further product improvement. If the product satisfies the need of the customer, the life cycle is longer and with 33.5% owning at least 2 sun protection products, enterprises can consider the price for a full-body covered sun safe outfit within the price range from 400,000 to 1,000,000 VND.

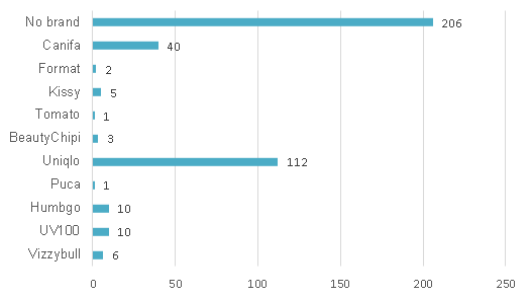


Fig. 2. Frequency of sun protective clothing brand in using

Data on form of payment showed that cash has been still the top choice (73.4%)

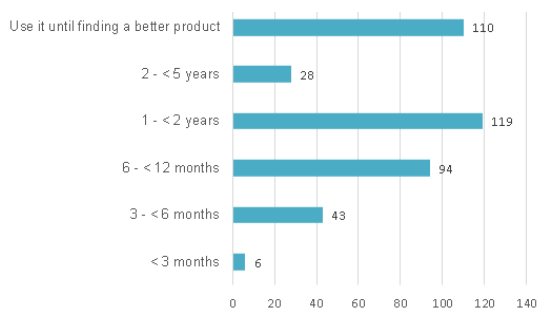


Fig. 3. Average time using sun protective clothing

Two popular shopping places chosen by respondents were retail stores (34.6%) and traditional markets (23.6%). Analyzing crosstabs with product brands, the above figures corresponded roughly to the percentage of no branded products. Online purchases accounted for 16.4%, of which 84.6% were branded products. Consumers who buy garments generally want to try on them before deciding to purchase, the proportion of branded products that account for a large

share of online purchases showed that brand has played a relatively important role in showing credibility to buyers.

### 3.3 Suggestions for sun protective clothing design

In general, apparel has three basic functions: the function of utility, the function of prestige-appearance /social status, and aesthetic function. Accordingly, the study investigated the need for these basic functions in sun-safe outfits in Hanoi's situation. Most of the respondents bought the product first because of the sun-protective function (98%), however, the data showed that customers also wanted to own a sun-safe clothing with other functions such as dust protection (64.8%), light rain protection (37.3%) and well-dressed when outdoor (41.8%). For the function of showing prestige - appearance /social status, the choice was negligible (2,5%).

In the investigation in the order of priority for the 7 factors of sun protection clothing (with 1 being the most preferred), from the mean value, it can be seen that: the most preferred factor was "The sun-safe outfit expressing individual style" (2,22), followed by the factors of "Sun-protection" (2.52), "Comfort" (2.93), "Clothing's shape" (4.48), "Material" (4.91), "Structure of clothes" (5.29) and finally "Pattern" (5.54). From the art of costume perspective, shape, material, the structure of clothes and pattern are specific elements for "The sun safe outfit expressing individual style". In addition to the sun protection factor, which is a natural factor when it comes to sun safe clothing, expression of personal style and comfort are the two factors that brands need to improve.

Basically, the user chooses the garment product that suits her daily outfit style. Surveying in this factor reflected that about three-fourths of the respondents chose the simplicity (70.8%), the youth and activeness (67%) (Fig.4). This choice is also suitable for the specific characteristics of sun-safe garment, then it can coordinate harmoniously with the user's main attire, as well as ensure the comfort of use. The youthfulness and activeness are also suitable for the majority of the respondents in the group of young women (20 - 34 years old).

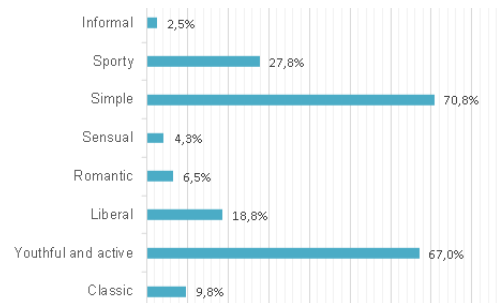


Fig. 4. Daily personal outfits style

Research on the satisfaction of respondents about their currently sun protection clothing was conducted by a specific survey on factors such as sun protection, dust protection, light rainproof, shape, material, pattern, color, style, body coverage, colorfastness, fit, seam strength, moisture drainage, air permeability, crease resistance, mold resistance, easiness of movement, and price. The survey used the 5 point likert scale to assess the satisfaction of respondents with these elements, in which the distance value = (Maximum - Minimum) /  $n = (5-1) / 5 = 0.8$ . The meanings of the levels were as follows: 1.00 - 1.80: Very satisfied, 1.81 - 2.60: Satisfied, 2.61 - 3.40: Neutral, 3.41 - 4.20: Dissatisfied, 4.21 - 5.00: Very dissatisfied. Statistical analysis of the mean value of all factors indicated that users satisfied with: sun protection, dust protection, shape, material, color, body coverage, colorfastness, fit, seam strength, moisture drainage, air permeability, crease resistance, easiness of movement, and price. For pattern, style, light rain protection, mold resistance, respondents expressed a neutral attitude. However, when considering each element in detail, the number of respondents choosing a neutral level was not small, ranging from 25% to 45% of the participants. Neutrality is necessary for the satisfaction scale, but a large number of respondents choosing this level can lead to an unclear direction in improving products. Issues such as a high number of factors to investigate (18), specialized terminology, or respondents' experience of using the product can lead to their choice of neutral status.

Statistics on respondents' outfit sizes showed that the M size data accounted for the largest proportion (47.3%), followed by L (25.9%), S (16.9%), XL (6, 7%), XS (1.5%), XXL (1.2%).

Vehicles influence sun protection clothing design in such aspects as using behavior, ergonomics. Surveying this factor resulted in motorcycles as a means of transportation of 90.3% of respondents, of which automatic transmission motorcycle accounted for 61.7% and Honda was the popular brand, accounting for 77.9%.

#### 4. Conclusion

This study has investigated the demand for sun protection clothing of Hanoi women. The possibilities for product improvement are found in issues such as sun safe outfits' style and comfort. The results showed

that most of the respondents were satisfied with the sun protective ability and the reasonable price was from 200,000 to 500,000 VND, however, if the product is improved on the style of clothing (simple, youthful, active), covering the whole body, the construction can be flexible according to the needs of use, integrating the ability of light rain-proof, antimycotic, it will better meet wearer's demand. In order to improve sun protection garments successfully, future research needs to examine more specifically the user's experience and perception of tangible and intangible aspects of the product. Kansei Engineering can be considered as an appropriate tool to translate users' experiences and feelings into parameters that effectively support future sun-protective clothing design and development.

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