Assessing consumers' attitudes, expectations and intentions towards health and sustainability regarding seafood consumption in Italy

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1 Introduction

Guaranteeing sufficient food and sustainable healthy diets is a requirement for the global population of 7.2 billion people, being expected that by 2050 at least 2 billion more people will need to be fed, with 1.1% annual increase in the demand of food products (European Union, 2015). This means that food production will (have to) increase, putting more pressure on land and water resources. Therefore, ensuring food production, processing, distribution and consumption in a way that is socially, economically and environmentally sustainable is one of the main challenges of this century (FAO,2017).

According to OECD-FAO (2017), the ocean and its resources (through fisheries and aquaculture productions) will be indispensable for addressing these challenges in the decades to come. In parallel, international bodies consistently recommend consuming seafood (including saltwater and freshwater fish, molluscs, cephalopods, and crustaceans) due to the corresponding health benefits (WHO and FAO, 2011). Therefore, world seafood production is projected to reach 194 million tonnes in 2026, with an overall increase of 26 million tonnes, or 15 percent compared with the average predicted values in the period 2014-2016. At the same time, global seafood consumption is projected to increase by 19 percent (or 29 million tonnes) by 2026. However, a complex variety of challenges and risks need to be addressed within the seafood sector due to increasing pressures that have been exerted on natural resources and additional

impacts on the environment and bio conservation interests (e.g., over-exploitation, pollution, declining biodiversity and climate change) demanding responsible and more sustainable approaches (OECD, 2016).

The EU and its Member States have articulated a sustainability vision 'to live well within the limits of our planet' by 2050. To do so, it is necessary to transform into a green economy, which addresses the multidimensional challenges of resource efficiency, ecosystem resilience, human well-being, equity and good governance (EEA, 2015). In this context, consumers play a key role, being able to drive seafood production sustainability and responsibility according to their behaviour (Gutierrez and Thornton, 2014; Iles, 2007; Rex and Baumann, 2007), also in relation to their attitudes towards health, nutrition and well-being.

Several studies demonstrated that seafood is widely perceived by consumers as a healthy food, thereby pushing them to be positively inclined towards higher seafood consumption frequency (Carlucci et al., 2015; Trondsen et al., 2004; Verbeke and Vackier, 2005a). However, consuming seafood has been perceived by consumers in an ambivalent way, such as in a difficult balance between meeting healthy nutrition requirements and safeguarding environmental sustainability (Alsaffar, 2016; Mitchell, 2011). Moreover, dietary recommendations to eat more seafood have been criticised as potentially unsustainable (Horgan et al., 2016; Riley and Buttriss, 2011; Westhoek et al., 2011). Thus, in order to achieve sustainability goals and gain the collaboration of consumers towards more sustainable food-related conduct and behaviour, it emerges as important to understand the complexity of consumer psychology dynamics and the individuals' appraisal in consuming seafood in terms both of nutritional health and environmental impact.

Most research has focused on the study of the impact of different socio-economic factors on consumers' health beliefs and choices to consume seafood products. The role of gender (Trondsen et al., 2004), age, educational level (Olsen et al., 2007; Pieniak et al., 2010), and social status as income level (Skuland, 2015) have been studied. However, there is a lack of studies assessing the relation between consumers' health concerns and their attitudes towards sustainability in relation to seafood products.

Furthermore, consumer psychology clarifies how individuals may be grouped according to their similar attitudes and motivations towards a specific food product. Such segmentation helps in orienting and personalizing communicational and educational initiatives thanks to a better understanding of a segment's interests, attitudes and consumption patterns (Brečić et al., 2017; Jaiswal et al., 2020). Segmentation analysis has been used successfully to identify, profile and select target groups that are most likely to benefit from specific campaigns or messages that promote and enhance the use of sustainable products, providing information on opinions and attitudes of the different groups and consequently facilitating the development of the most appropriate communications strategies (Grasso et al., 2019; Van Loo et al., 2017; Verain et al., 2017; Witzling and Shaw, 2019).

On the basis of these premises, this research explores Italian consumers' attitudes towards health and sustainability in relation to seafood, in order to segment different target of consumers. To our knowledge, this is the first scientific study with Italian data showing evidence on distinct patterns toward sustainability among seafood consumers.

2 Material and methods

The framework used in this study is mainly focused on a quantitative exploratory data collection with seafood consumers in Italy, based on an online survey to assess consumer attitudes, perceptions and expectations towards health and sustainability. Data were collected as part of a wider investigation at European level to assess consumer acceptance of eco-innovative seafood solutions and products developed

in the frame of the European project SEAFOOD[TOMORROW][1]. A copy of the research instruments used (i.e. questionnaires and protocols) are available in the related project deliverable (UGent, 2021).

The survey amongst seafood consumers was based on an online questionnaire distributed through a CAWI (Computer-Assisted Web Interviewing) methodology and it was composed of four parts: (i) sociodemographic characteristics of participants; (ii) seafood consumption; (iii) attitude and perceptions about seafood sustainability; (iv) attitudes towards general health (see next section on Measures). Data collection took place during September and October 2019 through the web-based survey using the software SurveyMonkey (SVMK Inc., San Mateo, CA – United Sates), allowing a large group of individuals to effectively express their opinion pseudo-anonymously (Donohoe and Needham, 2008). All data collection was performed according to ICC/ESOMAR principles regarding ethics and standards in social sciences research (ICC/ESOMAR, 2008). All questionnaires were sent to potential participants through a personalized link. This means that every participant had a single unique entry to the questionnaire and was able to fill it out only once. In total, 404 participants completed the questionnaires (837 attempts, 48% completed response rate).

2.1 Measures

In order to answer the research questions, the survey focused on measuring the following variables:

I.   Sociodemographic characteristics: a series of socio-demographical data were collected, including: age, gender, level of education and employment in order to characterize the sample and the resulting consumer segments

II.   Attitudes and perceptions towards seafood consumption: the statement "When I think about eating seafood products, I feel..." and it was presented on 7-point semantic differential scales. In particular, the items investigated consumer attitude based on the following pairs of adjectives: (ITEM1) Bad/Good, (ITEM2) Unsatisfied/Satisfied, (ITEM3) Unpleasant/pleasant, (ITEM4) Negative/Positive.

III. Sustainable seafood consumption and intention to consume: the *average consumption of seafood taking into account the ecolabel, origin and seasonality*, were measured with three ad hoc items with a 5-point frequency scale from 1= never eat/buy to 5= always eat/buy. For example, "On average, how often do you intentionally eat/buy seafood with an ecolabel (e.g. MSC - Marine Stewardship Council, ASC - Aquaculture Stewardship Council, FoS - Friend of the Sea or POPA - Azores Fisheries Observer Program label)?". Moreover, *the Intention to consume seafood with ecolabel/origin/seasonality* assessed the probability that consumers would consume these products in the next week. In particular, three ad hoc items measured on a 7-point interval scale from 1= very unlikely to 7= very likely, were created. An example of items is: "Please indicate how likely you are to eat/buy seafood with an ecolabel (e.g. MSC, ASC, FoS or POPA label) during the next week." Finally, *the perceived consumer effectiveness* questions adapted from Roberts (1996) were presented. A 5-point Likert scale (1 = 'Strongly Disagree' and 5 = 'Strongly Agree') with a total of four items assessed the level of perceived belief that individuals can protect the environment through the consumption of sustainable seafood products (e.g. 'An individual person can make a difference for the sustainability of seafood by carefully selecting seafood products'). Moreover, to measure the *perceived health benefits of seafood products,* seven ad hoc items were created and measured using a 7-point Likert scale from 1= Totally disagree to 7= Totally agree. An example of items is: "Eating seafood products is good for my health".

IV.   Finally, to measure the *general health interest*, a validated sub-scale of the Health and Taste Attitudes Questionnaires (Roininen et al., 1999) called "general health interest" was used. This subscale is composed by eight items measured using a 7-point Likert scale from 1= Totally disagree

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to 7= Totally agree. A high score on this subscale means a high interest in eating healthily and having an interest in light and natural products. An example of items is: "The healthiness of food has little impact on my food choices" (i.e. a reverse-coded item).

2.2 Data Analysis

With the aim of segmenting consumers of sustainable seafood products, a cluster analysis was performed. In this analysis, general health interest, perceived benefits of eating seafoods and attitude toward seafood were considered as the segmentation-based variables, using socio-demographic and sustainability attitudes and intentions as descriptors of the resulting segments. There are several methods developed to conduct a cluster analysis (Putler and Krider, 2012) and hierarchical methods are most often used. The Ward's method with the squared Euclidean distance is the most used in marketing and psychological research (Maciejewski, 2018). This method has a very valuable feature, because when calculating the distance among objects, great differences in values of variables describing these objects are taken into account more strongly than in the situation of a small variation of variables (Putler and Krider, 2012). Moreover, in order to obtain more accurate results, the use of other classification methods in the same study, such as division methods and non-hierarchical methods is therefore recommended. In light of these premises, in this study the segmentation of the study sample was conducted using a two-step cluster analysis: firstly, an hierarchical agglomeration method—Ward's method applied with the squared Euclidean distance— was used to identify the optimal number of segments; secondly, a non-hierarchical K-means analysis was performed with the number of clusters generated. The differences between clusters were examined using one-way ANOVA and Chi-square analyses. All the analysis were carried out using SPSS (version 20.0; Chicago, IL).

2.3 Participants

A proportional stratified sampling method was used (regarding gender, age and educational background) in selecting the participants. Prior to the commencement of data collections, the study protocols were approved by the Medical Ethics Committee of Ghent University Hospital (Approval reference number B670201941488; UGent, 2019). All participants were asked to provide a written informed consent before taking part in the study. In order to guarantee the pseudo-anonymity of participants and confidentiality of their data, a code or id number was used as identifier in the database for data processing. Only adult healthy volunteers (age ranged between 18 and 65 years), living in Italy (no specific information regarding place of birth/residence was requested), responsible for the purchase of food and consumers of seafood products.

3 Results

3.1 Description of the sample

The sample consisted of 404 Italian participants of which 44.6 % are male and 55.4 % are female with an age between 18 and 65 years, an average of 40.8 years and a standard deviation of ±12.9 years. The demographic profile of the sample is presented in detail in Table 1.

Table 1. Demographic profiles of the sample (n = 404)

	n	%

1. Gender		
Male	180	44.6
Female	224	55.4
2. Age (years)		
18-34	137	33.9
35-48	139	34.4
49-65	128	31.7
3. Education		
Primary or secondary	169	41.8
Higher education	235	58.2
4. Geographic area		
Suburb or hinterland of a large city	28	6.9
Countryside	113	28.0
Small town	205	50.7
Big city	56	13.9
Unknow	2	0.5
5. Profession		
Paid work	243	60.1
Housewife	29	7.2
Student	46	11.4
Retired	15	3.7
Unoccupied	16	4.0

3.2 Exploratory factor analysis of the health and seafoods attitude measures

An exploratory factor analysis with oblimin rotation was performed to examine the factor structure of the two measures composed of ad hoc items and used as segmentation base variables (perceived benefits of eating seafood and attitude toward seafoods). The first analysis, with an unconstrained number of factors, carried out on the items used to measure the perceived benefits of eating seafood yielded an eigenvalue of 4.03 with 57.6% of the variance explained and the factor loadings ranging from 0.56 to 0.79. Thus, the exploratory factor analysis confirmed that all items reflect the expected one-dimensional theoretical construct (α = 0.87). The second exploratory factor analysis, with an unconstrained number of factors, carried out on the items used to measure the attitude towards seafood yielded an eigenvalue of 3.23 with 80.7% of the variance explained and the factor loadings ranging from 0.82 to 0.91. Thus, the exploratory factor analysis confirmed that all items reflect the expected one-dimensional theoretical construct (α = 0.92). Moreover, we have also tested the reliability of the general health interest scale that was used as the third segmentation-base variable, showing a good Cronbach's alpha (α = 0.78), indicating that it is appropriate to merge the items into a single general health interest construct score.

3.3 Segmentation analysis

Participants' mean scores on general health interest, perceived benefits of eating seafoods and attitude towards seafood have been used as segmentation-base variables. A three-segment solution emerged as the optimal solution from the analysis. The resulting clusters differed significantly on each of the segmentation-base variables based on an F-test using analysis of variance (ANOVA, Table 2).

Cluster 1 is composed by 59 consumers (15%) who showed a strong interest in their personal health and recognized that the consumption of seafood provides substantial health benefits. However, unlike clusters

2 and 3, they did not show a particularly positive attitude towards the consumption of seafood, considering it a product that generates rather "neutral" sensations. Therefore, we refer to this segment as ''Health seekers who eat seafood for duty''.

Cluster 2 is composed by 198 consumers (49%) who showed a strong interest in their personal health and recognized that the consumption of seafood provides many health benefits. They also showed an extremely positive attitude towards the consumption of seafood considering it as being tasty and satisfying for the palate. Therefore, we refer to this segment as ''Health seekers and seafood lovers''.

Cluster 3 is composed by 145 consumers (36%) who have shown a weaker interest, compared to the other two clusters, towards health including health benefits that the consumption of seafood provides. They showed a fairly positive attitude towards seafood consumption in general. Therefore, we refer to this segment as ''Low commitment to health and indifferent to seafood''.

Table 2. Mean ratings of the segments on the classification variables (n=402)

	Health seekers who eat seafood for duty n (%)	Health seekers and seafood lovers n (%)	Low commitment to health and indifferent to seafood n (%)	F-value	η^2	p-value
Size (% of the sample)	59 (14.60%)	198 (49.01%)	145 (35.89%)			
General health interest	5,67[a]	5,57 [a]	4,09 [b]	166,025	0.458	<0.001
Seafood benefits	5,05 [a]	5,34 [a]	4,36 [b]	60,728	0.228	<0.001
Seafood Attitudes	4,06 [c]	6,61 [a]	5,21 [b]	295,156	0.598	<0.001

Mean scores with the same subscript letter for the same classification variable do not differ significantly from each other (Bonferroni's post hoc test).

3.4 Differences among clusters related to socio-demographic characteristics, sustainability attitudes and intentions

Due to the composition of identified clusters, the association with several other variables, such as familiarity, and intention to consume with ecolabel/origin/seasonality, and perceived consumer effectiveness on sustainability were verified by ANOVA. Following the one-way ANOVA at the significance level of 5%, a significant difference among clusters was confirmed (Table 3). In particular, health seekers who eat seafood for duty (cluster 1), similarly to cluster 2, pay attention to the origin of products and seasonality and declare that they intend to continue paying attention to these aspects in future purchases. Consumers belonging to cluster 2 (Health seekers and seafood lovers) pay attention to the origin of products and seasonality, and declare that they intend to continue paying attention to these aspects in future purchases. Particular attention is also paid to eco-labelled products, especially when compared to cluster 3. Moreover, it is conceivable that this consumption and intention to purchase sustainable seafood products is associated with the fact that these consumers strongly believe that through the consumption of sustainable seafood it is possible to protect the environment. Finally, cluster 3 (composed by consumers who are low committed to health and indifferent to seafood) are less interested than the other two groups in the origin and seasonality of the seafood products purchased, declaring that they have no intention of

increasing this attention in future purchases. Finally, these consumers do not believe that they can protect the environment through the consumption of sustainable seafood.

Table 3: ANOVA analysis of clusters vs. familiarity and intention to consume with ecolabel/origin/seasonality, perceived consumer effectiveness on sustainability (n=402).

	Health seekers eat seafood for duty	Health seekers and seafood lovers	Low commitment to health and indifferent to seafood	Total sample	F-value	η^2	p-value
Familiarity to consume with ecolabel	2.78 [a]	2.77 [a]	2.57 [a]	2.70	1,461	-	0,233
Familiarity to consume with origin	3.73 [a]	4.07 [a]	3.17 [b]	3.69	28,981	0.127	<0.001
Familiarity to consume with seasonality	3.15 [a]	3.31 [a]	2.62 [b]	3.04	11,908	0.056	<0.001
Intention to consume with ecolabel	3.49 [a,b]	3.79 [a]	3.22 [b]	3.54	3,988	0.020	<0.05
Intention to consume with origin	4.90 [b]	5.56 [a]	3.93 [c]	4.88	32,338	0.139	<0.001
Intention to consume with seasonality	4.61 [a]	4.63 [a]	3.62 [b]	4.26	11,289	0.054	<0.001
Perceived consumer effectiveness on sustainability	4.93 [a,b]	4.97 [a]	4.44 [b]	4.78	5.589	0.027	<0.01

Different superscripts indicate significantly different means between clusters for the same variable following ANOVA post hoc Bonferroni test.

Regarding socio-demographic differences (Table 4), it is observed that health seekers and seafood lovers are older (42.17 years old on average) than those less committed to health and indifferent to seafood (38.60 years old on average). There are no differences among segments with regard to the other socio-demographic variables.

Table 4: Socio-demographic profile of the segments (%, n=402)

	Health seekers eat seafood for duty	Health seekers and seafood lovers	Low commitment to health and indifferent to seafood	Total sample	Pearson *X2*/F-value	η^2	p-value
***Mean age* (years)**	41.22 [a,b]	42.17 [a]	38.60 [b]		3.273	0.016	0.039
Gender					5.642	-	0.060
Male	32.2	43.9	50.3	44.5			
Female	67.8	56.1	49.7	55.5			
Education					1.786	-	0.409
Primary or secondary	33.9	43.4	42.8	41.8			
Higher education	66.1	56.6	57.2	58.2			

					7.371	-	0.288
Nutritional status							
Underweight (BMI<18.5)	1.7	3.0	1.4	2.2			
Normal (18.5 ≤ BMI < 25)	55.9	54.0	54.5	54.5			
Overweight (25 ≤ BMI < 30)	37.3	31.8	27.6	31.1			
Obesity (BMI≥30)	5.1	11.1	16.6	12.2			

Different superscripts indicate significantly different means between clusters per socio-demographic item following ANOVA post hoc Bonferroni test.

4 Discussion

Many factors affect seafood consumers' choices. These range from demographic (e.g. age, gender, population group) (Murray et al., 2017; Olsen, 2003; Verbeke and Vackier, 2005b), regional (e.g. coastal vs. inland location) (Thong and Solgaard, 2017; Verbeke and Vackier, 2005a) and social (i.e. norms related to behaviour that are considered acceptable in a group) (Verbeke and Vackier, 2005a)characteristics, over traditions and habits (Almeida et al., 2015a, 2015b; Olsen et al., 2013; Pieniak et al., 2008b, 2008a) marketing, communication and information provisioning (Hallstein and Villas-Boas, 2013; Pieniak et al., 2008b), as well as a wide range of food-, health-, and environment-related personal attitudes, perceived barriers and motives (Altintzoglou and Heide, 2016; Christenson et al., 2017; Thong and Solgaard, 2017).

The research presented here reveals the presence of three segments of consumers in Italy who differ in attitudes, perceptions and expectations toward sustainability when consuming seafood. As stated in previous studies (e.g. EEA, 2016; Zander and Feucht, 2018), consumers are increasingly looking for improvements in sustainable seafood production, and they are increasingly willing to contribute by aligning their purchasing choices with sustainability criteria. However, differences regarding the importance attached to sustainability by consumers within specific seafood products were observed in this research. In particular, cluster 1 (Health seekers who eat seafood for duty) and 2 (Health seekers and seafood lovers) are more familiar with sustainable seafood products than cluster 3 (Low commitment to health and indifferent to seafood), both in terms of product origin and seasonality. Considering future intentions, the three clusters show differences especially as regards the interest in taking into account the origin of seafood products. In particular, consumers belonging to cluster 2 (Health seekers and seafood lovers) show a higher probability to buy seafood products considering origin than the other two groups. These results seem to be in line with other studies carried out on seafood products that revealed that consumers who are less concerned about healthy eating and less involved in their own health are also less interested in characteristics of seafood products such as quality or sustainability labels (Pieniak et al., 2010). This finding is consistent with the study Van Loo et al. (2017) who reported a strong perceived match between health and sustainability among consumers. Moreover, these studies show that through the classification of consumers based on the interest in their own health and attitudes towards seafood, it is possible to identify differences in the familiarity and intention to purchase sustainable seafood products. In particular, this aspect seems to be confirmed by previous studies that pointed out the importance given to one's own health, being often associated with the consumption of sustainable food products (Hoek et al., 2017; Lindgren et al., 2018).

Based on results obtained, a strategic plan could be developed to achieve relevant goals in education, communication and sustainability labelling related with seafood products. According to our analysis, it is recommended to promote the convergence and harmonization of programs by target seafood consumers. In this way, the simplicity of the system's applicability would increase, as well as the improvement of communication with greater sharing of information to seafood consumers, promoting adequate planning of training and education courses on sustainability for seafood operators, and promoting the development of

a local network that facilitates technological and cultural changes in the seafood sector. This approach requires public and private participatory interventions at the level of the production – fisherman/farmers -, processors, retailers and restaurants. From the technical-scientific point of view, the work can then be carried out more effectively at local level since tradition, culture and scientific knowledge are already available, but unfortunately lost in the absence of a clear operational direction. Based on a preliminary scouting carried out with all seafood stakeholders, a specific territory to test this approach has been already identified in Torre del Cerrano (https://www.torredelcerrano.it/). This will be the first pilot case in Italy, where the sustainable development of the seafood sector will cover the entire food chain from the Fishing farm (fisherman) to the Fork (consumer), including decision makers, market retailers, restaurant, and schools. Such approach is in harmony with the goals set in the European Green Deal and its core, the Farm to Fork Strategy which aims to make food systems fair, healthy and environmentally-friendly. The development of a framework for sustainable food labelling that covers the nutritional, climate, environmental and social aspects of products should be under consideration when the education and communication will be set in the seafood sustainability scheme besides the label.

The results from our study confirm that a substantial share of consumers increasingly recognize the importance of sustainability issues and in particular the close connection between ecosystems and human health, supporting the "One Health" perspective (Allès et al., 2017; Austgulen et al., 2018). The "One Health" perspective is defined as an approach that considers the health of people as closely connected to environmental themes and the health of animals (WHO, 2017). This awareness presented in this Italian seafood consumer sample could further explain the strong connection between health interest and sustainable seafood consumption, and it could also be used as a lever to encourage responsible purchases and more sustainable consumption. Furthermore, observing the average scores of the sample with respect to perceived consumer effectiveness in relation to sustainability, it is noted that consumers believe that they can contribute to the protection of the environment through the consumption of sustainable seafood products, and this aspect is associated with a high familiarity and high intention to buy sustainable seafood. Past studies have confirmed the existence of this link also in other types of sustainable food consumption (Joshi and Rahman, 2019; Nguyen et al., 2019).

Moreover, this research identified a segment of consumers that emerges as a vulnerable group, deserving special attention from both food and health policy makers due to its low interest in health and in the benefits and attitudes toward seafood. This is of particular concern as consumers belonging to this group are young and with a higher obesity rate than other identified segments. This is associated with a lower intention to eat sustainable seafood products and a lower familiarity with the consumption of it. Hence, specific efforts targeting this segment referred to as 'low commitment to health and indifferent to fish' are recommended as discussed in the next section.

From these results, it is possible to indicate some operational strategies to increase and encourage the consumption and purchase of sustainable seafood. Different types of information complexity and arguments are necessary to target the different consumer profiles. In particular, the group with little interest in its own health and in sustainable seafood consumption (Low commitment to health and indifferent to seafood) will require easy comprehensible and appealing communication strategies in order to persuade them to eat more sustainable seafood and to pay more attention to their health. For example, information provision aiming at increasing involvement, motivation and awareness of the important of healthy and sustainable eating, or providing favorable product experiences as a possible trigger to behavioral change might be recommended. In light of this, it seems important to create moments of educational exchange with nutritionists or dieticians (given their obesity rate) to raise their interest in one's health, for instance through stressing the relapse that it can have in their lives and underlining the advantages of sustainable seafood consumption for human health. Furthermore, a thematic relating to

hedonic values or pleasure from eating tasty seafood might have a higher impact on this low interested in healthy eating consumer segment.

Conversely, the other two segments who are strongly interested in their own health and in the consumption of sustainable seafood (Health seekers and seafood lovers; Health seekers who eat seafood) will require more detailed messages in order to be persuaded. In particular, it could be important to involve these two groups in round tables with experts to give them additional information and clarifying complex requests to stimulate their persuasion towards sustainable food consumption. Finally, tailor-made communication campaigns could also be created by leveraging the relationship between human health and sustainable seafood consumption, two very important themes for these groups.

Some important limitations of this research can also be identified that need to be addressed in the design of future research studies. A first limitation relates to the representativeness of the sample across the quantitative exploratory data collection performed. Significant differences among clusters have been identified addressing the aim of the article. However, only adult healthy volunteers ranging between 18 and 65 years of age were included in the research, excluding relevant portion of the entire population (e.g. about 23% of the Italian population is above 65). Follow-up research or studies focusing specifically at the elderly consumer group, such as Grasso et al. (2019) are recommended. Furthermore, geographic participant's place of birth/residence was not included as criteria in the proportional stratified sampling method used. This represents a relevant constraint in a country, like Italy, which is much influenced by local culture and traditions. Additional research is recommended to ensure a full characterization of the entire consumer market in Italy. A second limitation is related to the data collection method adopted: the survey was processed online with an estimated participant's effort of 20-25 minutes, representing a strong barrier for people with low motivations and/or not familiar with IT technologies (response rate = 48%). A third limitation is related to the lack of a common understanding by participants of critical concepts adopted in this research (e.g. sustainability, ecolabel, safety) that might be different depending on specific cultural backgrounds and experiences. The inclusion of extended definitions of concepts (e.g. in the form of a glossary in the questionnaire) is recommended for further studies.

5 Conclusions

The present study reveals the existence of different seafood consumer segments, and it has shown the basic features of Italian seafood consumers, which are relevant to future food policy and communication efforts. Indeed, understanding the common characteristics, such as attitudes towards health, beliefs and behaviors that identify people belonging to a cluster and differentiate them from other groups, allows to create targeted information and educational interventions to be provided through appropriate means and sources of information, resulting in greater effectiveness and higher impact. These specific and targeted interventions and communications can change the intentions and behavior of consumers, making them more responsible and predisposed to buy sustainable food products.

These results have a strong implication for policy makers and educational institutions as they identify differences in attitudes and perceptions among consumers that are crucial to design the right communication strategies and messages content. Indeed, information campaigns targeted at a specific audience are more likely to achieve their intended impact than broadly oriented campaigns.

However, it is important to stress that consumers are only one of the key players in the seafood value chain. Hence, efforts are also needed for other groups of stakeholders (e.g. policymakers, dieticians, consumer organisations, retailers, fishermen, aquaculture and seafood processing industry) to ensure that future seafood production, processing, distribution and consumption become more sustainable. In this sense, the development of traceability tools with transparent and trustful information with quality

certification labels that incorporate all information (obligatory and additional) related to the specific seafood product is recommended.

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