

Consumers' Value Perception of the Nutri-Score in Germany

*The influence of socioeconomic status and demographic factors
on consumers' perception of the Nutri-Score in Germany.*

Written by Antonia Verona Deger

European Food Business BSc

AERES University of Applied Sciences

August 14, 2023

Amsterdam, the Netherlands

Coached by Ms. K. Körösi

This report is written by a student of Aeres University of Applied Sciences (Aeres UAS). This is not an official publication of Aeres UAS. The views and opinions expressed in this report are those of the author and do not necessarily reflect the official policy or position of Aeres UAS, as they are based only on very limited and dated open source information. Assumptions made within the analysis are not reflective of the position of Aeres UAS. And will therefore assume no responsibility for any errors or omissions in the content of this report. In no event shall Aeres UAS be liable for any special, direct, indirect, consequential, or incidental damages or any damages whatsoever, whether in an action of contract, negligence or other tort, arising out of or in connection with this report.

Preface

The aim of this study is to gain insight into consumers' value perception of the Nutri-Score nutrition labelling in Germany. Currently, much research is being conducted as it seems certain that the Nutri-Score will be the standardized, mandatory nutrition label in the European Union. This study will contribute to showing the influence of socioeconomic status and demographic factors on consumer perceptions of the Nutri-Score in Germany, which has not been researched before. This research report was written as part of my final phase of the European Food Business degree at AERES University of Applied Sciences. My special thanks go to my supervisor Ms. Kata Körösi, who accompanied me through this intensive work phase.

The recommendations and input provided for the research proposal were integrated into this final research report to enhance the clarity of the study's exact objectives and to align the pre-collected data with the expected results.

Antonia Verona Deger

August 14, 2023

Amsterdam, the Netherlands

Table of Contents

Preface	III
Summary	VII
Chapter 1 Introduction	1
1.1 Front-of-pack nutrition labelling systems	2
1.2 EU Regulation on FoPNL	2
1.3 FoPNL Nutri-Score	3
1.4 Nutri-Score in Germany	4
1.5 Nutri-Score: consumption and chronic diseases.....	5
Chapter 2 Material and Methods	7
2.1 Research design and Data collection.....	7
2.2 Data Analysis	10
2.3 Validity and Reliability	12
Chapter 3 Results	14
3.1 General data.....	14
3.2 Influence of Nutri-Score on the importance of consuming healthy foods among different demographic groups	15
3.2.1 Influence of the Nutri-Score among different demographic groups.....	17
3.3 Influence of Nutri-Score among different socioeconomic groups on adoption and utilization... 18	
3.3.1 Importance of healthy food being labelled Nutri-Score A among socioeconomic status. ...	20
3.3.2 Importance of unhealthy food labelled with Nutri-Score E among socioeconomic status... 22	
3.4 Differences in opinion among consumers in Germany about the Nutri-Score.....	24
Chapter 4 Discussion of results	27
4.1 Research Reflection.....	27
4.2 Influence of Nutri-Score on the importance of consuming healthy foods among different demographic groups	28
4.3 Influence of Nutri-Score among different socioeconomic groups on adoption and utilization... 29	
4.4 Differences in opinion among consumers in Germany about the Nutri-Score.....	30
Chapter 5 Conclusions and Recommendations	31
5.1 Conclusions	31
5.2 Recommendations	32
5.2.1 Short-term recommendations	32
5.2.2 Long-term recommendations.....	32
List of References	34
Appendices	40
Appendix A: English Questionnaire.....	40

Appendix B: German Questionnaire	45
Appendix C: Tables of Statistical Analysis.....	50

Table 1: Calculation of the Nutri-Score (Azelis, n.d.).....	4
Table 2: Arrangement of the sub-questions in questionnaire	9
Table 3: New Nutri-Score algorithm for breakfast cereals (Nutriscore Europe, 2020).....	10
Table 4: Way of proceeding according to each sub-question.....	11
Table 5: Type and Variable	12
Table 6: Sociodemographic data	14
Table 7: MANOVA on importance of food/beverages labelled with the Nutri-Score and the importance to consume healthy foods among demographic groups.....	16
Table 8: Kruskal-Wallis Test results on demographics	17
Table 9: Scheffe post hoc test on demographic groups	18
Table 10: MANOVA on importance of healthy/unhealthy food labelled with Nutri-Score A/E among socioeconomic status	19
Table 11: Kruskal-Wallis Test healthy food labelled Nutri-Score A among socioeconomic status	20
Table 12: Scheffe post hoc test socioeconomic status on healthy food labelled Nutri-Score A	21
Table 13: Kruskal-Wallis Test unhealthy food labelled Nutri-Score E on socioeconomic status.....	22
Table 14: Scheffe post hoc test socioeconomic status and unhealthy food labelled Nutri-Score E	23
Figure 1: Nutri-Score (Nutriscore Europe, 2023)	3
Figure 2: Importance to consume healthy foods and food/beverages labelled with the Nutri-Score...	16
Figure 3: Importance of healthy/unhealthy food labelled with Nutri-Score A/E	19
Figure 4: Importance of Nutri-Score on processed/ultra-processed foods	24
Figure 5: Rating of the new Nutri-Score algorithm for breakfast cereals	26

Summary

This research was conducted to gain knowledge on the consumers' value perception of the Nutri-Score in Germany. A particular focus is on the influence of socioeconomic status and demographic factors on consumers' perception of the Nutri-Score. The study gathered insights on the general understanding of the Nutri-Score and its practical implications among consumers. A questionnaire-based approach was employed to assess the socioeconomic status and demographic factors in the value perceptions of individuals residing in Germany. The main findings revealed statistical significance for foods and beverages labelled with the Nutri-Score and an even higher importance for the consumption of healthy foods, which were related to each other in the determination of the demographic groups. This allowed statistical significance to be analysed across all three demographic groups in age, gender, and marital status. Further analysis revealed that Baby Boomers and Generation Z, identifying as female and male, and marital status (married or single) were statistically significant among foods and beverages labelled with the Nutri-Score. The importance of unhealthy foods labelled with Nutri-Score E was ranked even higher by respondents within socioeconomic groups than healthy foods labelled with Nutri-Score A, which was nevertheless also considered important by consumers. Opinions expressed about the Nutri-Score show that ultra-processed foods are given higher importance compared to all processed foods. In particular, the newly introduced Nutri-Score algorithm for breakfast cereals received positive ratings, with respondents generally expressing agreement. These findings contribute to a comprehensive understanding of how the Nutri-Score is perceived by German consumers, taking into account their socioeconomic status and demographic factors. The results of the study are of great importance for policy makers, especially in view of the ongoing development of an updated Nutri-Score algorithm, which will include stricter criteria, especially for breakfast cereals. As a result of these findings, specific recommendations were made, directed in particular to the Commission's Joint Research Centre. The study suggests that these findings should be considered during deliberations on the adoption of the Nutri-Score as a potential standardized and mandatory Front-of-Pack nutrition labelling system.

Chapter 1 Introduction

Non-communicable diseases have become a significant public health problem worldwide, including in Germany (Egnell, 2020). From now on referred as NCDs, also called chronic diseases, are conditions that are not caused by infectious agents and cannot be transmitted from person to person (WHO, 2022). They usually have a long duration and progress slowly over time. NCDs are often characterized by complex interactions between genetic, environmental and lifestyle factors (WHO, 2022). NCDs have a substantial socioeconomic impact and constitute a danger to the 2030 Agenda for Sustainable Development's advancement (Kathirvel & Rapporteurs, 2018). For the first time, NCDs are mentioned in the SDGs' third health objective, which is to "ensure healthy lives and promote well-being for all at all ages" (WHO, 2022). With regard to this, aim 3.4 sought to "reduce by one-third premature mortality from NCDs through prevention and treatment and promote mental health and well-being" (WHO, n.d.). Working on the global health agenda, i.e., SDGs for NCDs is necessary because NCDs account for the majority of all-cause mortality (Forouzanfar et al., 2015).

Non-communicable diseases can be categorized into four primary categories by the World Health Organization (WHO, 2022):

1. Cardiovascular diseases (CVDs): These include conditions such as heart attacks, strokes and high blood pressure (hypertension).
2. Cancer: NCDs include various types of cancer, including lung, breast, colorectal and prostate cancer.
3. Chronic respiratory diseases: This category includes conditions such as chronic obstructive pulmonary disease (COPD), asthma, and occupational lung disease.
4. Diabetes: Non-communicable diabetes refers to both type 1 diabetes (which is usually diagnosed in childhood) and type 2 diabetes (which is usually due to lifestyle factors).

These chronic diseases, such as cardiovascular disease, diabetes, obesity and certain cancers, are largely influenced by modifiable lifestyle factors, including dietary habits (Egnell, 2020). In recent years, there has been a growing recognition of the need to combat these diseases through effective preventive measures, including measures to promote healthier diets (Egnell, 2020). In this context, front-of-package nutrition labelling systems have gained importance as a potential tool to guide consumers toward healthier food choices and mitigate the burden of NCDs (WHO, 2021).

1.1 Front-of-pack nutrition labelling systems

Front-of-pack nutrition labelling systems provide easy-to-understand information about the nutritional content of foods directly on the package (European Commission, n.d.). Key nutritional information is displayed on the front of food and beverage packaging, which is known as front-of-pack nutrition labelling and from now on referred as FoPNL. It attempts to give consumers easy access to information on a product's nutritional makeup so they can decide on their food purchases quickly and intelligently (European Commission, n.d.). Easily recognizable symbols, icons, or labels that highlight the most important nutritional aspects or qualities of a product are frequently used in FoPNL. These may include specifics like the number of calories, portion size, and levels of nutrients like fat, sugar, salt, and fibre (Feunekes et al., 2008). To improve customer knowledge and comprehension of the nutritional makeup of food goods, FoPNL is used. By facilitating quick comparison and evaluation of various items, it aids people in making healthier decisions. Egnell et al. (2019) conducts that this labelling method may help lower the risk of non-communicable diseases like obesity, diabetes, and cardiovascular disorders that are linked to poor dietary practices.

1.2 EU Regulation on FoPNL

The FIC Regulation, also known as Regulation (EU) No. 1169/2011 on the supply of Food Information to Consumers, governs nutrition labelling in Europe (Regulation 1169/2011). In addition to defining the necessary nutrition information on food labels, the law also permits the use of extra forms of expression and other "voluntary food information" (where most Front-of-Pack schemes are applicable) under certain conditions outlined in articles 35 and 36 (Regulation 1169/2011). Nutritional information on the front-of-packages is not required by current EU regulations, but food industry operators may do it voluntarily in specific circumstances (Turck et al., 2022). However, as part of the Farm to Fork action plan, the European Commission is developing a proposal for standardized FoPNL at the EU level (Turck et al., 2022). The European Commission announced its Farm to Fork Strategy in May 2020, and by the fourth quarter of 2022, it promised to "propose harmonised mandatory front-of-pack nutrition labelling" to "empower consumers to make informed, healthy, and sustainable food choices" (EUPHA, 2023). According to that, in its initial impact assessment and consultation paper, the Commission proposed four types of labels as potential candidates for a standardized, mandatory EU-wide program: graded indicators (such as Nutri-Score), endorsement logos (such as Keyhole), color coding (such as Multiple Traffic Lights), and numeric labelling (such as NutrInform) (EUPHA, 2023; Peonides et al., 2022). The requirements for the development of an efficient FoPNL system were found in the review of the evidence on FoPNL conducted by

the Commission's Joint Research Centre, which was published in 2022 and contains literature on the consumer preference and performance perspectives (EUPHA, 2023; Peonides et al., 2022). It appears certain that the Nutri-Score, a public health measure founded on solid scientific data, will be the standardized mandatory nutrition label for Europe at this time (Nutriscore Europe, 2023).

1.3 FoPNL Nutri-Score

The Nutri-Score is the most popular FoPNL in the EU. It is thought to be a useful tool for encouraging customers to make healthier options, according to De Temmerman et al. (2021). The Nutri-Score was initially created and approved by the French government and is based on the French dietary recommendations' adaptation of the British Food Standards Agency's (FSA score) Nutritional Profiling System (NPS) (Julia & Hercberg, 2017). Following a two-year consultation process and period of intensive testing of the tool's efficacy, France became the first nation to deploy the Nutri-Score in 2017 (Julia & Hercberg, 2017). Spain accepted the Nutri-Score in November 2018, following the Netherlands in November 2019 and Luxembourg in February 2020. Regarding the use of the Nutri-Score, Germany published a national executive order in March 2020 (EU Commission, n.d.). Poland and Austria are two more countries that are contemplating whether to adopt the Nutri-Score in their country (EU Commission, n.d.). The Nutri-Score measures the degree of healthiness of a food considering all its nutrients (Egnell et al., 2020). It is a combination of letters, and the traffic light colours green, yellow, orange and red, with a fixed color assigned to each letter (A = dark green, E = red). There are five colours in total, each corresponding to a different letter. The letter "A" identifies foods with the highest nutrient content and is associated with the color dark green. The lowest value "E" has been assigned the color dark orange. No numbers or facts are given (Egnell et al., 2020). The color-letter combination provides a concise evaluation of the product's energy and nutrient content as well as the percentage of various food groups (such as veggies and nuts).

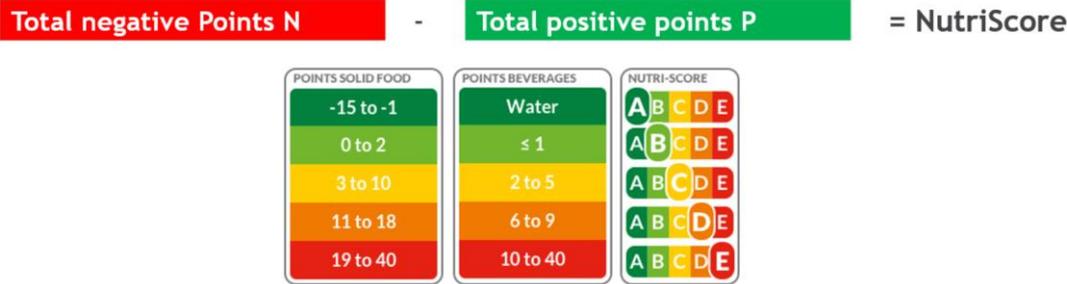
Figure 1: *Nutri-Score (Nutriscore Europe, 2023)*



Limit values based on 100 g or 100 ml of the product are used to calculate points, with positive points given to substances whose favorable effects on health have been established and negative points given to those whose excessive consumption has been linked to a higher risk of disease (Julia & Hercberg, 2017). These points are added together to generate a sum that is then translated into the relevant categories: The score tends further toward the letter A or the color green the better the summary score. This can be generally formulated with “Nutritionally unfavorable nutritional values N is offset against favorable nutritional values P (Nutri-Score = N - P)” according to EUPHA (2023). The unfavorable components (N) include the amounts of sugar, calories, saturated fatty acids, and transformed salt in sodium. Fruit, vegetables, nuts, fibre, protein, and walnut, rapeseed, and olive oils are among the advantageous components (P) (EUPHA, 2023).

Table 1: Calculation of the Nutri-Score (Azelis, n.d.)

Negative Points N	Positive point P
Energy (kj)	Fruit, vegetables (general & drinks)
Sugar (g)	Fiber (g)
Total fat (g)	Proteins (g)
Saturated fatty acids (g)	Minerals & Vitamins
Sodium	



1.4 Nutri-Score in Germany

In Germany the introduction of front-of-pack nutrition labelling systems, such as Nutri-Score, has gained momentum (Fedde et al., 2022). The Nutri-Score is being used by an increasing number of businesses and brands since its launch in Germany in the fall of 2020. Companies can add it to meals that already essentially have the required nutrition table, with the exception of dietary supplements and beverages with an alcohol level of more than 1.2 percent by volume (Fedde et al., 2022). This makes it much simpler for customers to choose wisely when they shop (BMEL, n.d.). Against the background of the debate about the introduction in Germany,

Danone's and Iglo's declaration to introduce the Nutri-Score achieved greater attention (Kwasniewski, 2018). In February 2019, Danone launched fruit dwarfs with Nutri-Score for the first time (Kwasniewski, 2018). At the same time, Iglo published the Nutri-Score of all 140 products on its own website (WELT, 2019). In April, the Hamburg Regional Court issued an injunction against Iglo's introduction of the Nutri-Score, arguing that it constituted so-called health claims (Kwasniewski, 2019). The company appealed the decision and eventually settled out of court with the so-called "Schutzverband gegen Unwesen in der Wirtschaft" (Kwasniewski, 2019). In support of the process, the European Bureau of Consumer Associations launched a European Citizens' Initiative in 2019 in partnership with seven national consumer protection groups (WELT, 2019b). The objective was to force the European Commission to investigate making the Nutri-Score mandatory throughout the European Union. The 20th of April 2020 saw the withdrawal of this plan (EUPHA, 2023). In March 2021, ALDI began using the Nutri-Score and announced its goal to eventually label its own food brands in this way to make them more comparable. Additionally, LIDL, REWE, and EDEKA have this label on their product or want to (Ärzteblatt.de, 2019).

1.5 Nutri-Score: consumption and chronic diseases

According to results of several epidemiological studies conducted as part of the French SU.VI.MAX study and the NutriNet-Santé cohort, the consumption of foods with a favourable Nutri-Score is associated with a lower risk of developing chronic diseases. The studies found that consumption of foods with higher Food Standard Agency-Nutrient Profiling System (FSA-NPS) scores, as modified by the French High Council for Public Health (HCSP), is associated with a higher risk of developing chronic diseases (Deschasaux et al., 2017; Julia et al., 2015). This corresponds to foods with a less favourable Nutri-Score according to Deschaux et al. (2017), and Julia et al. (2015). The consumption of foods with greater FSA-NPS (FSA-NPS modified by the HCSP) levels was also linked to higher levels of numerous key cardiovascular disease risk factors, including obesity according to a Spanish prospective cohort study of older persons with overweight/obesity and metabolic syndrome (Khoury et al., 2022).

To date, there have been few studies that specifically address the evaluation of the impact of Nutri-Score in Germany, particularly considering the influence of socioeconomic and demographic factors. This study aims to fill this gap by using a quantitative research method. By collecting comprehensive data on consumers' perceptions, understanding, and behaviour of the Nutri-Score, this study will provide valuable insights into its impact on food choices and dietary behaviour in Germany based on its socioecological and demographic factors. This

research will contribute to evidence-based policymaking and support strategies to promote healthier eating habits and reduce health disparities. Therefore, the research question is **how socioeconomic status and demographic factors influence consumers' perception of the Nutri-Score in Germany**. To systematically contribute to answering the main research question, three sub-questions were listed:

Sub-question 1: How does the implementation of the Nutri-Score influence the consumption of healthier food options among different demographic groups in Germany?

Sub-question 2: How does socioeconomic status influence the adoption and utilization of the Nutri-Score by consumers in Germany?

Sub-question 3: How does the opinion of consumers in Germany differ about the Nutri-Score?

The purpose of this study is to gain knowledge about consumers based on demographic factors and socioeconomic status of the Nutri-Score. Therefore, this study helps to increase the knowledge about the general understanding and use of the Nutri-Score and its application. The questionnaire is also considered as an educational activity for consumers by explaining at the beginning how the Nutri-Score is calculated and can be interpreted. Not only the consumer, but also policy makers benefit from the study, as obtaining consumer opinions is important for the optimization of the algorithm for the Nutri-Score, which is currently underway. These findings can be considered in further research by the Commission's Joint Research Centre on consumer preferences and performance perspectives of the Nutri-Score as a candidate for a standardized, mandatory FoPNL.

Chapter 2 Material and Methods

The following section of the research paper describes the material and methods used to gain valid insights into the impact of socioeconomic status and demographic factors on consumers' perception of the Nutri-Score in Germany.

2.1 Research design and Data collection

A quantitative research method was used to investigate consumers' value perception of front-of-pack labels, focusing on the Nutri-Score in Germany. In order to achieve a high evaluation objectivity and to avoid misunderstandings in the answers, a questionnaire with closed-end questions was used. The questions referred to single-choice questions, where respondents could choose a single answer option. The single-choice questions could also be used to determine various content, such as predetermined hierarchically arranged answer options. In this way, the intensity of the subjects' personal perceptions could be captured, i.e., consumers' value perceptions (Empirio, 2022). The questionnaire was carried out online, as this provided the opportunity to obtain response from all over Germany. This was also more cost-effective than having to physically conduct the questionnaire, which would have required extensive travel throughout Germany. To inform a wide range of participants, the questionnaire was disseminated on the social media platforms Instagram, Facebook, Linked-In, and WhatsApp. Participants were being asked to answer the 25 questions accordingly. Social media platforms like Instagram, for instance, allowed users to re-share content like a questionnaire with their own communities, thereby expanding the outreach. This multi-platform approach ensured divers user engagement, leading to extensive data collection (Statista, 2022). To establish an appropriate sample size, a sample size calculator was used. A number of 385 participants resulted in a confidence level of 95% with a margin of error of 5% (Calculator.net, n.d.). The purpose of obtaining these 385 respondents was to present as many different socio-demographic factors as feasible on a random sampling approach. Data collection was conducted using Google Forms and Excel. Further processing of the data took place in JASP. In total, two sections were made up to the questionnaire. The first section defined the socio-demographic groups, and the second section presented the 'consumer opinion' of the Nutri-Score. Additionally, two subcategories were formed to narrow down 'consumer opinion' on the Nutri-Score. This was based on the study by Folkvord et al. (2021) and a report by EU scientists and health professionals (Nutriscore Europe, 2023).

The following two categories were:

1. Consumer beliefs
2. Consumer expectations

The first subcategory, consumer beliefs, resulted from the Folkvord study, which analyzed the impact of the Nutri-Score label on consumer attitudes, considering processed and ultra-processed foods (Folkvord et al., 2021). The second subcategory of consumer expectations referred to the recently published report by EU scientists and health experts on the revised algorithm for calculating the Nutri-Score for sweet products, especially breakfast cereals, in which the distribution of points has become more stringent (Nutriscore Europe, 2023).

This formed the foundation for the three sub-questions in my research, which answered my main research question. In this research, I sought to determine the actual values that German consumers have when selecting meals based on the Nutri-Score in relation to different demographic groups and socioeconomic status.

The questionnaire encompassed a total of 25 closed-ended questions, with 14 of these questions adopting a multiple-choice format. The remaining 11 questions could be answered with the socio-demographic response options. The complete questionnaire is found in the **Appendix A** in English. Since I surveyed the German population, the actual questionnaire was in German, found in **Appendix B** to also reach consumers with a lower level of education.

The multiple-choice questions were each given with the following answer option on the Likert scale, of which only one could be selected:

- Strongly disagree
- Disagree
- Neither disagree or agree
- Agree
- Strongly agree

Each of the questions outlined in the questionnaire was strategically designed to address the three sub-questions central to this research, thereby contributing to the resolution of the main research question shown in table 2.

Table 2: Arrangement of the sub-questions in questionnaire

Sub-question	Questionnaire
Sub-question 1	Answered by question 1-7
Sub-question 2	Answered by question 8-16
Sub-question 3	Answered by question 17-25

Sub-question 1: How does the implementation of the Nutri-Score influence the consumption of healthier food options among different demographic groups in Germany?

This asked for demographic factors such as age, which is divided into Generation Z, Millennials, Generation X, and Baby Boomers (Ayanyemi, 2021), gender, and marital status. The consumption of healthier food was included as a prerequisite at first and how consumers perceive food/beverages labelled with a Nutri-Score as such. Accordingly, the demographic groups could be analysed.

Sub-question 2: How does socioeconomic status influence the adoption and utilization of the Nutri-Score by consumers in Germany?

Here, socioeconomic status was explored with information on income, highest qualification, and place of residence. In addition, this sub-question included the aspect about consumer adoption and utilization of the Nutri-Score. This was asked by a ranking on the Likert scale on the importance of healthy/unhealthy food being labelled with a Nutri-Score A/E.

Sub-question 3: How does the opinion of consumers in Germany differ about the Nutri-Score?

The opinion of the consumers in their beliefs and expectations was asked with various multiple-choice questions ranked on the Likert scale. These are partly based on the study by Folkvord et al. (2021) on consumer attitudes, considering processed* and ultra-processed foods** with the importance of having a Nutri-Score labelled and the report by Nutriscore Europe (2023). Examples of the report shown in Table 3 were taken based on how the change in the new Nutri-Score algorithm has affected sweet products, especially breakfast cereals which contain a relatively high sugar content.

Table 3: *New Nutri-Score algorithm for breakfast cereals (Nutriscore Europe, 2020)*

Nestlé Nesquik Chocapic®: Nutri-Score C	(formerly Nutri-Score A)
Nestlé Nesquik® crunchy breakfast: Nutri-Score C	(formerly Nutri-Score A)
Nestlé Original Fitness: Nutri-Score C	(formerly Nutri-Score A)
Kellogg’s Special K® with red berries: Nutri-Score C	(formerly Nutri-Score B)
Nestlé Lion® Caramel Chocolate: Nutri-Score D	(formerly Nutri-Score C)

**Processed food* = defined as food that underwent alterations during production. The change occurred for example, through processes such as cooking, baking, fermentation, or preservation (Ldn, 2020).

***Ultra-processed food* = defined as ultra-processed if they consisted of many ingredients or contained food additives to enhance taste attributes or consisted of processed raw materials and ingredients that were rarely used in domestic cooking (Ldn, 2020).

2.2 Data Analysis

The data was analysed using descriptive statistics to summarize and organize the characteristics of the collected data from the questionnaire. Two key distinctions were taken into account. Firstly, distribution, which referred to the frequency of the individual values and secondly, central tendency, which referred to the mean of the values. The second part of the questionnaire was analyzed by comparing the gathered results and showed how to understand the participants' opinion about the new Nutri-Score algorithm. Again, descriptive statistics were used to present the frequency of consumers' ranking based on the multiple-choice questions (strongly disagree, disagree, neither disagree or agree, agree, strongly agree) in relation to the Nutri-Score labeling of the products. Descriptive statistics helped me to develop a more thorough understanding of the variables that affected how consumers perceive the value of the Nutri-Score. Non-parametric test supported me in further analyzing the data according to its statistical significance and were presented in table 4 and 5.

Table 4: Way of proceeding according to each sub-question

Sub-questions	Way of proceeding
<p>1. Sub-question</p>	<p>MANOVA: due to two dependent variables tested along the independent variables</p> <p>Kruskal-Wallis Test: due to one dependent variable along three or more independent demographic groups</p> <p>Post Hoc Test: to show whether the differences among the mean are significant (<i>scheffe</i> instead of tukey because sample size is not equal)</p>
<p>2. Sub-question</p>	<p>MANOVA: due to two dependent variables tested along the independent variable</p> <p>Kruskal-Wallis Test: due to one dependent variable along three or more independent socioeconomic groups</p> <p>Post Hoc Test: to show whether the differences among the mean are significant (<i>scheffe</i> instead of tukey because sample size is not equal)</p>
<p>3. Sub-question</p>	<p>Descriptive statistics visualized in graphing distributions to present consumers frequency on the ranking of Likert scale.</p>

Table 5: Type and Variable

Type	Variable
Dependent (scale)	Importance of food/beverages being labeled with a Nutri-Score (Likert scale)
	Importance of consuming healthy foods (Likert scale)
	Importance of healthy food being labelled with Nutri-Score A (Likert scale)
	Importance of unhealthy food being labelled with Nutri-Score E (Likert scale)
Independent	Age groups (nominal)
	Gender (nominal)
	Marital status (nominal)
	Income (nominal)
	Highest qualification (nominal)
	Place of residence (nominal)

2.3 Validity and Reliability

Validity and reliability were two important concepts in the research methodology that were helpful in assessing the quality and dependability of study findings. Validity indicated the extent to which a research study accurately captured the phenomenon being studied or measured what it sets out to measure. Reliability was defined as the consistency, stability, and reproducibility of research results when the study was carried out repeatedly or under similar circumstances. To ensure reliability, in my study I considered the following measures. I pilot tested the questionnaire with a smaller sample of 150 respondents. This allowed me to identify any ambiguities, confusing questions, or potential problems with the structure or wording of the questionnaire. Based on the feedback, I made any necessary changes to improve clarity and comprehensibility. Also, at the beginning of my questionnaire, I clearly communicated instructions on how to complete the questionnaire. I included information about how to understand the Nutri-Score at first, what time frame to consider, and other relevant guidelines, such as the permission to me to make use of the information for my research. Consistent instructions helped to ensure that respondents understand and interpret the questions in a similar way.

I utilized an established measurement scale to guarantee validity. To evaluate opinions, attitudes, or behaviors, my questionnaire included a Likert scale. A statement or question was followed by a string of five possible responses. The answer that respondents felt most closely matched the statement or question being chosen. The participants could select from a variety of responses as a result. Likert scales were a great approach to express more nuanced degrees of agreement or sentiment regarding the consumers value perception of the Nutri Score.

With a firm belief in the established reliability and validity measures, I was confident that the conducted questionnaire allowed for an accurate assessment of consumers' value perception in Germany.

Chapter 3 Results

The questionnaire was made available for a total of 4 weeks starting on June 23, 2023, on the social media platforms Instagram, Linked In, Facebook and Whats App. Initially, a target of 385 participants was set, which could not be fully achieved due to the short duration of four weeks. The questionnaire reached a total of 256 participants, of whom 255 could be used for statistical analysis. Anticipated data pointed towards a relatively balanced dispersion of responses across demographic factors and socioeconomic status. However, the collection of ratings among the new Nutri-Score algorithm yielded unforeseen outcomes. While initial projections suggested greater variability in responses among five breakfast cereal options, the observed patterns converged closely across the Likert scale, deviating from the expected fluctuations.

3.1 General data

Participants' sociodemographic data was collected from 255 respondents and used to differentiate and segment groups. Table 6 illustrates this.

Table 6: Sociodemographic data

Socio - demographic groups	Percentage (%)					
	Age	18 – 26 40%	27 – 39 17%	40 – 58 24%	59+ 19%	
Gender	Women 65%	Male 35%	Divers 1% 'inconclusive'			
Marital Status	Married 31%	Single 50%	Divorced 10%	Widowed 5,5%	Separated 3,5%	

Income	>€2,000 31%	>€2,000 - €3,000 27%	>€3,000 - €4,000 20%	>€4,000 - €5,000 12%	>€5,000 5%	Don't know 5%
Highest qualification	High school diploma or lower 24%	High school diploma or equivalent 44%	Bachelor's degree 23%	Master's degree 8%	PhD. degree 0,5% 'inconclusive'	Don't know 0,5% 'inconclusive'
Place of residence	City 60%	Small town 20%	Suburb 5%	Rural area 15%		

3.2 Influence of Nutri-Score on the importance of consuming healthy foods among different demographic groups

The first sub-question was formulated to demonstrate whether the implementation of the Nutri-Score influence the consumption of healthier food options among different demographic groups which are divided into three in total:

Age: (Generation Z; Millennial, Generation X, Baby Boomers)

Gender: (Female; Male; Divers)

Marital status: (Married; Single; Divorced; Widowed; Separated)

The figure 2 shows the results based on the two statements that have been made in relation to the first sub-question. It is important for consumers that foods and beverages are labelled with the Nutri-Score, and there is even more importance in consuming healthy foods. The first statement 'it is important to me to consume healthy foods' received on the Likert scale (Strongly disagree – Strongly agree) a total from 46% on 'strongly agree'. This is followed by 'agree' with 46%. Only 7% selected 'neither disagree or agree' on the Likert scale. The second statement 'it is important to me that food/beverages are labelled with the Nutri-Score' received a total of 40% on 'agree'. This is followed by nearly the same number of respondents with 18% on 'strongly agree' and 22% on 'neither disagree or agree'. Only 14% indicated 'disagree' and 7% 'strongly disagree'.

Figure 2: Importance to consume healthy foods and food/beverages labelled with the Nutri-Score

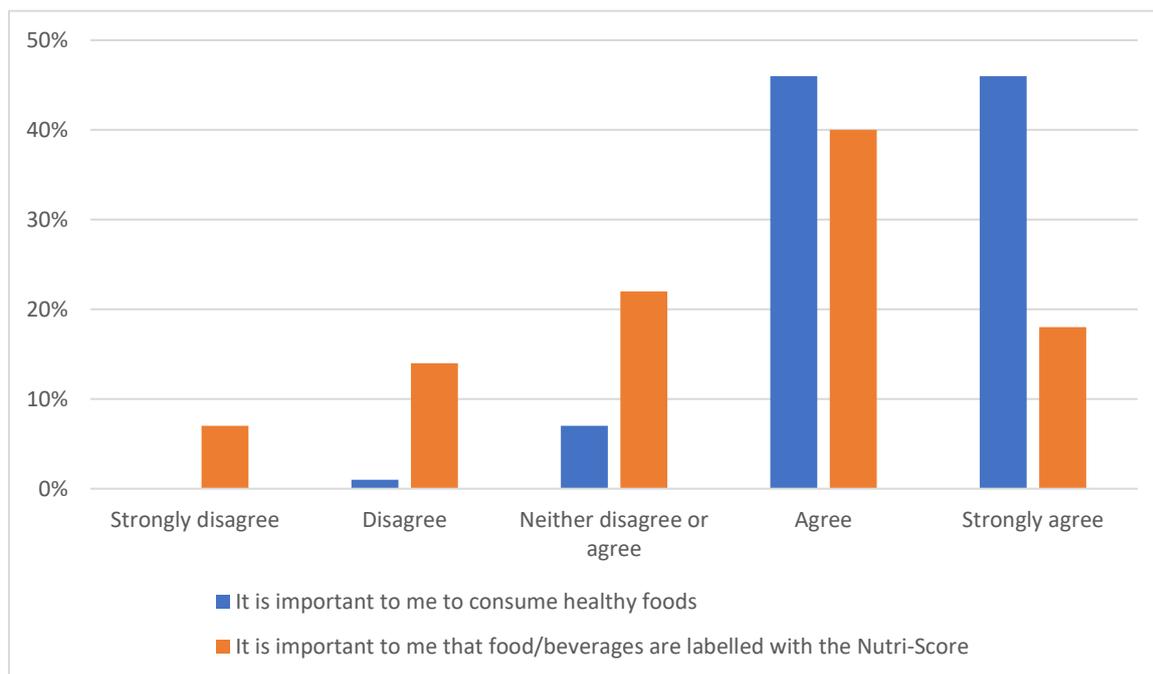


Table 7 shows that there are systematic differences between the importance of food/beverages labelled with the Nutri-Score and the importance of consuming healthy foods among different age groups with a statistically significant p value of 0.001. Among different gender there is a statistically significant p value of 0.009. Across the marital status there is a statistically significant p value of 0.001.

Table 7: MANOVA on importance of food/beverages labelled with the Nutri-Score and the importance to consume healthy foods among demographic groups

<i>Demographic groups</i>	MANOVA	df	p value
Age groups	0.085	3	0.001
Gender	0.037	1	0.009
Marital status	0.105	8	<.001

3.2.1 Influence of the Nutri-Score among different demographic groups

The Kruskal-Wallis Test results given in table 8 showed that there are systematic variations across the age groups and the importance on food/beverages labelled with the Nutri-Score resulting in a significant p value 0.001. Among gender the p value 0.015 indicates some evidence that there are significant differences in the distribution of the continuous variable across the group based on gender. A p value of 0.002 on the importance of food/beverages labelled with a Nutri-Score across different marital statuses indicates that there are statistically significant differences.

Table 8: *Kruskal-Wallis Test results on demographics*

<i>Demographic groups</i>	Statistic	df	p value
Age groups	20.628	3	<.001
Gender	5.886	1	0.015
Marital status	17.037	4	0.002

3.2.1.1 Significant Comparison on demographic groups

To further specify the data, among the importance of food/beverages labelled with a Nutri-Score on different age groups, the mean was calculated for each of the four different age groups and will be found in the Appendix C. Here, the generation Baby Boomers has the largest mean of 4.082 and has therefore higher importance on food/beverages labelled with a Nutri-Score. Testing whether the differences between the 4 mean are significant indicates that there is only a significant difference between Baby Boomers and Gen Z, with a significant p value 0.001, indicating that both generations place more importance on indicating the Nutri-Score on food/beverages (see table 9). The mean calculated for gender, found in Appendix C among the importance of food/beverages labelled with a Nutri Score resulted in a larger mean with 3.628 for female. This indicates a higher importance for food/beverages labelled with a Nutri-Score among females. The follow-up to examine the statistical significance of the mean being calculated for gender shows a significant p value 0.021 among female and male, indicating that both gender place more importance on indicating the Nutri-Score on food/beverages, found in table 9. The mean was calculated for all five different marital statuses and indicated married with the highest mean of 3.886 shown in Appendix C. Therefore, the marital status of being married indicates higher importance of food/beverages being labelled with a Nutri-Score. Further testing on significant differences between the five mean being calculated of the marital statuses shows only significant p value 0.001 between ‘married’ and ‘single’, indicating that both

marital statuses place more importance on the Nutri-Score labelled on food/beverages, found in table 9.

Table 9: Scheffe post hoc test on demographic groups

Comparison		p scheffe
Baby Boomers	Gen X	0.115
	Gen Z	<.001
	Millennial	0.097
Gen X	Gen Z	0.194
	Millennial	0.991
Gen Z	Millennial	0.494
Female	Male	0.021
Divorced	Married	0.999
	Separated	0.947
	Single	0.172
	Widowed	0.964
Married	Separated	0.861
	Single	0.001
	Widowed	0.862
Separated	Single	0.983
	Widowed	1.000
Single	Widowed	0.880

3.3 Influence of Nutri-Score among different socioeconomic groups on adoption and utilization

This sub-question was formulated to show how the socioeconomic status: income, highest qualification, and place of residence influence the adoption and utilization of the Nutri-Score by consumers in Germany. The influence of the adoption and utilization of the Nutri-Score was hereby based on the importance of healthy food being labelled with Nutri-Score A and unhealthy food being labelled with Nutri-Score E. It can be clearly seen that healthy foods labelled with Nutri-Score A are considered important by consumers, and even more importance is placed by consumers in Germany on the labelling of unhealthy foods with Nutri-Score E, as shown in Figure 3. Results from the Likert scale (Strongly disagree – Strongly agree) based on the statement ‘it is important to me that healthy food is being labelled with Nutri-Score A reached

50% on 'agree' and 20% on 'strongly agree'. Only 6% chose 'disagree' and 4% 'strongly disagree'. Close to 20% chose the categorical middle of the scale with 'neither disagree or agree'. The statement 'it is important to me that unhealthy food is being labelled with a Nutri-Score E' received almost the majority of respondents in 40% 'agree' and 38% 'strongly agree'. Only 6% went for 'disagree' and 4% 'strongly disagree'. The categorical middle was chosen with 12% 'neither disagree or agree'.

Figure 3: Importance of healthy/unhealthy food labelled with Nutri-Score A/E

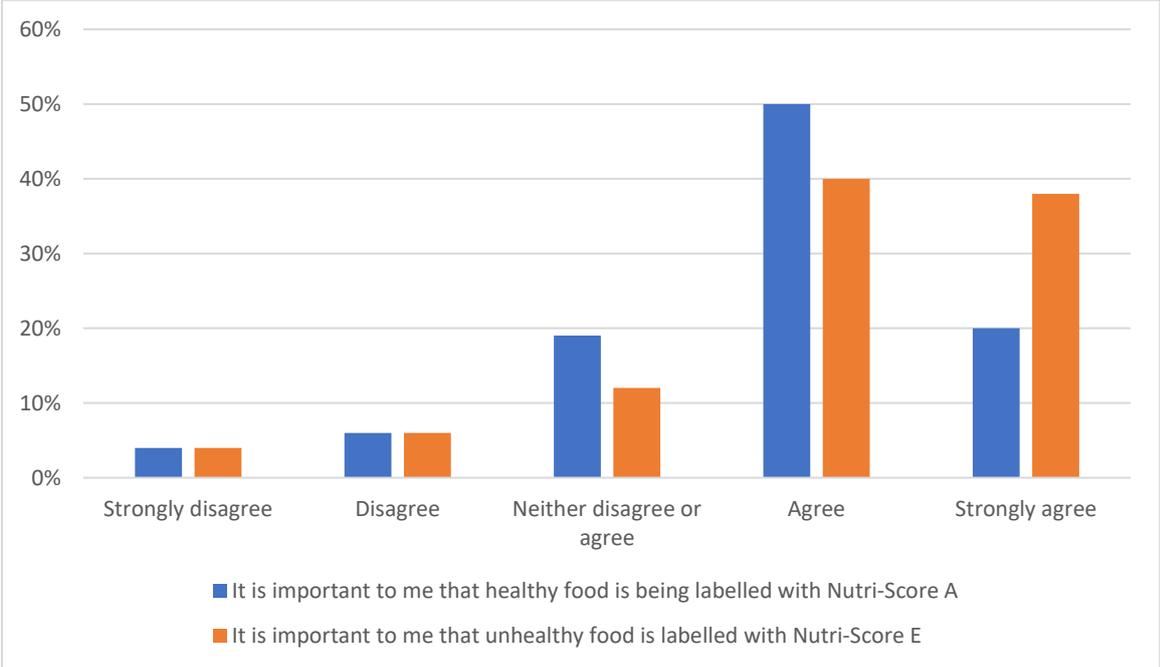


Table 10 shows whether there are systematic differences between the importance of healthy/unhealthy food labelled with a Nutri-Score A/E among different socioeconomic statuses. For income the p value of 0.068 is slightly above the significant threshold of 0.05 and gives therefore weak evidence. For highest qualification the p value of 0.548 is not significant and does therefore gives no evidence on systematic differences. For the place of residence, the significant p value is 0.023.

Table 10: MANOVA on importance of healthy/unhealthy food labelled with Nutri-Score A/E among socioeconomic status

Socioeconomic status	MANOVA	df	p value
Income	0.068	10	0.068
Highest qualification	0.020	3	0.548
Place of residence	0.057	3	0.023

3.3.1 Importance of healthy food being labelled Nutri-Score A among socioeconomic status.

The Kruskal-Wallis Test results given in table 11 shows whether there are systematic variations across socioeconomic status and healthy food being labelled with a Nutri-Score A. Among different income there is a significant p value of 0.007. For the socioeconomic status of highest qualification, the p value of 0.262 is not significant and gives no identification for systematic variations. For place of residence the statistically significant p value 0.019 result in systematic variations across the importance of healthy food being labelled with a Nutri-Score A.

Table 11: *Kruskal-Wallis Test healthy food labelled Nutri-Score A among socioeconomic status*

Socioeconomic status	Statistic	df	p value
Income	15.884	5	0.007
Highest qualification	3.997	3	0.262
Place of residence	9.915	3	0.019

3.3.1.1 Significant comparison on socioeconomic status among importance of healthy food being labelled with Nutri-Score A.

In order to further specify and elaborate the data, on the importance of healthy food being labelled with a Nutri-Score A and socioeconomic status the mean was calculated for each of the socioeconomic status. For income the highest mean 4.135 was calculated, elaborated in Appendix C for an income range between >€3,000 - €4,000 and indicates therefore highest importance on healthy food being labelled with Nutri-Score A. In table 12 further testing results on significant differences between the mean of income, only indicates one slightly above the threshold p value of 0.052 among >€3,000 - €4,000. Descriptives showing the highest mean 4.016 for 'less than a high school diploma' and indicates therefore the greatest importance of healthy food being labelled with Nutri-Score A found in the Appendix C. Further testing results applicable in table 12 whether the differences among the mean are significant does not point out any significant comparison. Calculating the highest mean 4.098 for small town as a place of residence states the highest importance for healthy food being labelled with a Nutri-Score A among this socioeconomic status. This is shown in Appendix C. Checking whether the differences across the mean for the place of residence are significant, table 12 shows only one

statistically significant p value 0.010 between small town and suburb, indicating that both places of residence have more importance on healthy food being labeled with Nutri-Score A.

Table 12: Scheffe post hoc test socioeconomic status on healthy food labelled Nutri-Score A

Comparison		p scheffe
>€2,000	€3,000	0.570
>€3,000	€4,000	0.052
>€4,000	€5,000	0,388
>€5,000	Don't' know	1.000
	Less than €2,000	0,999
Don't know	Less than €2,000	1.000
Bachelor's degree	High school diploma or equivalent degree	0.916
	Less than a high school diploma	0.250
	Master's degree	0.987
High school diploma or equivalent degree	Less than a high school diploma	0.468
	Master's degree	1.000
Less than a high school diploma	Master's degree	0.775
City	Rural area	0.772
	Small town	0.335
	Suburb	0.086
Rural area	Small town	0.160
	Suburb	0.438
Small town	Suburb	0.010

3.3.2 Importance of unhealthy food labelled with Nutri-Score E among socioeconomic status

The Kruskal-Wallis Test results given in table 13 shows whether there are systematic variations across socioeconomic status and unhealthy food being labelled with a Nutri-Score E. For income as one of the three socioeconomic statuses being testes, the significant p value 0.041 indicates systematic variations. For highest qualification the p value 0.874 is not significant and therefore does not give conclusion about the here asked systematic variations. For place of residence the p value 0.089 does not give a significant statistical indication on systematic variances.

Table 13: *Kruskal-Wallis Test unhealthy food labelled Nutri-Score E on socioeconomic status*

Socioeconomic status	Statistic	df	p value
Income	11.609	5	0.041
Highest qualification	0.695	3	0.874
Place of residence	6.515	3	0.089

3.3.2.1 Significant Comparison on socioeconomic status among importance of unhealthy food being labelled with Nutri-Score E.

To specify the data on the importance of unhealthy food being labelled with a Nutri-Score E and socioeconomic status the mean was calculated for each of the socioeconomic status. For income the largest mean of 4.365 was calculated in <€3,000 - €4,000 and indicates therefore the highest interest in unhealthy food being labelled with a Nutri-Score E. This is shown in the Appendix C. None of the p values from Scheffe post hoc test shown in table 14 were below the threshold value of 0.05, which indicates not finding statistically significant differences among the means of the groups being compared. The greatest interest in the importance of unhealthy food being labelled with a Nutri-Score is in the largest mean of 4.161 for less than a high school diploma. Further elaboration on the other mean being calculated for highest qualification will be found in Appendix C. The Scheffe post hoc test result applicable in table 14 does not indicate any significant p value for the difference among the mean being calculated for the highest qualification. The highest mean being calculated for small town as a place of residence and therefore indicates highest importance among unhealthy food being labelled with Nutri-Score E.

Table 14: *Scheffe post hoc test socioeconomic status and unhealthy food labelled Nutri-Score E*

Comparison		p scheffe
>€2,000	€3,000	1.000
>€3,000	€4,000	0.329
>€4,000	€5,000	0.904
>€5,000	Don't know	1.000
	Less than €2,000	1.000
Don't know	Less than €2,000	1.000
Bachelor's degree	High school diploma or equivalent degree	1.000
	Less than a high school diploma	0.825
	Master's degree	0.996
High school diploma or equivalent degree	Less than a high school diploma	0.756
	Master's degree	0.995
Less than a high school diploma	Master's degree	0.982
City	Rural area	0.457
	Small town	0.569
	Suburb	0.308
Rural area	Small town	0.117
	Suburb	0.916
Small town	Suburb	0.095

3.4 Differences in opinion among consumers in Germany about the Nutri-Score

This sub-question was formulated to shed more light into the beliefs and expectations of the consumers among the Nutri-Score. Therefore, the following results will present the consumer beliefs in figure 4 among the importance of the Nutri-Score being indicated on all processed/ultra-processed foods. The comparative analysis of these two statements clearly shows that ultra-processed foods labelled with a Nutri-Score are given a higher importance in contrast to all processed foods. The first statement ‘it is important to me that the Nutri-Score is indicated on all processed food products’ received the majority of responses from over 60% on ‘agree’ and 22% on ‘strongly agree’. Only 5% indicated ‘disagree’ and 3% ‘strongly disagree’. The neutral stance gathered 10%. For the second statement ‘it is important to me that the Nutri-Score is indicated on all ultra-processed food products’ the dominant choice of 60% made by the majority of respondents was ‘strongly agree’ followed by 25% on ‘agree’. The minority of participants 2% replied on ‘strongly disagree’ followed by 5% ‘disagree’. The point on the scale that respondents indicate no strong opinion scored 8%.

Figure 4: Importance of Nutri-Score on processed/ultra-processed foods

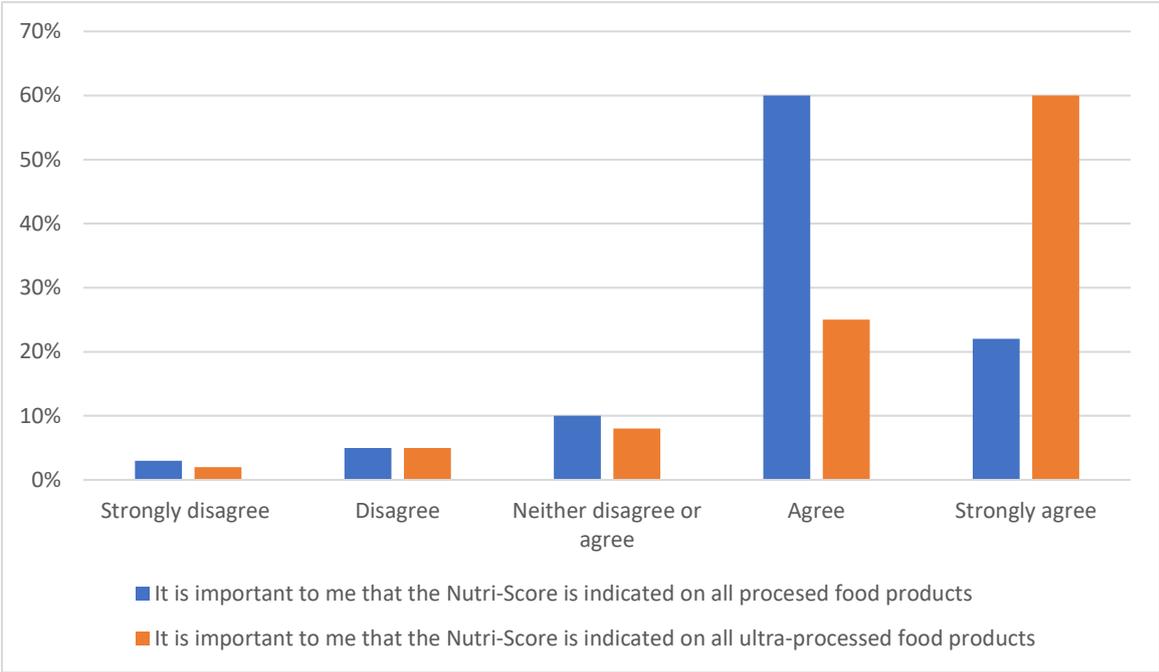
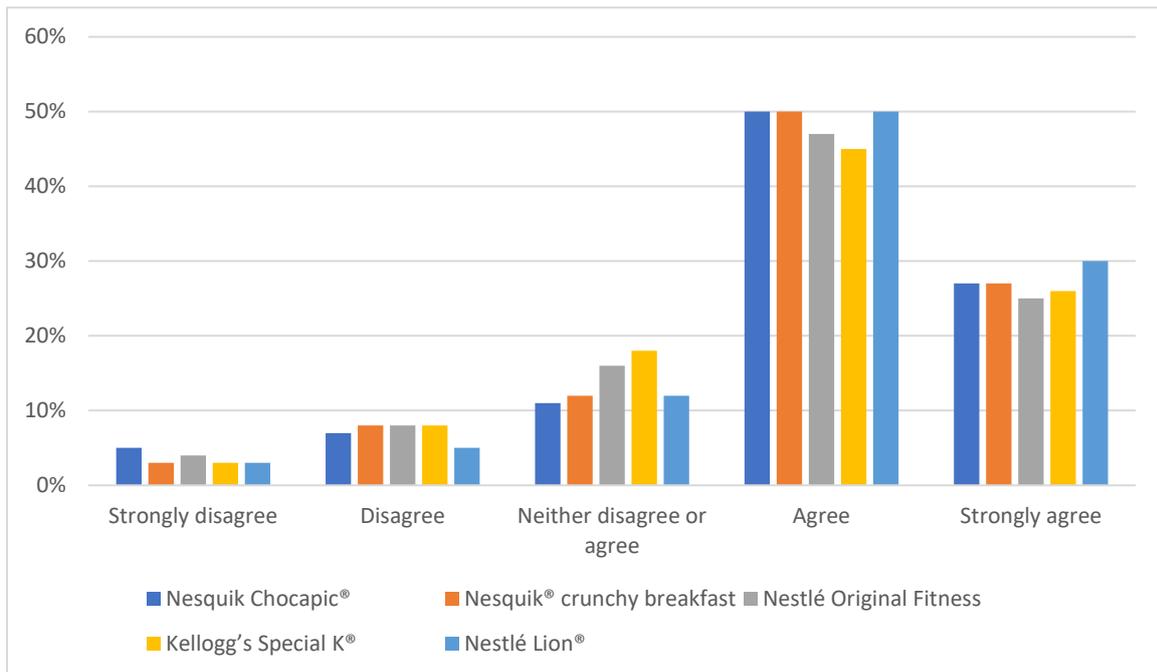


Figure 5 shows the results of consumer expectations on the Nutri-Score based on the change in the new Nutri-Score algorithm. Here, particular reference was made to the impact on sweet products, especially breakfast cereals based on the recently published EU report with the new Nutri-Score algorithm for this product category. The bar chart is showing the responses of the new Nutri-Score algorithm for breakfast cereals among the Likert scale (strongly disagree – strongly agree) with the corresponding percentage of participants. The bar chart clearly indicates a majority of responses for all five breakfast cereal categories being tested on ‘agree’. This shows a general approval towards the change of the new Nutri-Score algorithm based on the mentioned product category of consumers. Among the five breakfast cereal options, Kellogg’s Special K® with red berries (Nutri-Score C), previously rated as Nutri-Score B, received a slightly lower score compared to the remaining four cereals with 45%. Next in frequency is the responses category ‘strongly agree’, which is consistently chosen across all five available options, showing an even distribution. Notably, the Nestle Lion® Caramel Chocolate option, now designated with a Nutri-Score D instead of the previous Nutri-Score C, emerged as the dominant choice under ‘strongly agree’, garnering 30% of the total responses. The most notable variation within the ‘neither disagree or agree’ category among the five alternatives was observed in the case of Kellogg’s Special K® with red berries. This breakfast cereal, which transitioned from Nutri-Score B to Nutri-Score C, exhibited a distinct response rate of 18% in this category. However, despite this particular divergence, the responses across the Likert scale for the five available breakfast cereal options remain consistently and nearly evenly distributed. The responses falling within the ‘disagree’ category demonstrate a nearly uniform distribution across the available options. Notably, Nestle Lion® Caramel Chocolate (Nutri-Score D), previously rated as Nutri-Score C, registered the lowest proportion of respondents at 5% on the Likert scale. However, the consistently equitable distribution of responses among the five breakfast cereal choices precludes the emergence of a distinct outcome from this analysis. The distribution of respondents within the ‘strongly disagree’ category exhibits a similar degree of uniform across all five breakfast cereal options. Due to no strongly visible differences in the percentage distribution, and a low average of five participants calculated from all five breakfast cereal options, there is no clear result.

Figure 5: Rating of the new Nutri-Score algorithm for breakfast cereals



Chapter 4 Discussion of results

This contains a critical reflection of the research method being used and discussing the results that had been gathered with the use of a questionnaire. The aim of this thesis was to gain knowledge about Germans consumer's value perception of the Nutri-Score while having special emphasis on the influence of socioeconomic status and demographic factors.

4.1 Research Reflection

Opting for a quantitative research approach in the form of a questionnaire proved to be highly effective means of engaging a diverse range of consumers' value perception among different sociodemographic groups across Germany. This achievement was accomplished by developing the questionnaire on popular online platforms, namely Instagram, LinkedIn, Facebook, and WhatsApp, thereby ensuring widespread accessibility and participation. WhatsApp proved to be the most successful distribution medium for the questionnaire and received the most participation with a total of 204 people living in Germany. This approach effectively facilitated a broad participation reach by disseminating the questionnaire through individuals who had previously received and then shared it within their network of acquaintance.

The questionnaire remained accessible over a span of four weeks, commencing on June 23, 2023, and concluding on July 21. Within this designated timeframe, I held a positive expectation of reaching the target participation count of 385. Remarkably, during the first week, an impressive accumulation of nearly 150 responses was observed. This facilitated a preliminary assessment through pilot testing, allowing for the identification of any potential issues that may have emerged during the initial phase. Fortunately, this pilot test yielded encouraging results, as no confusions or difficulties were reported. The results garnered from this initial sample size proven valuable, in particular with regard to the different distribution of sociodemographic groups in Germany. Notably, the questionnaire's effectiveness was attributed to an introductory overview of the overarching topic provided at the outset, coupled with incorporated definitions of terms that might be ambiguous, such as 'processed foods' and 'ultra-processed foods' while answering the questionnaire.

Unfortunately, by the time the survey closed on July 21, a total of 256 respondents had been reached, of which 255 were eligible for comprehensive statistical analysis because they had successfully answered all of the questions marked (*) in the questionnaire that were critical to the statistical analysis. This rigorous completion was essential to ensure the consistency needed to examine different sociodemographic groups and their value perception on the Nutri Score.

The limited number of responses may be due to the relatively short time frame for completing the questionnaire within four weeks. One question of the questionnaire that was intended to explore consumer opinions about manufacturers' voluntary use of the Nutri-Score could not be included in the results section due to insufficient data as I made the mistake of not marking this question with (*) in the questionnaire. As a result, the analysis focused solely on the results of the questionnaire, which were consistent with the findings of Folkvord et al. (2021) and the most recent EU report (Nutriscore Europe, 2023), providing an adequate response to sub-question three. However, the questionnaire data collected were still robust and suitable for in-depth analysis of all three sub-questions that contributed to the main research question of this study.

4.2 Influence of Nutri-Score on the importance of consuming healthy foods among different demographic groups

The results of this study, based on demographic groups such as age, are consistent with the findings of Ayanyemi (2021) and were possible to divide in Gen Z at 40%, Millennials at 17%, Gen X at 24%, and Baby Boomers at 19%, resulting in a broad diversity in age. Likewise, this was possible for the subdivisions in gender and marital status. The results from this study showing that it is important for consumers that food and beverage are labelled with the Nutri-Score, and even more importance in consuming healthy foods is in line with the study according to De Temmerman et al. (2021). As the study stated that the Nutri-Score thought to be a useful tool for encouraging customers to make healthier options (De Temmerman et al., 2021).

As my study further examined the different demographic groups using multivariate analysis of variance, it showed that age, gender, and marital status all three had a significant p-value when comparing the importance of healthy foods to consumers with foods/beverages labelled with the Nutri-Score, thus showing systematic differences. This is of great importance to better understand consumers as their opinion is relevant for optimizing the Nutri-Score according to Nutriscore Europe (2023). In fact, the Kruskal-Wallis Test showed that there are systematic differences between age, gender and marital status for foods and beverages labelled with the Nutri-Score. It can thus be seen that consumer in Germany within the Baby Boomer generation and Generation Z, female and male, married or single, have a higher interest in the importance of foods/beverages labelled with the Nutri-Score, as shown by the significant p-values in the post hoc test in chapter 3.2.1.1.

4.3 Influence of Nutri-Score among different socioeconomic groups on adoption and utilization

Examining the results, consumers attach importance to the labelling of healthy foods with the Nutri-Score A and, in particular, even greater importance to the labelling of unhealthy foods with the Nutri-Score E. This alignment is consistent with the findings of Egnell et al. (2020), where the letter "A" was associated with higher nutrient content, while "E" was an inverse indicator.

The results among different socioeconomic status based on three socioeconomic groups could be identified based on the analysis of the questionnaire: income, highest degree, and place of residence. Only in the collection of ambiguous data on "PhD. Degree" and "don't know" with 0.5% of the responses were not included. Using multivariate analysis of variance, only indicated a significant p value for the place of residence, among the three groups between the importance of healthy/unhealthy food labelled with a Nutri-Score A/E. My study continued by initially testing only for healthy foods labelled with Nutri-Score A and found a significant p-value in the Kruskal-Wallis test for both income and place of residence. It was interesting to note here that when the data were further specified within incomes of >€3,000 and €4,000, a slightly above threshold p-value of 0.052 still allowed assumptions to be made about the highest importance of healthy foods labelled Nutri-Score A within this income range. This could be due to the assumption that consumers nowadays have to pay more for their groceries and spend more money, which could ultimately be attributed to their income when it comes to the importance of consuming healthy foods. Another interesting result was the significant p-value of 0.010 between small town and suburb as places of residence from the post hoc test. Therefore, when living in a small town or even suburb in Germany consumers have a higher importance of healthy food being labelled with Nutri-Score A. This was rather unexpected, as living in a city was assumed to have greater importance to this statement. For the unhealthy foods labelled with Nutri-Score E, only a significant p-value of 0.041 for income resulted from the Kruskal-Wallis test. Since only the descriptive statistics by calculation yielded the highest mean value for income between <3,000 - 4,000 €, this can be interpreted as an indication of the greatest importance of unhealthy foods labelled with Nutri-Score E, without the post hoc test yielding statistical significance, since no positive results were available given in chapter 3.3.2.1. Nevertheless, these findings are of great importance to determine consumer opinion and to contribute positively to the optimization of the Nutri-Score algorithm according to Nutriscore Europe (2023).

4.4 Differences in opinion among consumers in Germany about the Nutri-Score

The results clearly indicated a higher importance of ultra-processed foods being labelled with a Nutri-Score compared to processed foods and align with the outcomes by Folkvord et al. (2021) observing consumers' attitudes are being positively affected by the presence of Nutri-Score labels. Because of the comprehensive definitions provided within the questionnaire, which were substantiated by Ldn (2020), participants encountered no ambiguity when responding to questions concerning processed and ultra-processed foods.

The examples given based on the recently published Nutriscore Europe report (2023) were ranked accordingly by the participants after a short, easy-to-understand introduction in the questionnaire. Unexpectedly, a notable trend emerged as almost all five given examples of breakfast cereals were consistently ranked in the same category on the Likert scale. Respondents agreed that the new Nutri-Score algorithm was consistent with these breakfast cereals. This result was quite surprising and could possibly be due to the succession of three consecutive breakfast cereals that were previously rated with a Nutri-Score A but were now rated with a Nutri-Score C due to their comparatively high sugar content. The arrangement of the five breakfast cereal examples was not factored into the questionnaire's design. Consequently, altering the order could potentially lead to different assumptions being made. Participants might have anticipated that, following the consistent reclassification of three examples to a common Nutri-Score C (formerly Nutri-Score A), the remaining two examples would also follow the same pattern. Nonetheless, despite this consideration, the outcomes remained conclusive, as respondents unanimously concurred with the alignment of the new Nutri-Score algorithm to the breakfast cereals. This is critical to the development of the new Nutri-Score algorithm currently being developed by the Commission's Joint Research Centre in light of consumer preference and Nutri-Score performance perspectives as a candidate for standardized, mandatory FoPNL (EUPHA, 2023; Peonides et al., 2022).

Chapter 5 Conclusions and Recommendations

5.1 Conclusions

This research was conducted to fill the knowledge gap by providing valuable insights into the value perception of the Nutri-Score by consumers in Germany. A particular focus was placed on the influence of socioeconomic status and demographic factors on consumers' perceptions of the Nutri-Score in Germany. A questionnaire was used for this purpose, which provided valuable insights and answered all sub-questions relevant to answering the main research question. The main findings help to understand how consumers in Germany perceive the Nutri-Score, taking into account their socioeconomic status and demographic factors. The questionnaire-based approach added depth and nuance to the study results and ultimately served the research objective.

The main findings of the first sub-question, which clearly relates to the demographic groups studied, state that it is important to consumers that foods and beverages are labelled with the Nutri-Score, and consuming healthy foods is even more important, demonstrating the influence of the Nutri-Score on the importance of eating healthy foods among different demographic groups. The further research being conducted on this also addresses the statistical significance between the demographic groups of age, gender and marital status in relation to the importance of foods and beverages labelled with the Nutri-Score, as it is perceived to be. The valuable findings from specifying age groups in Baby Boomers and Generation Z, identifying as female and male, and being married or single as a marital status underscore the importance of examining consumer preference and performance perspectives of the Nutri-Score as a candidate for a standardized, mandatory FoPNL. This is currently under consideration by the Commission's Joint Research Centre.

Followed by the second sub-question, which states that healthy foods labelled with Nutri-Score A are considered important by consumers in Germany, and that consumers labelling unhealthy foods with Nutri-Score E attach even more importance to them. Since further research was conducted on socioeconomic status, it can be concluded that place of residence plays a crucial role in consumer adoption and use of the Nutri-Score due to its statistical significance. From the income range, it can be concluded that consumers from the middle or upper-middle class place a higher importance on the labelling of healthy/unhealthy foods with a favourable/unfavourable Nutri-Score A/E. The same is true for people living in small towns or suburbs for labelling healthy foods with a favourable Nutri-Score A. This underscores the

relevance of the Nutri score as a mandatory FoPNL in ongoing policy deliberations, as it should take socioeconomic status into account.

The latest sub-question underlines the high importance of comprehensive Nutri-Score labelling for processed foods, with ultra-processed foods being given even greater importance, reflecting prevailing consumer sentiment in Germany. In addition, respondents evaluated the new Nutri-Score algorithm for breakfast cereals, which now assigns stricter points for increased sugar content. From this, general consumer agreement could be inferred, which should guide further development of the new Nutri-Score algorithm to safely guide consumers in making healthier food choices and, for example, reduce exposure to NCDs.

To conclude, all of these relevant findings should be considered as part of the policy in developing a proposal to standardize the Nutri Score as a FoPNL and serve as support for the Commission's Joint Research Centre.

5.2 Recommendations

5.2.1 Short-term recommendations

In the short-term, all manufacturers currently or considering placing the Nutri-Score on their products in the future can benefit from this study, especially from the insights contained in the results on how consumers perceive the Nutri-Score as such. As a new algorithm for the Nutri-Score is currently being developed, the positive consumer response to the ranking for breakfast cereals is of great importance. According to Turck et al. (2022), it is still voluntary for manufacturers to decide whether or not to place a Front-of-Pack Nutrition Label such as the Nutri-Score on their own product, it is recommended for them to make use of it. Not only is this a good guide for consumers to make healthier food choices, but it also creates transparency for the manufacturer about their product and may even ultimately lead to higher sales.

5.2.2 Long-term recommendations

In the long run, policy makers will benefit from this study because of the valuable insights gained from consumers in terms of demographic factors and socioeconomic status. It is recommended that the Commission's Joint Research Centre on consumer preferences and performance perspectives from EUPHA (2023) uses the Nutri-Score as a candidate for a standardized, mandatory Front-of-Pack nutrition labelling system. It is advisable to incorporate the study's outcomes into the Farm-to Fork Action Plan currently under development by the European Commission. This integration could contribute substantively to the establishment of a standardized Front-of-Pack nutrition labelling system at the EU level, specifically utilizing

the Nutri-Score. To further enrich the study's depth, expanding the sample size could yield even more insightful results. Moreover, extending this research to encompass each EU member state that is considering the adoption of the Nutri-Score as a Front-of-Pack nutrition label will provide a comprehensive understanding of its implications across diverse demographic groups and socioeconomic status.

List of References

- Ärzteblatt.de. (2019, October 24). *Aldi und Lidl wollen Nutri-Score auf Eigenmarke einführen*. Retrieved April 23, 2023, from <https://www.aerzteblatt.de/nachrichten/106921/Aldi-und-Lidl-wollen-Nutri-Score-auf-Eigenmarken-einfuehren>
- Ayanyemi, T. (2021, 27. April). Age Survey Questions: How to Classify Age Range or Groups. *formplus*. <https://www.formpl.us/blog/age-survey-questions>
- Azelis. (n.d.). *Decoding Nutri-Score, a label to make nutritional facts easy to read*. Retrieved May 4, 2023, from https://explore.azelis.com/en_US/in_fh/decoding-nutri-score-a-label-to-make-nutritional-facts-easy-to-read
- BMEL. (n.d.). *Nutri-Score*. Retrieved May 3, 2023, from https://www.bmel.de/DE/themen/ernaehrung/lebensmittel-kennzeichnung/freiwillige-angaben-und-label/nutri-score/nutri-score_node.html
- Calculator.net. (n.d.). *Sample Size Calculator*. Retrieved April 24, 2023, from <https://www.calculator.net/sample-size-calculator.html?type=1&cl=95&ci=5&pp=50&ps=&x=87&y=38>
- De Temmerman, J., Heeremans, E., Slabbinck, H., & Vermeir, I. (2021). The impact of the Nutri-Score nutrition label on perceived healthiness and purchase intentions. *Appetite*, *157*, 104995. <https://doi.org/10.1016/j.appet.2020.104995>
- Deschasaux, M., Julia, C., Kesse-Guyot, E., Lécuyer, L., Adriouch, S., Méjean, C., Ducrot, P., Péneau, S., Latino-Martel, P., Fezeu, L., Fassier, P., Hercberg, S., & Touvier, M. (2017). Are self-reported unhealthy food choices associated with an increased risk of breast cancer? Prospective cohort study using the British Food Standards Agency

- nutrient profiling system. *BMJ Open*, 7(6), e013718. <https://doi.org/10.1136/bmjopen-2016-013718>
- Egnell, M., Crosetto, P., D’Almeida, T., Kesse-Guyot, E., Touvier, M., Ruffieux, B., Hercberg, S., Muller, L., & Julia, C. (2019). Modelling the impact of different front-of-package nutrition labels on mortality from non-communicable chronic disease. *International Journal of Behavioral Nutrition and Physical Activity*, 16(1). <https://doi.org/10.1186/s12966-019-0817-2>
- Egnell, M., Talati, Z., Galan, P., Andreeva, V. A., Vandevijvere, S., Gombaud, M., Dréano-Trécant, L., Hercberg, S., Pettigrew, S., & Julia, C. (2020). Objective understanding of the Nutri-score front-of-pack label by European consumers and its effect on food choices: an online experimental study. *International Journal of Behavioral Nutrition and Physical Activity*, 17(1). <https://doi.org/10.1186/s12966-020-01053-z>
- Empirio. (2022, July 18). *Was sind single-choice Fragen? Definitionen & Beispiel*. Retrieved May 18, 2023, from <https://www.empirio.de/empiriowissen/single-choice-frage-definition>
- European Commission. (n.d.). *Nutrition labelling*. Retrieved April 10, 2023, from https://food.ec.europa.eu/safety/labelling-and-nutrition/food-information-consumers-legislation/nutrition-labelling_en
- European Public Health Association. (2023, March 15). *Statement on front-of-pack nutrition labelling in the European Union*. <https://eupha.org/repository/advocacy/2023/EUPHA%20Statement%20on%20FoPNL%20FINAL.pdf>
- Fedde, S., Büttner-Koch, S., Plähn, V., Bosy-Westphal, A. (2022). Implementation of the Nutri-Score: First results and a comparison with the NOVA classification. *Ernährungs Umschau*, 69(5), 48–55. <https://doi.org/10.4455/eu2022.013>

- Feunekes, G. I., Gortemaker, I., Willems, A. A., Lion, R., & Van Den Kommer, M. (2008). Front-of-pack nutrition labelling: Testing effectiveness of different nutrition labelling formats front-of-pack in four European countries. *Appetite*, *50*(1), 57–70.
<https://doi.org/10.1016/j.appet.2007.05.009>
- Folkvord, F., Bergmans, N., & Pabian, S. (2021). The effect of the nutri-score label on consumer's attitudes, taste perception and purchase intention: An experimental pilot study. *Food Quality and Preference*, *94*, 104303.
<https://doi.org/10.1016/j.foodqual.2021.104303>
- Forouzanfar, M. H., Alexander, L., Anderson, H. R., Bachman, V. F., Biryukov, S., Brauer, M., Burnett, R. T., Casey, D. E., Coates, M., Cohen, A., Delwiche, K., Estep, K., Frostad, J., Astha, K. C., Kyu, H. H., Moradi-Lakeh, M., Ng, M., Slepak, E. L., Thomas, B., . . . Murray, C. J. L. (2015). Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *The Lancet*, *388*(10053), 1659–1724.
[https://doi.org/10.1016/s0140-6736\(16\)31679-8](https://doi.org/10.1016/s0140-6736(16)31679-8)
- Julia, C., Fezeu, L., Ducrot, P., Méjean, C., Péneau, S., Touvier, M., Hercberg, S., & Kesse-Guyot, E. (2015). The Nutrient Profile of Foods Consumed Using the British Food Standards Agency Nutrient Profiling System Is Associated with Metabolic Syndrome in the SU.VI.MAX Cohort. *Journal of Nutrition*, *145*(10), 2355–2361.
<https://doi.org/10.3945/jn.115.213629>
- Julia, C., & Hercberg, S. (2017). Nutri-Score: evidence of the effectiveness of the French front-of-pack nutrition label. *Ernährungs Umschau* *64*(12), 181-187.
<https://doi.org/10.4455/eu.2017.048>
- Kathirvel, S., & Rapporteurs, J. S. T. (2018). Sustainable development goals and noncommunicable diseases: Roadmap till 2030 – A plenary session of world

- noncommunicable diseases congress 2017. *International Journal of Noncommunicable Diseases*, 3(1), 3. https://doi.org/10.4103/jncd.jncd_1_18
- Khoury, N., Gómez-Donoso, C., Martínez, M. J., Martínez-González, M. Á., Corella, D., Fitó, M., Martínez, J. A., Alonso-Gómez, Á. M., Wärnberg, J., Vioque, J., Romaguera, D., Leon-Acuña, A., Tinahones, F. J., Santos-Lozano, J. M., Serra-Majem, L., Guijarro, P. M., Tur, J. A., Martín, V., Pintó, X., . . . Babio, N. (2022). Associations Between the Modified Food Standard Agency Nutrient Profiling System Dietary Index and Cardiovascular Risk Factors in an Elderly Population. *Frontiers in Nutrition*, 9. <https://doi.org/10.3389/fnut.2022.897089>
- Kwasniewski, N. (2018, June 14). *Der Spiegel: Danone führt Ampel ein*. Retrieved February 23, 2023, from <https://www.spiegel.de/wirtschaft/service/danone-fuehrt-ampelkennzeichnung-fuer-lebensmittel-ein-a-1212979.html>
- Kwasniewski, N. (2019, April 16). *Iglo darf Nährwertkennzeichnung nicht nutzen*. Retrieved February 28, 2023, from <https://www.spiegel.de/wirtschaft/service/nutri-score-bei-iglo-gericht-stoppt-naehrwertkennzeichnung-a-1263159.html>
- Ldn, K. D. M. M. R. (2020). What are ultra-processed foods and are they bad for our health? *Harvard Health*. <https://www.health.harvard.edu/blog/what-are-ultra-processed-foods-and-are-they-bad-for-our-health-2020010918605>
- Nutriscore Europe. (2023, April 29). *Nutri-Score Report EU*. https://nutriscore-europe.com/wp-content/uploads/2023/01/NS_rapport-EU-V10_230202.pdf
- Peonides, M., Knoll, V., Gerstner, N., Heiss, R., Frischhut, M., & Gokani, N. (2022). Food labeling in the European Union: a review of existing approaches. *International Journal of Health Governance*, 27(4), 460–468. <https://doi.org/10.1108/ijhg-07-2022-0072>

Regulation 1169/2011. *Regulation (EU) No 1169/2011 of the European Parliament and of the Council of 25 October 2011 on the prevention of food information to consumer.*

<https://eur-lex.europa.eu/eli/reg/2011/1169/2018-01-01>

Safefood. (n.d.). *Healthy Eating*. Retrieved June 24, 2023, from

<https://www.safefood.net/healthy-food/what-it-means>.

Statista. (2022, December 12). *Umfrage zur Häufigkeit der Nutzung von Social Media nach Generationen im Jahr 2020*. Retrieved May 23, 2023, from

<https://de.statista.com/statistik/daten/studie/1137640/umfrage/umfrage-zur-haeufigkeit-der-nutzung-von-social-media-nach-generationen/>

Turck, D., Bohn, T., Castenmiller, J., De Henauw, S., Hirsch-Ernst, K. I., Knutsen, H. K., Maciuk, A., Mangelsdorf, I., McArdle, H. J., Naska, A., Peláez, C., Pentieva, K., Thies, F., Tsabouri, S., Vinceti, M., Bresson, J., & Siani, A. (2022). Scientific advice related to nutrient profiling for the development of harmonised mandatory front-of-pack nutrition labelling and the setting of nutrient profiles for restricting nutrition and health claims on foods. *EFSA Journal*, 20(4). <https://doi.org/10.2903/j.efsa.2022.7259>

WELT. (2019a, March 22). *Iglo kennzeichnet Produkte bald mit Nährstoff-Ampel*. Retrieved April 4, 2023, from <https://www.welt.de/regionales/hamburg/article190676521/Iglo-kennzeichnet-Produkte-bald-mit-Naehrstoff-Ampel.html>

WELT. (2019b, May 20). *Europäische Bürgerinitiative fordert Nährwertampel Nutriscore*. Retrieved April 4, 2023, from <https://www.welt.de/newsticker/news1/article193786767/Verbraucher-Europaeische-Buergerinitiative-fordert-Naehrwertampel-Nutriscore.html>

World Health Organization. (2021, September 27). *Nutrition labelling*.

<https://www.who.int/initiatives/food-systems-for-health/nutrition-labelling>

World Health Organization. (2022, September 16). *Noncommunicable diseases*.

<https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>

World Health Organization. (n.d.). *The global health observatory*.

<https://www.who.int/data/gho/data/themes/topics/indicator-groups/indicator-group-details/GHO/sdg-target-3.4-noncommunicable-diseases-and-mental-health>.

Appendices

Appendix A: English Questionnaire

My name is Antonia Deger, and I am conducting research on consumers' value perceptions of front-of-pack labelling with a focus on the Nutri-Score in Germany. This research is performed as part of my final year in the European Food Business study at AERES University of Applied Sciences. The data collected will be kept confidential, all responses are anonymous and will not be shared with third parties. It will take approximately 5-10 minutes to complete this questionnaire. If needed, you can contact me at antonia.deger@gmx.de.

**For three years now, companies in Germany have been able to label their products with the five-level Nutri-Score nutritional value system. Using color and letter combinations, consumers are given a breakdown of the nutrients in a product. In addition to sugar, fat and salt, it includes necessary ingredients such as fiber, protein and appropriate amounts of fruits and vegetables. Points are awarded based on amounts per 100 grams. The result is a single total score displayed on a five-point scale, with "A" on a deep green box indicating the most favorable balance and "C" or "E" the least favorable. The corresponding field is underlined.*

By completing this questionnaire, you grant me permission to use the information for my research

Please tick only one answer option for each question.

Please note that questions with an (*) must be answered.

1. What is your current age?*

- 18 – 26
- 27 – 39
- 40 – 58
- 59+

2. Which gender do you identify most with?*

- Female
- Male
- Divers
- Prefer not to say

3. What is your marital status?*

- Married
- Single
- Divorced
- Widowed
- Separated

4. What is your current employment status?*

- Full-time employment
- Part-time employment
- Unemployed
- Self-employed
- Student

- Apprentice
- Retired

5. Do you have any of the following health issues?

- Cardiovascular diseases (heart attacks, strokes and high blood pressure (hypertension))
- Cancer
- Asthma
- Diabetes (type 1)
- Diabetes (type 2)
- None
- Prefer not to say

6. It is important to me to consume healthy foods*

*Healthy foods are those that contain essential nutrients, vitamins and minerals while promoting overall wellness and a balanced diet (Safefood, n.d.).

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

7. Is it important to me that food/beverages are labeled with the Nutri-Score.*



- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

8. Which group does your monthly household income fall under?*

- Less than €2,000
- >€2,000 - €3,000
- >€3,000 - €4,000
- >€4,000 - €5,000
- >€5,000
- Don't know

9. What is your highest qualification?*

- Less than a high school diploma
- High school diploma or equivalent degree
- Bachelor's degree
- Master's degree
- PhD. degree
- No degree

10. Place of residence*

- City like: Berlin, Hamburg, Munich, or Cologne, ...
- Small town
- Suburb
- Rural area

11. How often do you go grocery shopping?

- Daily
- Multiple days a week
- One day a week
- 1-3 days a month
- Rarely

12. How much do you spend per person on grocery shopping per month?

- €0 - €100
- <€100 - €200
- <€200 – 300€
- <€300

13. It is important for me to have a shopping list prepared before shopping

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

14. It is important to me that healthy food is labelled with Nutri-Score A*



- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

15. It is important to me that unhealthy food is labelled with a Nutri-Score E*

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

16. It is important to me that beverages are labelled with Nutri-Score

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

17. It is important to me that the Nutri-Score can be used on a voluntary basis by the manufacturer

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

18. It is important to me that the Nutri-Score is indicated on all processed food products*

*"Processed food" means that the food has been changed in production. The change occurs, for example, through processes such as cooking, baking, fermentation or preservation (Ldn, 2020).

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

19. It is important to me that the Nutri-Score is indicated on all ultra-processed food products*

*defined as ultra-processed if they consisted of many ingredients or contained food additives to enhance taste attributes or consisted of processed raw materials and ingredients that were rarely used in domestic cooking (Ldn, 2020).

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

The following are examples showing the impact of updating the Nutri-Score algorithm on breakfast cereals. For example, breakfast cereals with a relatively high sugar content are no longer rated with an A but with a C (Nutriscore Europe, 2023). Rate on a scale from strongly agree to disagree at all how you rate the new rating.

20. Nestlé Nesquik Chocapic®: Nutri-Score C (formerly Nutri-Score A)*

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

21. Nestlé Nesquik® crunchy breakfast: Nutri-Score C (formerly Nutri-Score A)*

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

22. Nestlé Original Fitness: Nutri-Score C (formerly Nutri-Score A)*

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

23. Kellogg's Special K® with red berries: Nutri-Score C (formerly Nutri-Score B)*

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

24. Nestlé Lion® Caramel Chocolate: Nutri-Score D (formerly Nutri-Score C)*

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

25. Have a guess: How many brands are registered to use the Nutri-Score in Germany?

- 1.090
- 9.090
- 19.090

Thank you for your participation!

Appendix B: German Questionnaire

Mein Name ist Antonia Deger und ich führe eine Studie über die Wertvorstellungen von Verbraucher:innen in Bezug auf die Front-of-Pack-Kennzeichnung mit Schwerpunkt auf dem Nutri-Score in Deutschland durch. Diese Forschung wird im Rahmen meines Abschlussjahres im Studiengang European Food Business an der AERES University of Applied Sciences durchgeführt. Die erhobenen Daten werden vertraulich behandelt. Alle Antworten sind anonym und werden nicht an Dritte weitergegeben. Das Ausfüllen des Fragebogens wird etwa 5-10 Minuten in Anspruch nehmen. Bei Bedarf können Sie mich unter antonia.deger@gmx.de kontaktieren.

**Seit drei Jahren können Unternehmen in Deutschland ihre Produkte mit dem fünfstufigen Nutri-Score-Nährwertsystem kennzeichnen. Wichtig hierbei ist zu wissen, dass der Nutri-Score innerhalb einer Produktgruppe vergeben wird (beispielsweise: Frühstückscerealien). Anhand von Farb- und Buchstabenkombinationen erhalten die Verbraucher:innen eine Aufschlüsselung der Nährstoffe in einem Produkt. Neben Zucker, Fett und Salz werden auch notwendige Inhaltsstoffe wie Ballaststoffe, Eiweiß und angemessene Mengen an Obst und Gemüse aufgeführt. Die Punkte werden auf der Grundlage der Mengen pro 100 Gramm vergeben. Das Ergebnis ist eine einzige Gesamtpunktzahl, die auf einer fünfstufigen Skala angezeigt wird, wobei "A" auf einem tiefgrünen Feld die günstigste Bilanz und "C" oder "E" die ungünstigste anzeigt. Das entsprechende Feld ist unterstrichen.*

**Mit dem Ausfüllen dieses Fragebogens erteilen Sie mir die Erlaubnis, die Informationen für meine Forschung zu verwenden*.*

Bitte kreuzen Sie bei jeder Frage nur eine Antwortmöglichkeit an.

Bitte beachten Sie, dass Fragen mit einem () unbedingt beantwortet werden müssen.*

1. Welcher Altersgruppe gehören Sie an?*

- 18 – 26
- 27 – 39
- 40 – 58
- 59+

2. Bitte geben Sie Ihr Geschlecht an.*

- Weiblich
- Männlich
- Divers
- Keine Angabe

3. Sind sie derzeit verheiratet, verwitwet, geschieden, getrennt oder ledig?*

- Verheiratet
- Verwitwet
- Geschieden
- Ledig
- Getrennt

4. Welche Stellung im Erwerbsleben trifft auf Sie überwiegend zu?*

- Erwerbstätige*r in Vollzeit
- Erwerbstätige*r in Teilzeit
- Arbeitslos/Arbeitssuchend

- Selbstständige*r
- Student*in
- Auszubildende*r/Lehrling
- In Rente/Pension

5. Leiden Sie unter einer der folgenden Erkrankungen?

- Herz-Kreislauf-Erkrankung (Herzinfarkt, Schlaganfall und hoher Blutdruck (Hypertonie))
- Krebserkrankung
- Asthma
- Diabetes (Typ 1)
- Zuckerkrankheit (Typ 2)
- Keine
- Keine Angabe

6. Es ist mir wichtig, gesunde Lebensmittel zu konsumieren.*

**Gesunde Lebensmittel sind solche, die wichtige Nährstoffe, Vitamine und Mineralien enthalten und gleichzeitig das allgemeine Wohlbefinden und eine ausgewogene Ernährung fördern (SafeFood, n.d.).*

- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu

7. Es ist mir wichtig, dass die Lebensmittel/Getränke mit dem Nutri-Score gekennzeichnet sind.*



- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu

8. Wie hoch ist Ihr monatliches Netto-Haushaltseinkommen?*

- Unter 2.000 Euro
- 2.000 bis unter 3.000 Euro
- 3.000 bis unter 4.000 Euro
- 4.000 bis unter 5.000 Euro
- 5.000 Euro und mehr
- Weiß nicht

9. Was ist Ihr höchster Schul- oder Hochschulabschluss?*

- Hauptschulabschluss
- Realschul- oder gleichwertiger Abschluss
- Abitur oder gleichwertiger Abschluss
- Bachelor-Abschluss

- Master-Abschluss
- Doktor-Abschluss
- Kein Abschluss

10. Ort des Wohnsitzes*

- Stadt wie: Berlin, Hamburg, München, oder Köln, ...
- Kleinstadt
- Vorort
- Ländliche Gegend

11. Wie oft kaufen Sie Lebensmittel für Ihren Haushalt ein?

- Täglich
- Mehrmals in der Woche
- Etwa einmal in der Woche
- Mehrmals im Monat
- Seltener

12. Wie viel geben Sie durchschnittlich pro Monat für Lebensmitteleinkäufe aus?

- Unter 100 Euro
- 100 bis unter 200 Euro
- 200 bis unter 300 Euro
- 300 Euro und mehr

13. Es ist mir wichtig, vor dem Einkaufen eine Einkaufsliste zu erstellen.

- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu

14. Es ist mir wichtig, dass gesunde Lebensmittel mit dem Nutri-Score A gekennzeichnet werden.*



- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu

15. Es ist mir wichtig, dass ungesunde Lebensmittel mit einem /Nutri-Score E gekennzeichnet werden.*

- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu

16. Es ist mir wichtig, dass Getränke mit dem Nutri-Score gekennzeichnet werden.

- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu

17. Es ist mir wichtig, dass der Nutri-Score auf freiwilliger Basis von Hersteller:innen verwendet werden kann.

- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu

18. Es ist mir wichtig, dass der Nutri-Score auf allen verarbeiteten Lebensmitteln angegeben wird.*

*“Verarbeitetes Essen“ heißt, dass die Lebensmittel in der Produktion verändert wurden. Die Veränderung geschieht beispielsweise durch Verfahren wie Kochen, Backen, Fermentieren oder Konservieren. (Ldn, 2020).

- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu

19. Es ist mir wichtig, dass der Nutri-Score auf allen ultra-verarbeiteten Lebensmitteln angegeben wird.*

*Lebensmittel gelten als ultra-verarbeitet, wenn diese aus vielen Zutaten bestehen oder Lebensmittelzusatzstoffe beinhalten, die die Geschmackseigenschaften verbessert oder aus verarbeiteten Rohstoffen und Zutaten bestehen, die in der Hausmannskost selten verwendet werden (Ldn, 2020).

- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu

Im Folgenden werden Beispiele aufgeführt, die die Auswirkungen der Aktualisierung des Nutri-Score Algorithmus auf Frühstückscerealien zeigen. So werden beispielsweise Frühstückscerealien mit einem relativ hohen Zuckergehalt nicht mehr mit einem A, sondern mit einem C bewertet (Nutriscore Europe, 2023). Bewerten Sie auf einer Skala von stimme voll und ganz zu bis stimme überhaupt nicht zu, wie Sie die neue Bewertung einschätzen.

20. Nestlé Nesquik Chocapic®: Nutri-Score C (ehemaliger Nutri-Score A)*

- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu



21. Nestlé Nesquik® Knusper-Frühstück: Nutri-Score C (ehemaliger Nutri-Score A)*

- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu



22. Nestlé Original Fitness: Nutri-Score C (ehemaliger Nutri-Score A)*

- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu



23. Kellogg's Special K® mit roten Beeren: Nutri-Score C (ehemaliger Nutri-Score B)*

- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu



24. Nestlé Lion® Karamell-Schoko: Nutri-Score D (ehemaliger Nutri-Score C)*

- Stimme voll und ganz zu
- Stimme zu
- Stimme weder zu noch lehne ich ab
- Stimme nicht zu
- Stimme überhaupt nicht zu



25. Schätzfrage: Wie viele Marken sind in Deutschland für die Verwendung des Nutri-Scores registriert?

- 1.090
- 9.090
- 19.090

Danke für Ihre Teilnahme an der Umfrage!

Appendix C: Tables of Statistical Analysis

Coding of Likert scale for statistical analysis

Likert scale	Code
Strongly disagree	1
Disagree	2
Neither agree nor disagree	3
Agree	4
Strongly agree	5

Coding of Age groups

Age groups	
18 - 26	Generation Z
27 - 39	Millennials
40 - 58	Generation X
59+	Baby Boomer Generation

Tables of statistical analysis of sub-question 1 age

MANOVA: Pillai Test

Cases	df	Approx. F	Trace _{Pillai}	Num df	Den df	p
(Intercept)	1	4146.902	0.971	2	250.000	< .001
Age groups	3	3.726	0.085	6	502.000	0.001
Residuals	251					

ANOVA: Importance on food/beverage labelled with Nutri-Score

Cases	Sum of Squares	df	Mean Square	F	p
(Intercept)	3134.259	1	3134.259	2613.377	< .001
Age groups	26.713	3	8.904	7.425	< .001
Residuals	301.028	251	1.199		

ANOVA: Importance of consumption on healthy foods

Cases	Sum of Squares	df	Mean Square	F	p
(Intercept)	4710.651	1	4710.651	6665.649	< .001
Age groups	1.966	3	0.655	0.927	0.428
Residuals	177.383	251	0.707		

Descriptives - Importance on food/beverage labeled with Nutri-Score

Age groups	N	Mean	SD	SE	Coefficient of variation
Baby Boomers	49	4.082	0.932	0.133	0.228
Gen X	63	3.571	1.027	0.129	0.288
Gen Z	101	3.188	1.222	0.122	0.383
Millennial	42	3.500	1.042	0.161	0.298

Post Hoc Comparisons - Age groups

		Mean Difference	SE	t	pscheffe
Baby Boomers	Gen X	0.510	0.209	2.446	0.115
	Gen Z	0.894	0.191	4.686	< .001
	Millennial	0.582	0.230	2.526	0.097
Gen X	Gen Z	0.383	0.176	2.180	0.194
	Millennial	0.071	0.218	0.327	0.991
Gen Z	Millennial	-0.312	0.201	-1.551	0.494

Tables of statistical analysis of sub-question 1 gender

MANOVA: Pillai Test

Cases	df	Approx. F	Trace _{Pillai}	Num df	Den df	p
(Intercept)	1	4133.945	0.970	2	252.000	< .001
Gender	1	4.839	0.037	2	252.000	0.009
Residuals	253					

Kruskal-Wallis Test

Factor	Statistic	df	p
Gender	5.886	1	0.015

Descriptives - Importance on food/beverage labeled with Nutri-Score

Gender	N	Mean	SD	SE	Coefficient of variation
Female	164	3.628	1.109	0.087	0.306
Male	91	3.286	1.157	0.121	0.352

Post Hoc Comparisons - Gender

	Mean Difference	SE	t	pscheffe
Female Male	0.342	0.147	2.325	0.021

Tables of statistical analysis of sub-question 1 marital status

MANOVA: Pillai Test

Cases	df	Approx. F	Trace _{Pillai}	Num df	Den df	p
(Intercept)	1	4202.822	0.971	2	249.000	< .001
Marital status	4	3.458	0.105	8	500.000	< .001
Residuals	250					

Kruskal-Wallis Test

Factor	Statistic	df	p
Marital status	17.037	4	0.002

Descriptives - Importance on food/beverage labeled with Nutri-Score

Marital status	N	Mean	SD	SE	Coefficient of variation
Divorced	26	3.808	0.981	0.192	0.258
Married	79	3.886	0.961	0.108	0.247
Separated	9	3.444	0.882	0.294	0.256
Single	126	3.206	1.222	0.109	0.381
Widowed	15	3.533	0.990	0.256	0.280

Tables of statistical analysis of sub-question 2: Income /healthy foods labelled Nutri-Score A

MANOVA: Pillai Test

Cases	df	Approx. F	Trace _{Pillai}	Num df	Den df	p
(Intercept)	1	2378.335	0.950	2	248.000	< .001
Income	5	1.744	0.068	10	498.000	0.068
Residuals	249					

Descriptives - Importance of healthy food labelled with Nutri-Score A

Income	N	Mean	SD	SE	Coefficient of variation
>€2,000 - €3,000	70	3.786	0.915	0.109	0.242
>€3,000 - €4,000	52	4.135	0.950	0.132	0.230
>€4,000 - €5,000	30	4.033	0.615	0.112	0.152
>€5,000	13	3.692	1.109	0.308	0.300
Don't know	11	3.545	0.522	0.157	0.147
Less than €2,000	79	3.557	1.141	0.128	0.321

Kruskal-Wallis Test

Factor	Statistic	df	p
Income	15.884	5	0.007

Tables of statistical analysis of sub-question 2: Highest qualification / healthy food labelled Nutri-Score A

MANOVA: Pillai Test

Cases	df	Approx. F	Trace _{Pillai}	Num df	Den df	p
(Intercept)	1	2307.300	0.949	2	250.000	< .001
Highest qualification	3	0.829	0.020	6	502.000	0.548
Residuals	251					

Kruskal-Wallis Test

Factor	Statistic	df	p
Highest qualification	3.997	3	0.262

Descriptives - Importance of healthy food labelled with Nutri-Score A

Highest qualification	N	Mean	SD	SE	Coefficient of variation
Bachelor's degree	61	3.656	1.047	0.134	0.286
High school diploma or equivalent degree	112	3.768	0.977	0.092	0.259
Less than a high school diploma	62	4.016	0.859	0.109	0.214
Master's degree	20	3.750	1.164	0.260	0.310

Tables of statistical analysis of sub-question 2: Place of residence / healthy food labelled A

MANOVA: Pillai Test

Cases	df	Approx. F	Trace _{Pillai}	Num df	Den df	p
(Intercept)	1	2403.065	0.951	2	250.000	< .001
Place of residence	3	2.473	0.057	6	502.000	0.023
Residuals	251					

Kruskal-Wallis Test

Factor	Statistic	df	p
Place of residence	9.915	3	0.019

Descriptives - Importance of healthy food labelled with Nutri-Score A

Place of residence	N	Mean	SD	SE	Coefficient of variation
City	152	3.809	0.982	0.080	0.258
Rural area	37	3.622	1.163	0.191	0.321
Small town	51	4.098	0.640	0.090	0.156
Suburb	15	3.133	1.187	0.307	0.379

Tables of statistical analysis of sub-question 2: Income /unhealthy foods labelled Nutri-Score E

Kruskal-Wallis Test

Factor	Statistic	df	p
Income	11.609	5	0.041

Descriptives - Importance of unhealthy food labelled with Nutri-Score E

Income	N	Mean	SD	SE	Coefficient of variation
>€2,000 - €3,000	70	3.886	1.057	0.126	0.272
>€3,000 - €4,000	52	4.365	0.886	0.123	0.203
>€4,000 - €5,000	30	4.200	0.997	0.182	0.237
>€5,000	13	3.846	1.214	0.337	0.316
Don't know	11	3.909	0.701	0.211	0.179
Less than €2,000	79	3.924	1.095	0.123	0.279

Tables of statistical analysis of sub-question 2: Highest qualification /unhealthy foods labelled Nutri-Score E**Kruskal-Wallis Test**

Factor	Statistic	df	p
Highest qualification	0.695	3	0.874

Descriptives - Importance of unhealthy food labelled with Nutri-Score E

Highest qualification	N	Mean	SD	SE	Coefficient of variation
Bachelor's degree	61	3.984	1.162	0.149	0.292
High school diploma or equivalent degree	112	3.982	1.057	0.100	0.265
Less than a high school diploma	62	4.161	0.853	0.108	0.205
Master's degree	20	4.050	1.050	0.235	0.259

Tables of statistical analysis of sub-question 2: Place of residence /unhealthy foods labelled Nutri-Score E**Kruskal-Wallis Test**

Factor	Statistic	df	p
Place of residence	6.515	3	0.089

Descriptives - Importance of unhealthy food labelled with Nutri-Score E

Place of residence	N	Mean	SD	SE	Coefficient of variation
City	152	4.059	1.050	0.085	0.259
Rural area	37	3.757	1.211	0.199	0.322
Small town	51	4.294	0.642	0.090	0.149
Suburb	15	3.533	1.246	0.322	0.353