International Journal of Marketing, Communication and New Media
ISSN: 2182-9306. Special Issue on Sustainable Marketing, JUNE 2021

Research Paper

Knowledge of the Markings and Marketing Declarations for Sun Protection Products

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ABSTRACT

Information, in the form of written messages or symbols, placed on the packaging of cosmetic preparations, including sunscreen preparations which are so important for health, is a valuable source of consumer knowledge about a given product. The aim of the study was to assess the knowledge of markings and marketing declarations. Moreover, to obtain information regarding which markings the respondents pay attention to and which of them they associate with the high quality of sunscreen preparations. The respondents' opinion on the usefulness of selected statements was also examined. A total of 201 respondents, purposively selected, participated in the quantitative study using a proprietary survey questionnaire. Research results indicate that the knowledge of markings and marketing declarations is unsatisfactory. 11.4% of the respondents stated that they did not know any of the quality labels presented in the survey. It was shown that the respondents pay special attention to the information and the symbol indicating protection against UVA (*ultraviolet type A*) and UVB (*ultraviolet type B*) radiation. They also believe that this translates into a high quality of the photoprotective preparation. A significant proportion of the respondents expect sunscreen preparations to include the guidelines for the proper selection of a product for the type of skin and the level of exposure to sunlight, as well as information on the exact amount of preparation that should be applied to the skin to achieve the protection level indicated on the packaging.

Keywords: Sunscreen preparations; packaging, markings; marketing declarations.

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Received on: 2021/03/30

Approved on: 2021/06/27

Evaluated by a double blind review system

1. INTRODUCTION

In the modern, dynamically developing economy, correct, transparent and understandable labelling of the packaging plays a crucial role. It is particularly important in self-service sales, where information on the packaging often becomes the only source of information about the product. The packaging performs many important functions, one of them is the information function, enabling the consumer to obtain knowledge about: the type of product, its features, operation, date of manufacturing, method of use, expiry date, storage conditions, manufacturer and others. Packaging is a kind of space used by the manufacturer to communicate with a potential or current buyer. This means that it provides information about the product, promotes it and builds trust in the product and brand. Packaging is also an important marketing tool used to build a competitive advantage. It enables the creation of a product image and makes it easier for consumers to make purchasing decision (Ankiel & Sojkin, 2018; Białecki, 2006; Emblem & Emblem, 2014; Kubiak & Borowy, 2014; Malinowska, 2020; Wnorowski, 2009)

According to many authors, labelling is a significant part of the product and element of marketing. Information on the packaging may support companies' marketing communication strategies, build the image and brand (Ankiel & Walenciak, 2016; Limon, Kahle & Orth, 2009; Shah, Ahmed & Ahmad, 2013). Nowadays, it is expected that product packaging is a carrier of commercial information that performs educational and warning functions, and not only promotional (Rak, 2011).

UV protective preparations are a special type of cosmetic products because their primary function is to protect the skin against the harmful effects of UV radiation, and thus to protect human health. In the European Union, sunscreen products have the status of cosmetics, while in the United States, most sunscreen products are registered as OTC (over-the-counter) drugs. These preparations are subject of broader and more restrictive studies on effectiveness and safety (Baron & Stevens, 2002; Krzyżostan, 2018; Palm & O'

Donoghue, 2007).

According to information published in 2016 by the World Health Organization, every person is exposed to UV radiation emitted by the sun. Ultraviolet radiation has been classified by the World Health Organization as a carcinogen responsible for the formation of skin cancers, including basal cell carcinoma, squamous cell carcinoma and melanoma (Kryczyk, Piotrowska, Opoka & Muszyńska, 2018; *World Health Organisaton,* 1992; *World Health Organisation,* 2012). It has been proven that excessive exposure to UV rays, among other things, may cause: erythema, skin pigmentation, sunburn, premature skin aging, lead to the development of precancerous lesions and skin cancer, and immunosuppression (Egambaram, Pallai & Ray, 2019; Lucas, Neale, Madronich & McKenzie, 2018; Narbutt et al., 2018).

Research findings indicate that proper use of sunscreen products is effective in reducing the risk of skin malignancies (Ghiasvand, Weiderpass, Green, Lund & Veierod, 2016; Green, Williams, Logan & Strutton, 2011; Olsen et al., 2015). Studies also show that these formulations are often applied incorrectly and thus do not effectively protect against the harmful effects of sunlight. One reason for this may be insufficient understanding of the labeling on sunscreen formulations (Geller et al., 2002; Petersen, Datta, Philipsen & Wulf, 2013).

Taking into account the above facts, sunscreen products should be commonly used and form the basis of daily care in order to prevent cancer and skin damage. Providing effective skin protection through the use of sunscreen preparations depends, inter alia, on the correct selection of the product for the type of skin and the degree of exposure to solar radiation, as well as the appropriate amount and frequency of application of the preparation on the skin.

Producers of sun protection cosmetics must pay special attention to the information included on the packaging of the photoprotective product. The labelling on the packaging, in the form of information, symbols and warnings, must be informative and educational. It should warn the consumer about the harmful effects of UV radiation, inform about the dangers of excessive exposure to the sun, about the lack of 100% protection after using sunscreen, and about the need for frequent and abundant application to ensure proper skin protection (British Association of Dermatologists, 2013; European Commission, 2006).

The aim of the present study was therefore to assess the knowledge of labelling and marketing declarations of sunscreen products, as well as the usefulness of information placed on the packaging of sunscreen preparations. The respondents were also asked to indicate which labels and information they pay special attention to and which, in their opinion, translate into high quality of the preparation.

The paper contains a theoretical overview on: legal acts regulating the rules of cosmetic products labeling, organizations certifying natural and organic cosmetics and claims related to sunscreen products. Next, the results of a survey concerning the knowledge of labeling and marketing claims of sunscreen products are presented and discussed.

2. LITERATURE REVIEW

2.1 The legal regulations of cosmetic products labelling

Information and marking of cosmetic preparations are regulated by both national and European Community law. The overriding legal act regulating the cosmetics market in Poland and in the European Union, including also markings, is the Regulation of the European Parliament and of the Council (EC) No. 1223/2009 of 30 November 2009 on cosmetic products. It is worth paying attention that this law is identical in all European Union countries and therefore ensures the same level of cosmetics safety in all member states, and also allows for the free exchange of goods. Article 19 of this Regulation, regarding markings, specifies what information must appear on the outer packaging of cosmetic products made available on the market. According to the Regulation, the labelling should be indelible, easy to read and visible, and the packaging should contain information such as:

1. Name and surname or registered company and address of the responsible person (imported preparations should contain the name of the country of origin).
2. The nominal content at the time of packaging, expressed in units of weight or volume.
3. The date until which the cosmetic product, when stored under appropriate conditions, retains its original properties in full.
4. Necessary precautions to be taken while using it and any other information on precautionary measures required for cosmetic products for professional use.
5. The product batch number or markings allowing the identification of the cosmetic

product.

6. The function of a cosmetic product, unless it is clearly apparent from its presentation.

7. List of ingredients, preceded by the term "ingredients" (this information may appear on the outer packaging only) (Regulation No. 1223/2009; Steinberg, 2011).

Some information may be included on an attached leaflet, label, band, tag or card. It is also possible to include information as a symbol or in an abbreviated form. Additionally, the Regulation stipulates that any information on the label, i.e. text, names, trademarks, pictures or other signs, must not be used in such a way that it attributes features or functions that, in fact, these products do not have (Regulation No. 1223/2009).

In the Commission Regulation (EU) No 655/2013 of 10 July 2013 setting out common criteria for justifying claims used in connection with cosmetic products, it is specified that consumers are faced with very diverse claims regarding the composition, function and operation of a cosmetic product. Therefore, manufacturers should ensure that the information provided in the claims is useful, understandable and reliable, and enables consumers to take conscious decision and to select products that meet their needs and expectations (Commission Regulation (EU) No 655/2013).

In addition to the mandatory information, which, according to the Regulation of the European Parliament and of the Council (EC), must appear on the packaging of cosmetic products, the manufacturer may place additional graphic and / or language signs in order to provide the consumer with more information about the product. These, among others, include: product certificates, recommendations of market institutes, ecological certificates, decorations, ornaments and other language and graphic signs, QR graphic code redirecting to product advertising, fan page (Ankiel & Sojkin, 2018).

The rules of labelling placed on packaged goods are also specified in the Act of May 7, 2009 on packaged goods, where, among other, it is stated that packaged goods introduced to the market must have: product name, nominal quantity of the product, company name of the packer, the person ordering the packing, importing or importer and their addresses, as well as the nominal quantity of the product (Journal of Laws 2009 no. 91 item 740; Journal of Laws 2009 no. 122 item 1010).

The following also apply: Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of

substances and mixtures, amending and repealing Directives 67/548 / EEC and 1999/45 / EC and amending Regulation (EC) No. 1907/2006; Act of 13 June 2013 on the management of packaging and packaging waste (Journal of Laws 2013 item 888; Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008).

The Act of 13 June 2013 on the management of packaging and packaging waste allows the entrepreneur to place markings on the packaging indicating: the type of materials the packaging was made of; the possibility of multiple use of the packaging in the case of reusable packaging; the suitability of the packaging for recycling in the case of recyclable packaging (Journal of Laws 2013 item 888).

Ordinance of the Minister of Environment of September 3, 2014 on packaging labelling templates pursuant to Art. 15 sec. 4 of the Act of 13 June 2013 on the management of packaging and packaging waste defines the packaging labelling templates specifying the individual types of materials which they were made of (Journal of Laws 2014 item 1298).

Natural, ecological (organic) products are becoming more and more common on the cosmetics market. Unfortunately, in Poland and in the European Union there are no legal regulations defining such cosmetic products. However, in 1996 the Cosmetic Products Expert Committee of the Public Health Committee of the Council of Europe (ESCOP) was established. Experts have developed a definition of a natural cosmetic: "Natural cosmetic is a product that is supposed to beautify and nourish with natural substances, skin and environment friendly, promoting health, supporting self-regulation of the body and supporting the preservation of natural beauty and harmonious development of the body and spirit for a long time." "A natural cosmetic is a product obtained from ingredients of natural origin (plant, animal, mineral), obtained by physical (for example, pressing, extraction, filtration, distillation, drying, etc.), microbiological or enzymatic methods" (Jabłońska, 2019; Mirkowska, 2013).

At the request of the European Commission, the independent, non-governmental international organization ISO (International Organization for Standardization) has established standard 16128-1:2016 and 16128-2:2017, which defines natural and organic ingredients and presents a methodology for calculating indices of naturalness, natural origin, and organics and organic origin. Like other ISO standards, standard 16128 is not

legally required (ISO 16128-1, 2016; ISO 16128-2, 2017; Lauriola & Corazza, 2019).

2.2 Certification of natural and organic cosmetics

Due to the great interest of consumers in products described as "natural", "organic", "eco" or "bio", and to ensure the credibility of declarations on products marked this way, many independent institutions have been established to certify and supervise the production of natural and organic cosmetics. Certification of a given product is a paid service and confirms that the product meets the criteria specified and required by a given institution. Certification organizations control the product in terms of its naturalness, safety and performance, and verify the quantity, quality and origin of the components it contains (Mirkowska, 2013).

Certifying organizations operating in Europe include: ECOCERT, International Organic and Natural Cosmetics Corporation BDIH, NaTrue, BIO Cosmetique Charte Cosmebio, Soil Association Organic Standard, ICEA (Ethical and Environmental Certification Institute), Vegan Society (Tab. 1.) (Duber-Smith, 2013). Five organizations (BDIH-Germany, Cosmebio/EcoCert- France, ICEA- Italy and Soil Association- UK) have established common standards for natural and organic cosmetics. The COSMOS standard defines the certification requirements for natural and organic cosmetic products in Europe. The main objectives of the COSMOS standard include, among others: promotion of organically grown products, respect for biodiversity, responsible use of natural resources, respect for the environment, development of the concept of "Green Chemistry" (Barros & Barros, 2020; Lee, 2013; Pawlik, Niewęgłowska-Wilk, Kalicińska & Śpiewak, 2017).

The market also includes the EU Ecolabel "EU ECOLABEL", which is part of the Community's sustainable consumption and production policy, which aims to reduce the negative impact of consumption and production on the environment, health, climate and natural resources, regulated by Regulation (EC) No 66/2010 Of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel (Regulation (EC) No 66/2010).

In Poland, the certifying body is the Polish Centre for Testing and Certification, which awards the ecological label "ECO CERTIFIED NATURAL COSMETIC". It can be obtained by natural cosmetics that do not cause negative effects on the environment and meet the established criteria for the protection of health, the environment and the effective

use of natural resources throughout the product's life cycle (Polish Centre for Testing and Certification, 2021).

Table 1. Selected certification organizations and ecological symbols

Certification organizations	Ecolabelling
ECOCERT	
International Organic and Natural Cosmetics Corporation BDIH	
NaTrue	
BIO Cosmetique Charte Cosmebio	
Soil Association Organic Standard	
ICEA (Ethical and Environmental Certification Institute)	
Vegan Society	
EU ECOLABEL	
ECO CERTIFIED NATURAL COSMETIC	

Source: own study based on: https://icea.bio/en/; https://www.cosmebio.org/en/; https://www.ecocert.com/en/home; https://www.ionc.info/; https://www.natrue.org/; https://www.pcbc.gov.pl/; Regulation (EC) No 66/2010; https://www.soilassociation.org/our-standards; https://www.vegansociety.com/the-vegan-trademark.

2.3 Claims related to sunscreen products

In 2006, the recommendations of the Commission of the European Communities on the

efficacy of sunscreen products and related claims were published in the Official Journal of the European Union (Commission Recommendation of 22 September 2006).

As defined by the European Commission, "claim" means any declaration regarding the properties of a sunscreen product in the form of text, names, trademarks, images or other marks used for labelling, selling and advertising sunscreen products.

These regulations, also referring to Council Directive 76/768 / EEC of 27 July 1976 on the approximation of the laws of the Member States relating to cosmetic products (Directive as amended by Commission Directive 2006/65 / EC), indicate the need for placement of proper statements, precautions and instructions for use on the packaging of photoprotective preparations. They draw attention to the way sunscreen products are marked, keeping the message simple and understandable to enable the consumer to choose the right product.

The document highlights issues such as:

1. The need for frequent, repeated application of the sunscreen product,
2. Amount of the preparation used necessary to ensure proper protection (i.e. 2 mg / cm2, which corresponds to 6 teaspoons of the emulsion (about 36 grams) per body of an average adult),
3. Protection against UVA and UVB radiation should be related, the ratio of UVA to UVB protection should be 1/3,
4. Statements regarding the effectiveness of sun protection against both UVA and UVB radiation should be simple, specific and based on identical criteria,
5. Placing on the label a category of protection defined as: "low", "medium", "high" and "very high", which provides a simpler and more specific indication of the effectiveness of sunscreen products than the numerical values characteristic for the SPF sun protection factor,
6. Consumers should be informed about the dangers of excessive sun exposure.
7. Guidelines should be provided for the appropriate product in terms of sun protection and efficacy, taking into account the level of sun exposure and skin type (Commission Directive 2006/65 / EC of 19 July 2006 amending Council Directive 76/768 / EEC; Commission Recommendation of 22 September 2006; Latha et al., 2013).

The packaging of sunscreen preparations should not contain information such as: "100%

protection against UV radiation", "Sun blocking", "Total protection", "No need to reapply the product", "All-day protection". However, it is advisable for the manufacturer to include warnings, such as:

"Even when using a sunscreen product, it is not recommended to stay in the sun for a long time", "Infants and children should be protected from direct sunlight", "Excessive exposure to the sun is a serious health hazard", "Apply the product before going out into the sun", "Reapply to maintain protection, especially after sweating, swimming or towelling" (Commission Recommendation of 22 September 2006; Smyk, Smyk, Hołyńska-Iwan & Olszewska-Słonina, 2016).

All the above guidelines, in the form of statements placed on the packaging of sunscreen products, are intended to provide the consumer with reliable, professional and understandable information in order to effectively protect the skin against UV radiation. Due to the fact that some information is placed on the packaging in the form of graphic symbols, the basic question arises whether consumers recognize and understand the information encoded in the form of graphic symbols?

3. MATERIAL AND METHODS

The study used a proprietary questionnaire consisting of a total of 12 questions. Multiple-choice closed questions and open-ended questions were included in the questionnaire. Respondents were presented with markings of selected quality certificates, described in chapter 2.2 (Tab. 1), and asked to indicate those they are familiar with. Moreover, selected markings, which the manufacturer is obliged to place on the packaging, and optional statements fulfilling an additional informative function were presented, and respondents were asked to specify the meaning of the symbols (Tab. 2).

A five-point Likert scale was also used to gain knowledge about the degree of acceptance of the presented opinions and statements concerning, among others: the type of information that should be included on the packaging of radioprotective preparations and its meaning and usefulness. Moreover, the respondents could express their opinion on the information and labels that facilitate the choice of an appropriate preparation.

The results of the study have been analysed taking into account selected socio-demographic variables. The influence of selected socio-demographic factors on the

knowledge of symbols, which can be found on cosmetics labels, has been analysed. The markings and information, which particular groups of respondents pay attention to, have been indicated. Gaining knowledge about the information and symbols that translate into high product quality, has also been an important element of the analysis.

The research was conducted using an online survey (64.9% of the questionnaires), as well as paper questionnaires passed to respondents (35.1% of the questionnaires).

The use of the CAWI (*Computer Assisted Web Interview*) technique allowed the quantitative survey to be conducted in a much shorter time, as the survey questionnaire was completed electronically by respondents. This also made it possible to reach respondents during the coronavirus pandemic. The time frame in which the survey was conducted and pandemic restrictions prevented a larger group of respondents from being reached. A total of 201 respondents participated in the survey, including 167 women and 34 men. Respondents were predominantly young, under 35 years of age (48%), followed by middle-aged individuals between 36 and 59 years of age (36%), while those over 60 years of age made up 16% of respondents. Taking into account both socio-demographic factors (gender and age), the highest percentage of the people surveyed were young women (44.7%), followed by middle-aged women (30.3%), and the lowest were men over 60 years of age (3.4%). In the surveyed population, the most numerous group were people with secondary education (50.7%) and higher education (42.2%). There were 4.7% of respondents with vocational education and only 2.4% with primary education. 16.5% of respondents lived in villages and 83.5% lived in towns, of which 11.6% lived in towns with up to 20 thousand inhabitants, 21.8% lived in towns with 20 to 100 thousand inhabitants, 28.8% lived in towns with 100 to 500 thousand inhabitants, and 21.3% lived in towns with more than 500 thousand inhabitants. Respondents with average monthly income per family member above the national average constituted the largest group in the surveyed population (44.2%), 19.9% declared average monthly income per family member below the national average. Persons with income equal to the national average constituted 35.9% of the surveyed population.

The respondents participating in the study were selected in a non-random, purposive manner. The subjective selection of respondents was based on the selection of people who use sunscreen preparations during exposure to the sun, because they are the most valuable

source of information relating to the problem raised. The survey was conducted between December 2020 and the end of January 2021. Survey results were compiled in a Microsoft Excel 2016 spreadsheet and presented as percentages of responses.

Table 2. Mandatory and non-obligatory marking of packaging of UV protective preparations

Symbols on the packaging	Meaning of symbols
	Period after opening the package
	Reference to attached information
	Best-before date
	Flammable product
	Trade mark “Green point”. It means that the manufacturer has financially supported the construction and operation of the system for the recovery and recycling of packaging waste, created by Rekopol Packaging Recovery Organization S.A. in Poland.
	Marking indicating the type of materials the packaging is made of
	Not tested on animals
	Sign “Keep it clean” Informs that the packaging of the used product should be thrown into the bin.
	The “e” sign means the assurance of the packer or the person ordering the packing that the packaged goods meet the requirements specified in the regulations.
	Protection against UVA radiation

Source: own study based on: Commission Recommendation of 22 September 2006; Journal of Laws, 2009, no. 91, item 740; Journal of Laws, 2014, item 1298; Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008; Regulation of the European Parliament and of the Council (EC) No. 1223/2009.

4. RESULTS AND DISCUSSION

The first question in the questionnaire was to determine what percentage of respondents use the information and markings on the packaging of sunscreen preparations. Other variants of answers were also proposed to gain more knowledge about the sources of information about sunscreen products. It was a multiple- choice question. The data analysis shows that more than half of the respondents (52.2%) look for information on the packaging of sunscreen products. A similar number of respondents obtain information from the Internet (53.2%) (Fig. 1).

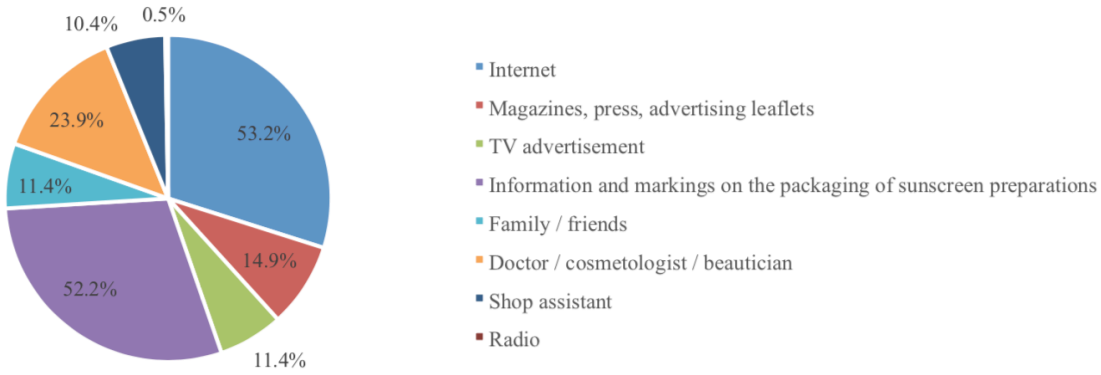

Fig. 1. Source of information on sunscreen products.

An important element of the survey was to learn about the respondents' opinions on the statements presented, which had to be assigned an appropriate degree of acceptance. For this purpose, the Likert scale and the answers were used: definitely yes, rather yes, I have no opinion, rather no, definitely not. Over 60% of respondents definitely confirm that the label should contain guidelines for the proper selection of a product for the type of skin and the level of exposure to sunlight, and additionally 22.4% considered it rather yes. Overall, nearly 80% of respondents considered the information, symbols and signs on sunscreen product labels to be clear and understandable, and to help them choose the right product. A total of 77.1% of respondents pay attention to the graphic symbols and labelling of sunscreen preparations, and more than 50% pay attention to the label regarding the naturalness and environmental performance of sunscreen preparations. The number of respondents who think that sunscreen preparations can guarantee complete

protection against the health risks associated with solar radiation is disturbing, 9% believe that “definitely yes”, 38.8% think “rather yes”. In total, over 80% of the respondents believe that the numerical determination of the SPF sun protection factor is understandable and facilitates the selection of the appropriate preparation, including 46.8% of them as “definitely yes” and 36.3% as “rather yes” (Fig. 2).

In total, over 75% of the respondents believe that including information on sun protection such as "low", "medium", "high", "very high" on the label would facilitate the selection of the appropriate product. This is a Recommendation of the Commission of the European Communities of 22 September 2006 on the efficacy of sunscreen products and the claims relating to them. The category of the sunscreen product should be specified at least as clearly as the sun protection factor. Unfortunately, many products do not contain a definition of the category or it is placed in a less visible place (Commission Recommendation of 22 September 2006).

In total, more than 70% of people participating in the study decided that sunscreen preparations should be accompanied by the instructions for use and the recommended amount of the preparation applied to the skin (exact amount), ensuring effective protection. The recommendations of the European Commission regulate this issue by proposing examples of instructions placed on the packaging of sunscreen preparations, such as: "Apply the product before going out into the sun" or "Reapply to maintain protection, especially after sweating, swimming or towelling". The regulations also specify the amount that provides effective protection, i.e. 2 mg / cm2, which corresponds to 6 teaspoons of emulsion (about 36 grams) per body of an average adult. However, the need to include this information on the packaging, is not indicated.

It has been shown that consumers use a much lower amount of the cosmetic than recommended by the European Commission. The applied amounts of sunscreen are usually from 0.5 to 1.5 mg / cm2, which reduces the protection factor by an average of 20-50% compared to the expected value stated on the preparation packaging. It is also recommended to reapply every 2-3 hours due to the removal of the preparation from the skin through moisture, sweat, physical activity and rubbing with clothes (Bauman, 2013; Bojarowicz & Bartnikowska, 2014; Reich, Harupa, Bury, Chrzaszcz & Starczewska, 2019).

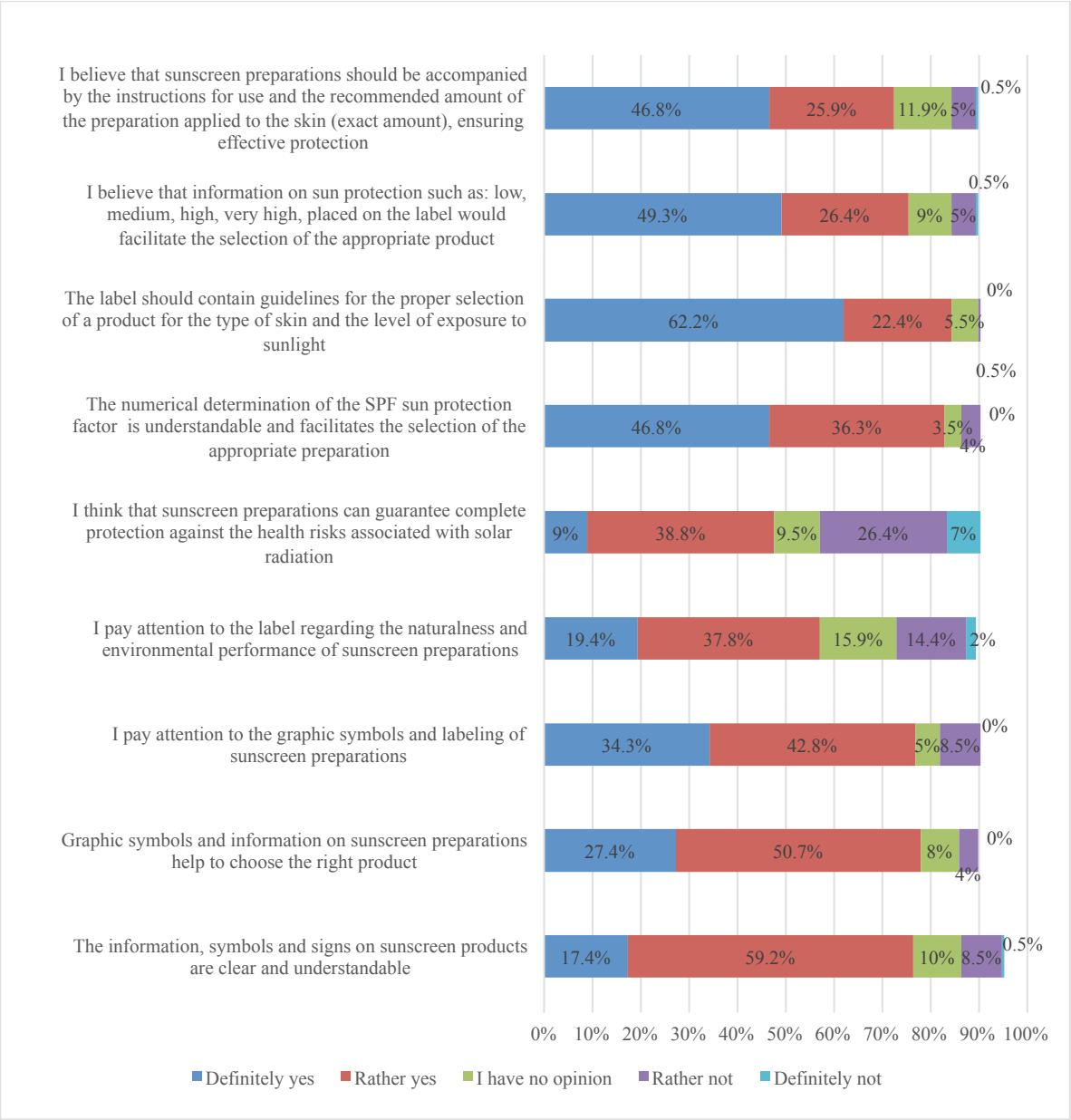

Fig. 2. The degree of acceptance of selected statements concerning the markings of sunscreens.

In order to verify the knowledge of the markings placed by the manufacturers on the packaging of radiation protection preparations, the respondents were asked not only to mark the symbols they know, but also to define their meaning. The results indicate that the most recognizable markings include: the fire symbol denoting a flammable product, most often placed on aerosols (74.1%), the period after opening the package (63.7%), the symbol "Not tested on animals" (61.7%). The symbol denoting protection against UVA

radiation was recognized by 38.8% of the respondents. The "e" sign, denoting the guarantee of the packaging company, was correctly determined by only 6.5% of the respondents (Fig. 3).

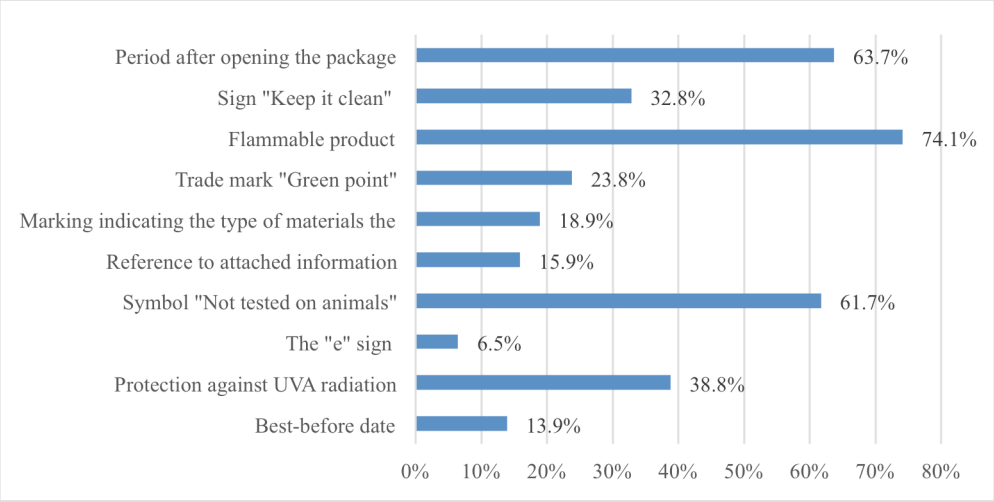

Fig. 3. Knowledge of the symbols on the labels of sunscreen cosmetics.

When analyzing the knowledge of the symbols on the sunscreen products, it can be observed that the labels presented in the questionnaire are better recognized by women than men. Only the "e" sign and the label of the packaging material were recognized by more men than women (Fig. 4).

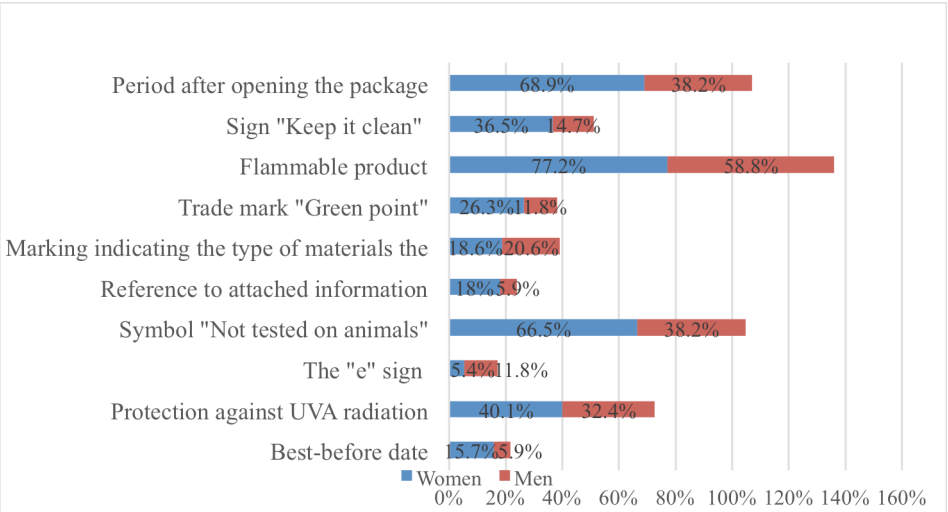

Fig. 4. Knowledge of the symbols on the labels of sunscreen cosmetics among women and men.

In all age groups, the most recognizable symbols were: the period after opening, the fire symbol-flammable product, the "Not tested on animals" symbol, and the UVA protection symbol. However, it can be noted that people over 60 years old recognize the other symbols to a lesser extent (Fig. 5).

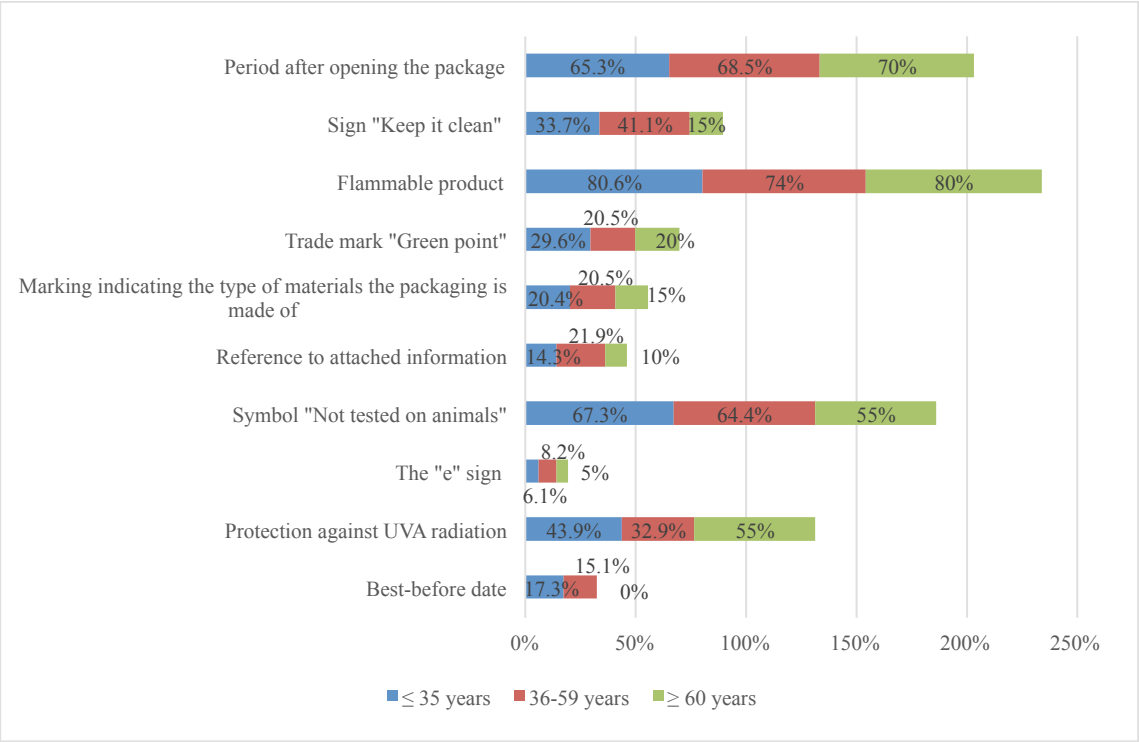

Fig. 5. Knowledge of the symbols on the labels of sunscreen cosmetics among people of different age ranges

The most recognized symbol, associated with natural and ecological products, was the Vegan Society sign, which means that the product is free from animal ingredients (75.1%). 54.2% of the respondents recognize the Eco Certified Natural Cosmetic certificate, 42.3% know the BIO Cosmetique Charte Cosmebio label. The least recognized quality certificate was the Soil Association Organic Standard (10%) (Fig. 6).

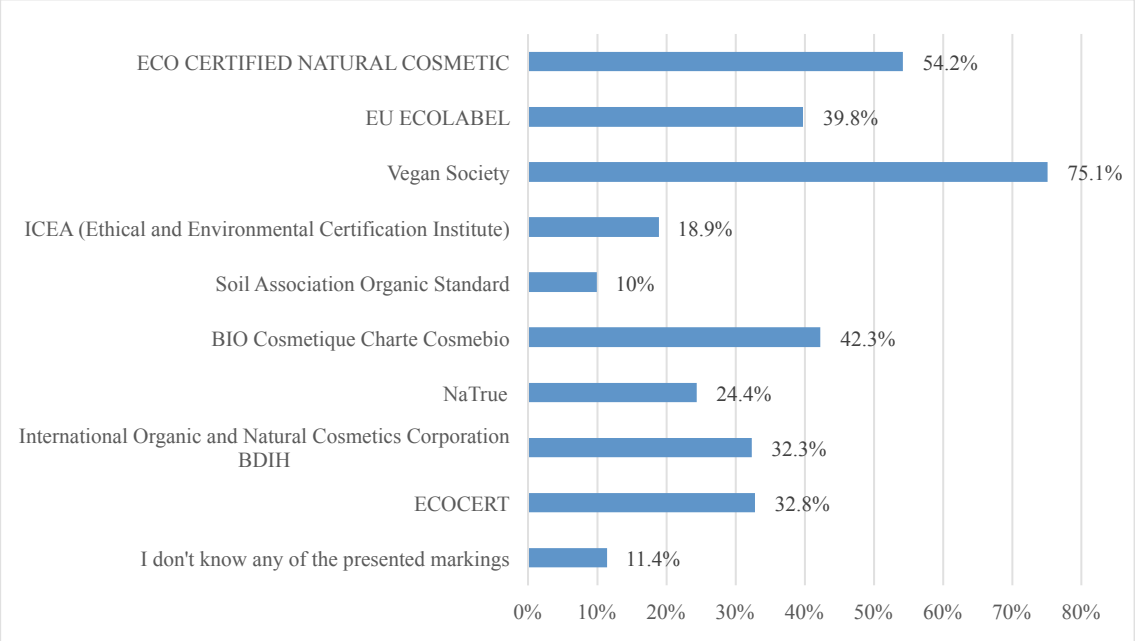

Fig. 6. Knowledge of selected quality certificates

The analysis of the results showed that the respondents pay attention to the following information and markings: information or a symbol indicating that the preparation protects against both UVA and UVB (64.7%), the value of the sun protection factor SPF (60.7%), brand / manufacturer they trust (58.2%), information about the water resistance of the preparation (52.7%). The least important information was the lack of nanoparticles in the preparation (3%). Only 2% of the respondents considered that they did not pay attention to any signs or information (Fig. 7).

The authors of the research on the knowledge of the markings and symbols used on cosmetics indicate still little knowledge of consumers and lack of knowledge of basic pictograms and composition of cosmetics, despite the fact that over the years 2007-2012 the awareness of consumers increased (Wolniak & Moskaluk- Grochowicz, 2015).

The present study showed that 2.4% of women did not pay attention and 0% of men paid attention to any labels or information on sunscreen products.

According to other authors, 4% of women and 2% of men declare that they almost never read the information on the packaging. It is worth noting, however, that the indicated studies concerned cosmetic products, and not only sunscreen preparations (Młoda-Brylewska, 2019).

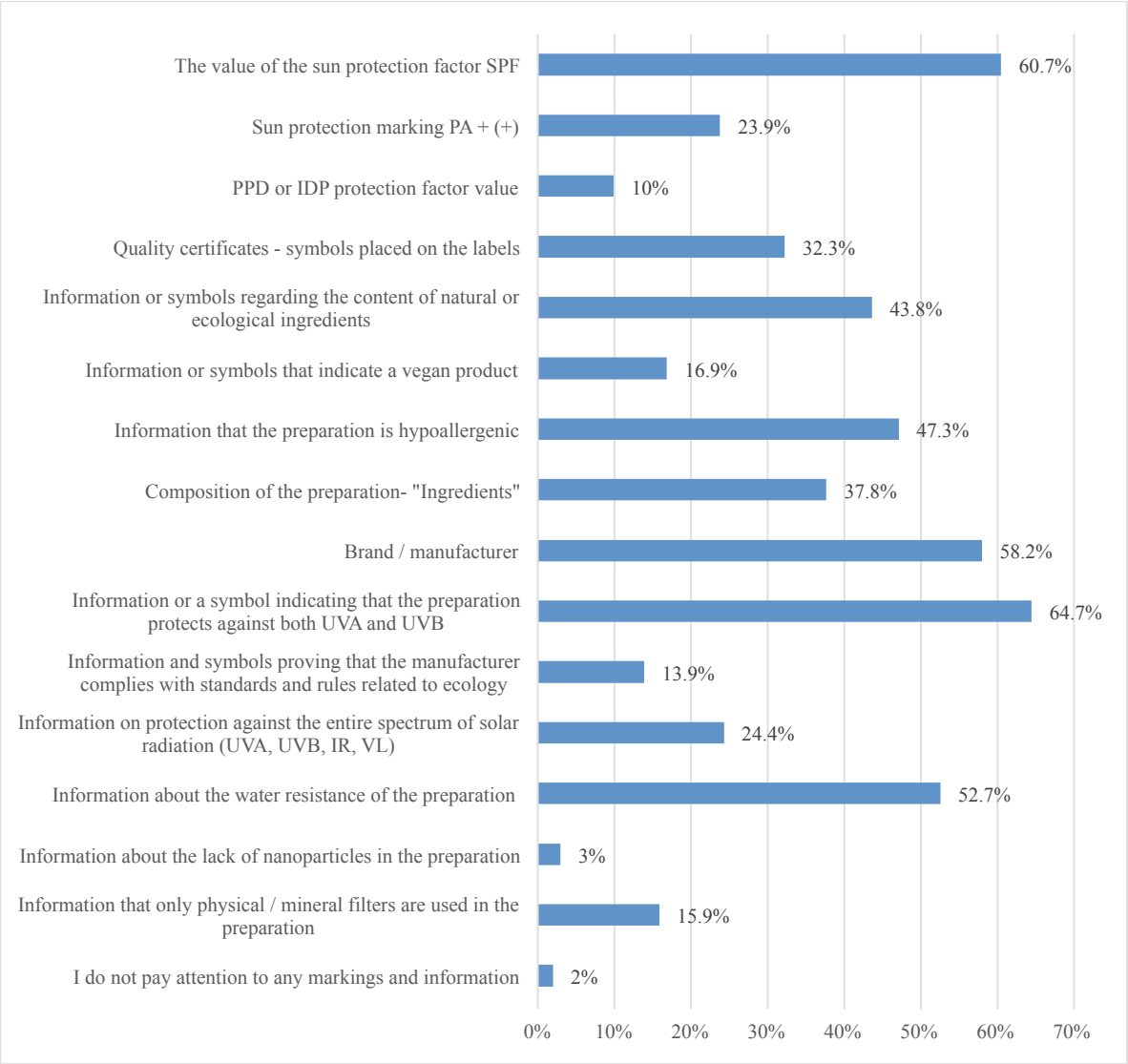

Fig. 7. Information and markings on sunscreen products that respondents pay attention to

The results show that men pay much less attention than women to: information about the absence of nanoparticles in the formulation (0%), the value of the PPD and IDP protection factor (2.9%), the PA+(+) protection designation (5.9%), information about protection against the entire spectrum of sunlight (5.9%), and information about the use of only physical filters in the formulation (5.9%) (Fig. 8).

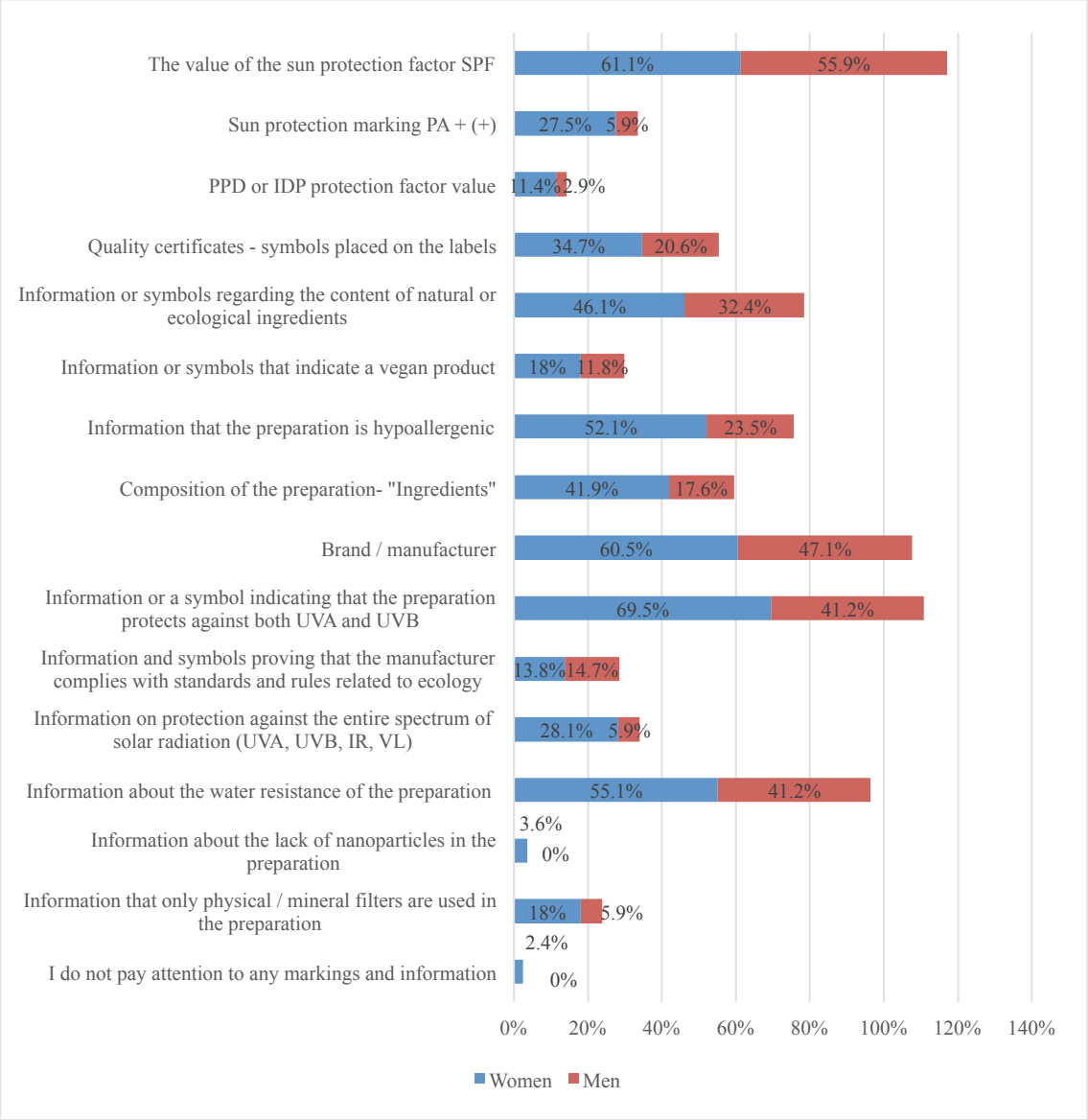

Fig. 8. Information and markings on sunscreen products that women and men pay attention to

When analyzing the information and labels that people in different age groups pay attention to, it is noticeable that very few people over 60 pay attention to: P+(+) sun protection designation (5%), information or symbols indicating a vegan product (5%), information about the absence of nanoparticles in the formulation (5%) and information about the use of physical filters only (5%). The PPD or IDP protection factors were completely irrelevant to them (0%). Younger people are much more likely than middle-aged and older people to pay attention to information and symbols indicating the product

is vegan (30.6%), hypoallergenic (63.3%). The analysis shows that younger respondents are also more likely to read the composition of the product (51.1%). For all age groups, information or symbols indicating UVA and UVB protection, the SPF protection factor and the brand/manufacturer of the product are most important (Fig. 9).

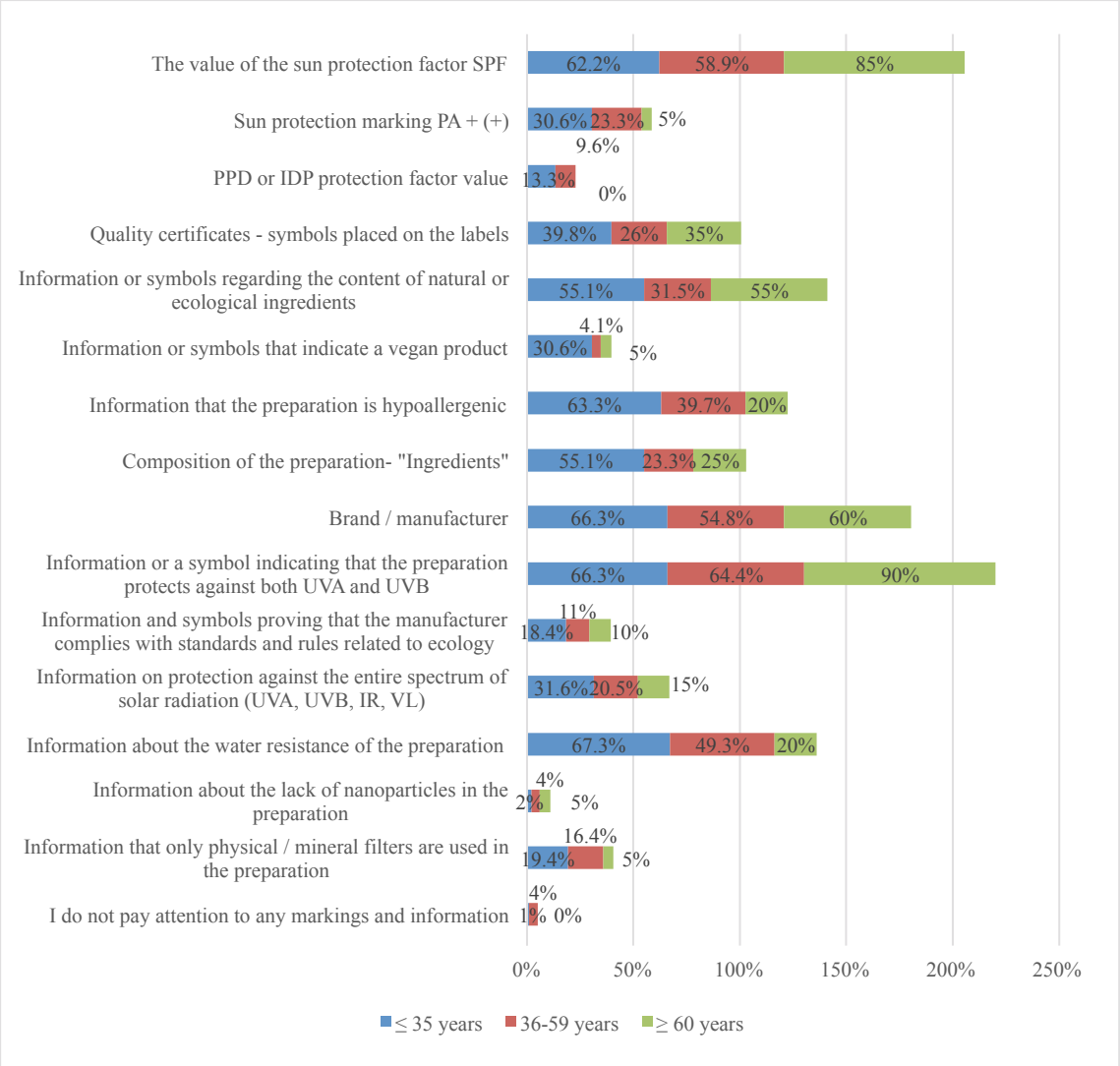

Fig. 9. Information and markings on sunscreen products that people in different age groups pay attention to

An important element of the survey was to learn about the information and markings that, according to the respondents, translate into high quality of products. 62.7% of respondents believe that high-quality products are those with an information or a symbol denoting protection against both UVA and UVB radiation. 61.7% of the respondents believed that information about the naturalness of a product translates into its high quality. Slightly

more than half of the respondents (51.2%) believe that the high value of the SPF sun protection factor is associated with the high quality of photoprotective products. The smallest number of respondents (7%) indicated information about the lack of nanoparticles in the preparation, 6.5% indicated information about the use of nanotechnology. Only 2.5% of the respondents believe that none of the above-mentioned markings translates into the quality of the sunscreen preparation (Fig. 10).

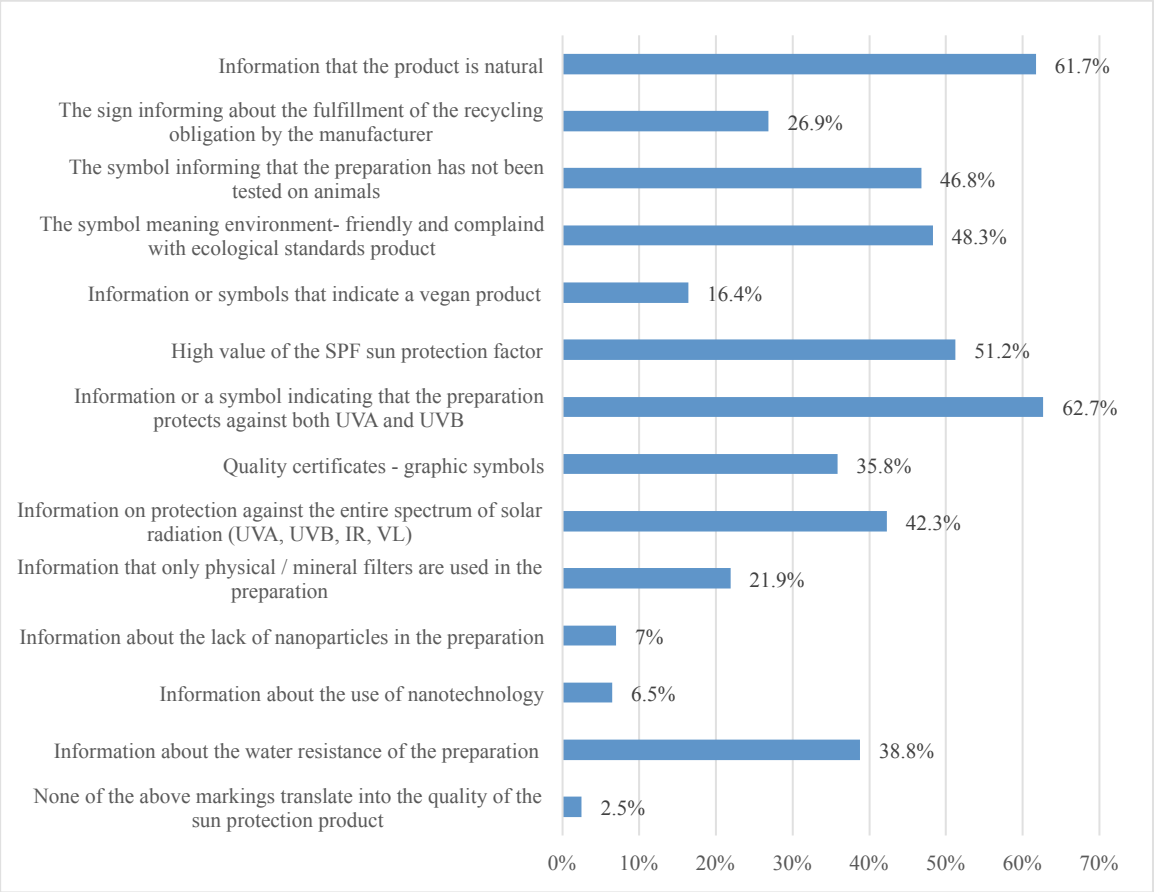

Fig. 10. Information and symbols on the packaging which translate into high quality of the sun protection product

The analysis of the survey results in terms of selected socio-demographic characteristics shows which information on sunscreen products is indicative of a high product quality. Women pointed out mainly to information concerning the naturalness of the product and protection against UVA and UVB radiation. According to men, a high quality of a sunscreen product is indicated by its natural composition. The largest amount of information about the high quality of a sunscreen was given by young people under the

age of 35 and older people over the age of 60. According to young people, in addition to information on naturalness and UVA and UVB protection, the following factors also indicate high quality: the symbol indicating that the product has not been tested on animals and information that the product is environmentally safe and compliant with ecological standards. Natural ingredients, protection against UVA, UVB and other light spectrums and quality certification are considered a proof of quality by the oldest group of respondents. People between 36 and 59 years of age considered information on UVA and UVB protection to be indicative of high quality (Tab. 3).

Table 3. Information and symbols on the packaging which translate into high quality of the sun protection product

Information and symbols on the packaging which translate into high quality of the sun protection product	Women	Men	≤ 35 years	36-59 years	≥ 60 years
None of the above markings translate into the quality of the sun protection product	2,4%	2,9%	3,1%	2,7%	0%
Information about the water resistance of the preparation	39,5%	35,3%	51%	34,2%	15%
Information about the use of nanotechnology	5,4%	11,8%	9,2%	4,1%	5%
Information about the lack of nanoparticles in the preparation	7,2%	5,9%	8,2%	6,8%	5%
Information that only physical / mineral filters are used in the preparation	24,6%	8,8%	25,5%	13,7%	45%
Information on protection against the entire spectrum of solar radiation (UVA, UVB, IR, VL)	44,3%	32,4%	50%	32,9%	60%
Quality certificates - graphic symbols	35,3%	32,8%	43,9%	21,9%	65%
Information or a symbol indicating that the preparation protects against both UVA and UVB	68,3%	35,3%	65,3%	63%	80%
High value of the SPF sun protection factor	58,7%	14,7%	64,3%	53,4%	5%
Information or symbols that indicate a vegan product	18,6%	5,9%	26,5%	8,2%	5%
The symbol meaning environment- friendly and complaind with ecological standards product	52,7%	26,5%	64,3%	39,7%	25%
The symbol informing that the preparation has not been tested on animals	52,1%	20,6%	63,3%	42,5%	5%
The sign informing about the fulfillment of the recycling obligation by the manufacturer	29,3%	14,7%	41,8%	11%	25%
Information that the product is natural	64,1%	50%	67,3%	54,8%	90%

5. CONCLUSIONS

The research results show that information and markings on the product packaging, in addition to the internet, are the main source of information on sunscreen preparations.

Most of the respondents declare that they pay attention to the graphic symbols and

labelling of sunscreen preparations and that they help to choose the right product. In total, over 80% of respondents believe that the label should contain guidelines for the proper selection of a product for the type of skin and the level of exposure to sunlight. It can be assumed that they expect the determination of the type of skin which a given preparation is advisable for and when it should be used, at what time of the day or time of the year. This information could be correlated with the UV index, which is the measured or predicted amount / intensity of ultraviolet radiation at a given location and on a given day. Some weather forecasts on the internet contain information about the UV index.

In accordance with the regulations, the packaging should bear warnings that sunscreen products do not provide 100% protection and that even when using a sunscreen product, it is inadvisable to stay in the sun for a long time. Despite this, almost half of the respondents agreed with the statement that sunscreen preparations can guarantee complete protection against the health risks associated with solar radiation. The opinion of the respondents is quite surprising considering that over 75% declared that the information on the packaging is clear and understandable.

Among the quality certificates and markings typical of natural / ecological products, most people recognized the Vegan Society mark, but it is not a symbol that respondents pay special attention to and which is associated with high quality sunscreen preparations. According to the survey findings, respondents mainly pay attention to the information or symbol indicating protection against both UVA and UVB radiation. This statement, according to the respondents, translates into high quality of sunscreen products. Respondents also believe that information regarding the naturalness of a sunscreen product is related to the high quality of the product.

The vast majority of respondents believe that the choice of sunscreen preparation would be facilitated by information such as: "low protection", "medium protection", "high protection", "very high protection", and that the guidelines regarding the exact amount of the preparation applied to the skin, should be placed on the photoprotective products.

The analysis of the obtained data shows that consumers are not always aware of all the markings that appear on sunscreen preparations.

As the study and literature data show, there is a need to expand education on the meaning of symbols, declarations and quality certificates placed on the packaging of sunscreen

preparations. There is a need to implement educational programs on the negative effects of sun exposure and the necessity of the skin protection as well as the ways to protect it, including the effective use of sunscreen. It is also worth considering the validity of placing the guidelines on the sunscreen preparation regarding the proper selection of the product for the type of skin and the level of exposure to sunlight, i.e. the type of skin which the product is advisable for and the exact amount of the preparation that should be applied to the skin to ensure effective protection.

As suggested by other researchers, more standardized labeling of sunscreen formulations would also be desirable (Wahie, Lloyd & Farr, 2007). It is important that the symbols and labels of sunscreen formulations inform about the risks of sunlight exposure, enable proper product selection, and provide clear and accessible information on how to apply the product to the skin and the amount needed to provide more effective protection.

The author's survey questionnaire used in the study can serve as a comparative study through which the changing knowledge and awareness of respondents about the meaning, recognition and differentiation of individual labels and symbols placed on sunscreen preparations can be assessed. Furthermore, as a relatively small number of people were surveyed, it is necessary to continue the research on the problem presented.

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How to cite this article:

Engler-Jastrzębska, M. &Wilczyńska, A. (2021). Knowledge of the Markings and Marketing Declarations for Sun Protection Products, *International Journal of Marketing, Communication and New Media*. *Special Issue on Sustainable Marketing*, June 2021, 171-199.