The use of the EUROHIS-QOL-8 to Assess The Perception of Quality of Life at *Termas de Chaves*

Márcia Vaz[1], Isabel Sofia Loureiro[2], Maria José Alves[3], Fernanda Ferreira[2], Vânia Costa[4], Paula Odete Fernandes[1] and Alcina Nunes[1]

[1]UNIAG, Instituto Politécnico de Bragança, Portugal
[2]ESHT-P. PORTO, UNIAG, Vila do Conde, Portugal
[3]CIMO, AquaValor, Instituto Politécnico de Bragança, Portugal
[4]GOVCOPP, Instituto Politécnico do Cávado e do Ave, Barcelos, Portugal

marciafvaz@ipb.pt
sofiasloureiro@gmail.com
maria.alves@ipb.pt
faf@esht.ipp.pt,
vcosta@ipca.pt
pof@ipb.pt, alcina@ipb.pt

Abstract: Quality of life is a person's perception of life in the context they belong in. It compresses multiple dimensions that need to be assessed. The EUROHIS-QOL-8 scale is an instrument that measures the subjective well-being of individuals and the impact of different health issues. It is a brief tool to measure the quality of life that includes eight items. The higher the results shown in this scale, the better the quality of life of individuals. The EUROHIS-QOL-8 has been proven to have good internal consistency and an excellent index for measuring the quality of life. It has been validated and reliable in many different contexts of application. This paper uses EUROHIS-QOL-8 to evaluate thermalists' perception of quality of life before and after attending a thermal spa. It intends to identify if there are differences between the state of quality of life before and after using thermal spa services. For this purpose, a self-administrated questionnaire was applied to the *Termas de Chaves'* users during the 2021 thermal season, i.e., between 09 August and 20 December. A convenience method of non-probability sampling allowed to obtain a sample of 213 thermal users. The data were analysed through statistical techniques of exploratory descriptive and inferential analysis. The results showed statistically significant differences in customers' perception of quality of life before and after 14 days of treatment. In addition, the study of five sociodemographic variables showed that the categories: female, up to 35 years old, single, without academic qualifications, and housekeeper were the most benefited from the thermal treatments. Regarding the analysis of pathologies, the participants guided by their family doctor to attend the Chaves thermal springs for respiratory problems showed the most significant improvement. The paper's results dissemination becomes an added value for verifying the benefits of thermal spas on the individuals' quality of life. It also allows for better development of thermal spa products to improve the quality of life perceived by individuals.

Keywords: Chaves thermal spa, EUROHIS-QOL-8, Health and well-being, Perceived health status, Quality of life, Thermalism

1. Introduction

Contemporary society is more aware and concerned about its health status and well-being, both physically and psychologically (Alén et al., 2014). For this reason, health and wellness tourism has become widespread worldwide from the 21st century onwards (Kim, Chiang and Tang, 2017).

Health can be defined as the absence of disease or infirmity but also as the presence of physical, mental, and social well-being (World Health Organization, 1948). The term quality of life was first used in 1920. However, only since the 1960s has become widely applied and valued (Cummins, 2000). Recently, there has been an increased effort to associate the quality of life (QoL) as a necessary concept in health care practice and research (Heinemann, 2000). The WHOQOL Group defined QoL as an "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (WHOQOL Group, 1995, p. 1403).

It has been found that health and wellness tourism is currently associated with ensuring the maintenance of the individual's health and well-being. Thus, Anderssen (2016) states that the services available in this sector target personal care, health, and well-being and aim to cultivate and improve the body and the soul. In this sense, thermal spas are increasingly sought after by society for offering services that allow them to improve their quality of life.

In this sense, the present study considers the particular case of *Termas de Chaves*. To analyse thermal treatments' impact on perceived health issues, a measurement tool of individuals' subjective well-being was

used – The EUROHIS-QOL-8 scale. Pereira, Melo, Gameiro and Canavarro (2011) applied and duly validated this scale for the Portuguese population. This diagnostic tool was selected as it revealed itself to be potentially valuable in evaluating the perception of thermalists' quality of life. For this purpose, 213 thermal spa users were surveyed over five months in 2021, during which participants assessed their quality of life on the first day of treatment and after 14 days. The dissemination of this study's results reveals an added value, as it allows identifying and verifying the benefits of visiting a thermal spa.

This study is structured in four parts: theoretical framework, methodology, results and discussion, and final considerations. The theoretical framework correlates quality of life with seeking thermal spas to improve their well-being/quality of life. It shows the importance of tools like the EUROHIS-QOL-8 scale to evaluate individuals' perception of quality of life. In this case, the scale is used to evaluate the perceived quality of life before and after visiting a thermal spa. The second part of this paper incorporates the methodology and methods used. This is information regarding how data was collected, treated, and analysed so that the results could be presented in the third part. Finally, the main conclusions of this research are presented. It is hoped that the results from this paper highlight the importance of attending thermal spas to improve the individual's perceived quality of life and the weight that tools like EUROHIS-QOL-8 scale have when evaluating this aspect.

2. Theoretical Background

Literature using quality of life (QoL) to evaluate individuals' subjective well-being and the impact of different health issues has increased in the past few years (Hisasue, Kruse, Raitanen, Paavilainen and Rissanen, 2020). According to Nordenfelt (1994), quality of life may be assessed in an objective and subjective manner. The objective QoL is evidenced through social well-being, and the subjective QoL is evidenced through personal well-being. These aspects are not necessarily linked to each other.

Quality of life is directly associated with health and personal well-being. It comprises several elements, including functional capability, socioeconomic status, emotional status, social interaction, intellectual activity, self-care, health status, lifestyle, satisfaction with the job and/or daily activities, and the environment in which one lives (Mühlan, Bullinger, Power and Schmidt, 2008). Therefore, the challenge of modern therapeutic interventions is not only to prolong a person's life but to improve the quality of life. So, there is a growing interest in researching the quality of life of people with different conditions who may achieve it differently. The search for well-being through attendance at thermal establishments is one of the possible ways (Zwolińska, Weres and Wyszyńska, 2018). Thermal treatments are, in this way, the subject of diverse research on the quality of life topic, where the use of quality of life scales as the ones created by the WHOQOL Group starts to the recognised (Zwolińska, Weres and Wyszyńska, 2018; Loncaric, Loncaric and Markovic, 2015; Im and Han, 2013).

The assessment of QoL for the WHOQOL Group in 1995 is a subjective assessment that incorporates the social and environmental context. It covers not only the individual's physical health but also the psychological state, level of dependence, established social relationships, as well as effective relationships and the environment in which they live (Canavarro and Serra, 2010). In this regard, the WHOQOL Group (1995) indicates that QoL is the individual's perception of life in the context they are inserted in, such as culture and values, regarding their own goals, expectations, and concerns. Quality of life comprises multiple dimensions that need to be assessed (Louzado et al., 2021). Different instruments have been developed based on the complexity of the different dimensions of Qol. An example of that is the EUROHIS-QOL-8 scale.

The EUROHIS-QOL-8-item index was developed as an adaptation of the World Health Organisation Quality of Life instrument (WHOQOL-100) and the WHOQOL-BREF (Schmidt, Muhlan and Power, 2005). The WHOQOL-100 is composed of one hundred questions from six dimensions: physical, psychological, level of independence, social relations, environment, spiritual/religion, and beliefs (Pereira, Melo, Gameiro and Canavarro, 2011). The WHOQOL-BREF corresponds to a brief version of the WHOQOL-100. The EUROHIS-QOL 8-item has eight items to measure the quality of life. Each question includes a five-point scale that ranges from "not at all" to "completely" (Schmidt, Muhlan and Power, 2005). These items approach the overall QoL and health, their energy and finances, the individual's relationships and self-esteem, and their household and daily activities (Hisasue, Kruse, Raitanen, Paavilainen and Rissanen, 2020). According to Mendes, Martins and Fernandes (2020), the eight-item index approaches four domains: physical, psychological, social relations, and environment. It includes two questions per domain whose answers the scores are then transformed linearly to a 0–100 scale. Siltanen, Ilmarinen, Luoma, Leppäaho and Kehusmaa (2022) indicate that the total is based on the sum of all individual responses divided by the number of items responded to. The higher the results presented, the better the quality of life of the individuals.

All these instruments were developed by the WHOQOL group and validated in different languages, revealing good psychometric properties in their versions (Pereira, Melo, Gameiro and Canavarro, 2011). The EUROHIS-QOL-8 has been proven to have good internal consistency in Portugal with a Cronbach Alpha of 0,83 (Pereira, Melo, Gameiro and Canavarro, 2011). They concluded that the data regarding the precision and validity of the EUROHIS-QOL-8 in Portugal assure excellent psychometric performance, proving to be a great index to measure the quality of life. This instrument also appeared as a reliable and valid tool to evaluate the quality of life of patients infected with HIV in Portugal, as shown in Pereira and Canavarro's (2015) study. In addition, as mentioned in (Louzado et al., 2012), the EUROHIS-QOL-8 is not only a simplified version, easier to apply and with lower application costs, but also assesses all the psychometric properties of the original tool.

To the authors' knowledge, the EUROHIS-QOL-8 scale has just started to be used to evaluate thermalists' perception of their quality of life before and after attending a thermal spa, even if other quality of life evaluation scales have also been applied to reach the same goal (Quintela, Costa and Correia, 2023; Campón-Cerro et al., 2020, Zwolińska, Weres and Wyszyńska, 2018) The EUROHIS-QOL-8 approach here presented, allows to introduce new information to the literature and emphasises the importance of thermal spas to improve individuals' perceived quality of life. It also allows thermal spas to understand how the products and services provided affect the individual's QoL.

3. Methodology

This study evaluates thermalists' perception of quality of life on their health status before and after 14 days of thermal spa treatments. In order to achieve this goal, three research hypotheses (RH) were built: RH_1, RH_2 (that includes five sub-hypotheses) and RH_3. RH_1: There are differences between the mean values of thermalists' perception of quality of life before and fourteen days after treatment. RH_2: There are differences between the mean values of thermalists' perception of quality of life before and fourteen days after treatment by sociodemographic variable:

RH_{2a}: There are differences between the mean values of thermalists' perception of quality of life before and fourteen days after treatment by gender.

RH_{2b}: There are differences between the mean values of thermalists' perception of quality of life before and fourteen days after treatment by age.

RH_{2c}: There are differences between the mean values of thermalists' perception of quality of life before and fourteen days after treatment by marital status.

RH_{2d}: E There are differences between the mean values of thermalists' perception of quality of life before and fourteen days after treatment by educational level.

RH_{2e}: There are differences between the mean values of thermalists' perception of quality of life before and fourteen days after treatment by professional status.

RH_{2f}: There are differences between the mean values of thermalists' perception of quality of life before and fourteen days after treatment by group identification.

RH_3: There are differences between the mean values of thermalists' perception of quality of life before and fourteen days after treatment by pathologies.

To achieve this goal, exploratory research of quantitative nature was conducted, with the application of a questionnaire survey to the users of *Termas de Chaves*. This survey was applied in person through a convenience sampling process to the users of *Termas de Chaves* during the thermal season in 2021, i.e., between 09 August and 20 December. As health and wellness tourism is a seasonal activity, these months were selected to cover an extensive period of the thermal season. The respondents were asked to participate in this survey in two distinct moments. The first corresponds to the first day of treatment, and the second to the end of the treatment period, the fourteenth day. No indicative data regarding the total population attending Termas de Chaves was obtained during the data collection period.

The final sample of respondents who agreed to participate voluntarily in the study achieved 213 individuals. Every respondent received an explanation of the research's objectives, duration, and voluntary and confidential nature. Consequently, they provided their informed consent to participate. It should be noted that the data collection period was conditioned by the pandemic caused by the SARS-CoV-2 virus that led to the closure of thermal spas across Portugal for a prolonged period in the first half of 2021.

In terms of structure, the questionnaire survey is divided into two parts. The first includes questions that allow for characterising the user profile, such as sociodemographic information. The second one integrates self-reported questions dedicated to the analysis of thermalists' perception of quality of life, including questions about the overall evaluation of the personal quality of life, their satisfaction regarding the condition of their health, themselves and their personal relationships, the ability to conduct daily tasks, and the conditions of the place they live in. It is also asked if they have the money and energy necessary to live and perform their daily life. Participants responded to each question using a five-point Likert-type scale.

After this data collection, data analysis was performed using the following statistical techniques: exploratory descriptive and inferential analysis. To that end, the values recorded in the questions were converted according to the criteria of the EUROHIS-QOL-8 assessment scale. The scale scores from 0, the worst quality of life possible, to 100 points, the best quality of life possible. The higher the score, the better the quality of life perceived by individuals.

For the applicability of statistical tests using paired samples, the first step was to verify the following assumptions: the sample size should be equal to or more than 30 observations or follow the normal distribution (Marôco, 2021). In the second step, the test to be applied was chosen. Thus, the parametric t-Student test was applied when the sample size allowed, or the non-parametric Wilcoxon test when the sample size was less than 30 cases and did not follow the normal distribution. For the analysis of the assumption of normal distribution, the result of the Shapiro-Wilk test was used, as recommended in several studies (Winkens et al., 2017; Van Hoek, Portzky and Franck, 2019).

For validating the research hypotheses, it was assumed a 5% level of significance. Thus, for evidence values below 5%, it was concluded that there are statistically significant differences. For the RH_2, if 50% of the categories were validated, a partial validation of the respective variables (gender, age, marital status, educational level, professional status, and group identification) was assumed.

4. Results

4.1 Chaves Thermal spa Customer Profile

Users of Chaves thermal spa are typically female (68%) with an average age of 68 years (standard deviation of 12.93). They are married (70.7%) and have basic education levels (56.4%). They are typically national individuals (96.4%) living in Portugal (97.8%) and coming from the northern region, particularly from the districts of Vila Real (44.4%) and Oporto (20.4%). These last results may be related to the geographical proximity of *Termas de Chaves*. The household is composed of two elements (59.1%). Regarding the labour situation, pensioners prevail (70.2%), and the customer has mainly a monthly net income of 666 to 1300 euros (42.2%). It was also perceived that 60.4% of the respondents are familiar with the Chaves thermal spa and do not frequent other thermal spas (74.4%), indicating that customers are satisfied with the experience and revisit the space (Vaz et al., 2022).

4.2 Thermalists' Perception of Quality-Of-Life

Helpful information was collected from the total number of respondents (n=213), which allowed analysing the perception of thermalists regarding the quality of life in two distinct moments, before and after visiting *Termas de Chaves*. Table 1 shows the minimum and maximum values, mean, standard deviation, rate of change and p-value calculated through the values of the EUROHIS-QOL-8 scale.

Table 1*:* Thermalists' Perception of Quality-of-Life Analysis Before and After Treatment

Thermal treatment	n	Min.	Max.	Mean	Std. Deviation	Rate of change	Student t-test value	P-value
Before	213	37.50	93.75	71.93	9.409	4.2%	-5,019	<0.001
After	213	37.50	96.88	74.93	8.474			

Source: Authors' elaboration

Based on the results (Table 1), it was found that in the pre-treatment, the minimum score concerning the respondents' perception of quality of life was 37.50 points, and the maximum value was 93.75, with an average of 71.93 (standard deviation of 9.409). After treatment, the minimum value remained at 37.50, and the maximum value increased to 96.88, with a mean value of 74.93 (standard deviation of 8.474). Thus, there was a 4.2% improvement in the respondents' perception of quality of life after 14 days of treatment. Student's t-test for paired samples was applied to verify the existence of differences pre and post-treatment. Thus, it was

concluded that there were statistically significant differences between the mean values of the perceived quality of life of the thermalists before and after treatment at the thermal spa, which allowed the validation of the first research hypothesis (Table 1).

4.3 Thermalists' Perception of Quality-of-Life By Sociodemographic Variables and Pathology

For a more detailed analysis of the perception of the quality of life of thermalists before and after 14 days of treatment, parametric and non-parametric tests were applied to the five sociodemographic variables under study (gender, age, marital status, educational level and professional status), based on the EUROHIS-QOL-8 scale results. The results are organised by categories in Table 2.

Table 2: Thermalists' Perception of Quality-of-Life Analysis Before and After Treatment By Sociodemographic Variables

Variable	Category	n	Thermal treatment	Mean	Std. Deviation	Rate of change	p-value
Gender (n=213)	Female	149	Before	71.92	9.501	4.3%	<0.001[a]
			After	74.98	8.835		
	Male	64	Before	71.97	9.266	4.0%	0.009[a]
			After	74.80	7.632		
Age (n=211)	<=35	3	Before	68.75	9.375	18.1%	0.109[b]
			After	81.25	3.125		
	36-45	8	Before	67.19	11.08	13.4%	0.093[b]
			After	76.17	4.706		
	46-55	26	Before	71.88	9.057	2.8%	0.224[b]
			After	73.80	8.753		
	56-65	45	Before	71.18	10.70	3.3%	0.105[a]
			After	73.54	10.05		
	66-75	70	Before	73.53	9.378	3.4%	0.015[a]
			After	75.98	8.472		
	76-85	48	Before	71.22	8.767	5.6%	<0.001[a]
			After	75.20	7.932		
	86+	11	Before	72.73	7.139	1.2%	0.587[b]
			After	73.58	6.150		
Marital status (n=208)	Single	12	Before	66.41	11.85	9.4%	0.040 [b]
			After	72.66	9.244		
	Married	152	Before	72.20	8.781	3.6%	<0.001[a]
			After	74.77	8.218		
	Divorced	17	Before	73.71	8.048	5.0%	0.015[b]
			After	77.39	8.233		
	Widow	27	Before	72.11	12.35	4.0%	0.084[b]
			After	75.00	10.26		
Education level (n=210)	No qualification	4	Before	60.16	6.442	18.4%	0.068[b]
			After	71.88	5.103		
	Primary school	118	Before	71.72	9.316	3.6%	<0.001[a]
			After	74.31	8.224		

Variable	Category	n	Thermal treatment	Mean	Std. Deviation	Rate of change	p-value
	High school	36	Before	72.31	6.688	6.1%	0.010[a]
			After	76.74	6.658		
	Higher education	52	Before	73.26	10.94	3.9%	0.015[a]
			After	76.08	8.858		
Professional status (n=213)	Employee	45	Before	71.60	10.94	3.3%	0.163[a]
			After	73.96	8.532		
	Self-employed	8	Before	72.27	6.563	4.9%	0.307[b]
			After	75.78	7.967		
	Retired	149	Before	72.02	9.164	4.3%	<0.001[a]
			After	75.13	8.526		
Professional status (n=213)	Housekeeper	7	Before	70.09	9.692	6.4%	0.235[b]
			After	74.55	7.745		
	Unemployed	4	Before	75.00	6.751	3.1%	0.276[b]
			After	77.34	11.23		

Notes: [a] Student t-test; [b] Wilcoxon test.

Source: Authors' elaboration

The variable gender was first analysed and showed a more extensive improvement for the female gender (4.3%) compared to the male gender (4.0%). In other words, the perception of the quality of life of women (n=149) was initially an average of 71.92 (standard deviation of 9.501). In the post-treatment period, the average increased to 74.98 (standard deviation of 8.835). With a p-value <0.05, there are statistically significant differences between the mean values of men and women before and after thermal treatment. Thus, validation of hypothesis RH_{2a} is assumed.

The variable age includes individuals between 23 and 92 years old, with a mean age of 68 years (standard deviation of 12.921), and the median is around 71 years. The results show statistically significant improvements (p-value <0.05) in the perceived quality of life for one of the seven age groups: people aged between 76 and 85. However, the respondents comprising the <=35 age group (n=3) appeared to be the ones who benefited the most from the thermal treatments. More specifically, at pre-treatment, they showed a mean score of 68.75 (standard deviation of 9.375) with an improvement at post-treatment to 81.25 (standard deviation of 3.125), corresponding to a rate of change of 18.1%. Thus, RH_{2b} is not validated.

Regarding the variable marital status, the single category (n=12) was the one with the highest level of improvement since before the thermal treatments, they had a mean value of 66.41 (standard deviation of 11.85), and after 14 days of treatment, they showed a mean value of 72.66 (standard deviation of 9.244). Thus, there is a rate of variation of 9.4%. Of the four categories under study, the only one that did not show statistically significant improvements (p-value <0.001) between the means of thermalists' perception of quality of life was widows. Thus, it is concluded that the RH_{2c} is partially validated.

For the educational level, it was verified that individuals with no academic qualifications (n=4) were the ones who most benefited from the thermal spa treatments. On their first visit to Chaves Thermal Spa, the respondents presented an average quality of life of 60.16 (standard deviation of 6.442). After the treatments, they positively changed to 71.88 points (standard deviation of 5.103). However, although the variation rate was positive (18.4%), it was not statistically significant (p-value = 0.068). Also, in this variable, it was observed that there are statistically significant differences (p-value <0.001) between the initial and final averages of the perceived quality of life by thermalists in primary education, high school and higher education. Since more than 50% of the categories were validated, the RH_{2d} is partially validated.

Finally, regarding the variable professional status, it was noted that the housekeeper category (n=7) was the one that presented the most positive changes before and after treatment. Initially, the average was 70.09 (standard

deviation of 9.692), changing to an average of 74.55 (standard deviation of 7.745), corresponding to a variation rate of 6.4%. It should be noted that improvements were observed in all categories of this variable. However, statistically significant differences were shown only in the category of those retired, which translates into a p-value <0.05. Thus, it was not possible to validate the research hypothesis RH_{2e} (Table 2).

It was also possible to verify the perception of the quality of life of three identification groups based on the EUROHIS-QOL-8 scale results. The results are organised in Table 3.

Table 3: Thermalists' Perception of Quality-of-Life Analysis Before and After Treatment by Pathologies

Variable	Category	n	Thermal treatment	Mean	Std. Deviation	Rate of change	p-value
Group identification (n=213)	GH	156	Before	73.40	8.268	3.2%	<0.001[a]
			After	75.78	8.061		
	ME	42	Before	68.38	11.59	4.9%	0.024[a]
			After	71.73	8.891		
	RE	15	Before	66.67	9.929	12.5%	0.035[b]
			After	75.00	9.882		

Notes: [a] Student t-test; [b] Wilcoxon test; GH: Group of thermalists without registered pathologies/disease; ME: Group of thermalists with reported musculoskeletal pathologies/disease; RE: Group of thermalists with reported respiratory pathologies/disease.

Source: Authors' elaboration

The variable group identification analyses three groups of participants were divided by identification of the type of condition, in which a) the GH corresponds to spontaneous thermalists who may or may not have health problems; b) the ME are individuals referred by the Portuguese National Health Service with musculoskeletal pathologies/diseases; c) the RE are the participants referred by their family doctor to visit the *Termas de Chaves* for having respiratory problems. The RE group (n=15) was the one that presented a higher level of perceived quality of life after the thermal treatment since the mean went from 66.67 (standard deviation of 9.929) to 75.00 (standard deviation of 9.882) after treatment. The rate of change was 12.5%. There were statistically significant improvements in the GH, ME and RE categories, as they show a p-value <0.05. Thus, validation of RH_3 was assumed (Table 3).

In general terms, perceived improvements in thermalists' quality of life were observed after the 14-day treatment. In conclusion, it was found that the first research hypothesis was validated. Regarding the second hypothesis, RH_{2a} were validated, and RH_{2c} and RH_{2d} were partially validated. Thus, the RH_2 was partially validated. RH_3 is validated since there were statistically significant improvements in the three categories under analysis. Table 4 summarises the results of the previously outlined research hypotheses.

Table 4: Summary of the Results of the Research Hypotheses

Research Hypotheses (RH)	Sub-Hypotheses	Variables	Result
RH_1: There are differences between mean values of thermalists' perception	-	-	Validated

Research Hypotheses (RH)	Sub-Hypotheses	Variables	Result
of quality of life before and fourteen days after treatment.			
RH_2: There are differences between the mean values of thermalists' perception of quality of life before and fourteen days after treatment by sociodemographic variable.	RH_{2a}	Gender	Validated
	RH_{2b}	Age	Unvalidated
	RH_{2c}	Marital status	Partially validated
	RH_{2d}	Education level	Partially validated
	RH_{2e}	Professional status	Unvalidated
RH_3: There are differences between the mean values of thermalists' perception of quality of life before and fourteen days after treatment by pathologies.	-	-	Validated

Source: Authors' elaboration

The EUROHIS-QOL-8 scale is a diagnostic tool that assesses individuals' perception of their quality of life. It was possible to apply it to the thermalism sector and understand how thermalists evaluate their quality of life before thermal spa treatments and after 14 days of treatment.

5. Final Considerations

This paper introduces the application of the EUROHIS-QOL-8 scale to thermal spas, which had not been used in this context. The statistical methods applied in this research allowed an understanding of whether the thermal user's perception of quality of life was altered or affected by the visit to the thermal spa. Thus, the paper's results dissemination becomes an added value for verifying the benefits of thermal spas on the quality of life of individuals.

The results made it possible to answer the specific objective outlined for this study. In the first stage, a statistically significant positive change was found concerning the perception of quality of life. In the second stage, a more detailed analysis of the five studied sociodemographic variables showed that, within the gender category, women were the ones who obtained the most benefits from thermal treatments. In the age category, improvements were noted for those up to 35 years old, but no statistically significant difference was found. Singles stood out in the marital status category, but the research hypothesis was only partially validated. In the education category, those with no qualifications were mentioned as the group that showed the most positive differences between periods, but the research hypothesis was only partially validated. In the professional status category, the housekeeper showed the most considerable improvement in the after results for the professional status category. However, the research hypothesis was invalidated. From this analysis, it was possible to verify that for the RH_2, it was possible to validate one sub-hypotheses: gender and to partially validate two others: marital status and education level. In this way, RH_2 is partially validated. Even though there are evident changes between the first and the fourteenth-day results, it is not possible to affirm that they were all statistically significant for the five sociodemographic variables. In the last stage, pathologies were analysed through three group identification categories. Respondents with respiratory pathologies/diseases (RE) were the ones who showed a higher level of improvement in perceived quality of life after the thermal treatment. It was also possible to verify statistically significant progress concerning the perception of quality of life of the participants of the three groups under analysis after attending *Termas de Chaves*. Thus, the third research hypothesis is validated.

The analysis of the results showed that thermal treatments help improve the quality of life of individuals who attend thermal spas. However, since the scale used only assesses the perception of individuals and the analysis performed only tested hypotheses, not being a true impact analysis, it is considered that the improvements should not be attributed solely to the spa treatments. The participant in this research stays fourteen consecutive days in *Termas de Chaves* to perform treatments. With that, the daily routine changes and other factors that could negatively influence the quality of life might be automatically "forgotten" once they stay at the thermal spa. A few aspects that could influence the change of the before and after of the perception of quality of life are the fact that they are in a holiday spirit, with less worrying, with no commitments or workdays. This changes the perception of quality of life, which is why applying different scales and doing biological analysis can help

complete information, enrich the results obtained and explain why the thermal spas play a significant role in the perception of quality of life from individuals.

The study's main contribution is to understand that the perception of the thermalists is translated into improvements in their quality of life with thermal treatments.

Acknowledgements

This article is a result of the project "GreenHealth - Digital strategies in biological assets to improve well-being and promote green health" (Norte-01-0145-FEDER-000042), supported by Norte Portugal Regional Operational Programme (NORTE 2020), under the PORTUGAL 2020 Partnership Agreement, through the European Regional Development Fund (ERDF)". The authors are grateful to the FCT Portugal for financial support by national funds FCT/MCTES to UNIAG, under Project n. UIDB/04752/2020.

References

Alén, E., Nicolau, J. L., Losada, N. and Domínguez, T. (2014) "Determinant factors of senior tourists' length of stay. Annals of Tourism Research", *Annals of Tourism Research*, Vol 49, pp 19-32. https://doi.org/10.1016/j.annals.2014.08.002.

Anderssen, J. (2016). "What is a health worker? How spa therapists in a Norwegian health hotel understand their work". *Anthropology & Medicine*, Vol 23(1), pp 30–41. https://doi.org/10.1080/13648470.2015.1077198.

Campón-Cerro, A. M., Di-Clemente, E., Hernández-Mogollón, J. M. and Folgado-Fernández, J. A. (2020). "Healthy water-based tourism experiences: Their contribution to quality of life, satisfaction and loyalty". International Journal of Environmental Research and Public Health, 17(6), 1961. https://doi.org/10.3390/ijerph17061961

Canavarro, M. C. and Serra, A. V. (2010). *Qualidade de vida e saúde: Uma abordagem na perspectiva da Organização Mundial de Saúde*. Fundação Calouste Gulbenkian, Lisboa.

Cummins, R. A. (2000). "Objective and subjective quality of life: An interactive model. Social Indicators Research", *Springer*, Vol 52, pp 55-72. https://doi.org/10.1023/A:1007027822521

Edlin, G., and Golanty, E. (2015) *Health and Wellness*. Jones & Bartlett Publishers.

Ferreira A. F., Rodrigues, C., Costa, V., Alves, M. J., Fernandes, P. O., Vaz, M. and Nunes, A. (2021) "User's Profile of Thermal Establishments: A Literature Review". *International Conference on Tourism Research*, Vol 15(1), pp 352-360. https://doi.org/10.34190/ictr.15.1.129.

Heinemann, A. W. (2000). *Functional status and quality-of-life measures*. *Handbook of rehabilitation psychology*. Washington, DC: American Psychological Association.

Hisasue, T., Kruse, M., Raitanen, J., Paavilainen, E., & Rissanen, P. (2020). "Quality of life, psychological distress and violence among women in close relationships: a population-based study in Finland". *BMC women's health*, Vol 20(1), pp 1-10. https://doi.org/10.1186/s12905-020-00950-6

Im, S. H. and Han, E. Y. (2013). "Improvement in anxiety and pain after whole body whirlpool hydrotherapy among patients with myofascial pain syndrome". *Annals of Rehabilitation Medicine*, 37(4), 534-540.

Kim, E., Chiang, L. and Tang, L. (2017). "Investigating wellness tourists' motivation, engagement, and loyalty: In search of the missing link". *Journal of Travel & Tourism Marketing*, Vol 34(7), pp 867-879. https://doi.org/10.1080/10548408.2016.1261756.

Loncaric, D., Loncaric, D. and Markovic, S. (2015). "Health tourism, customer satisfaction and quality of life: The role of specialty hospitals". Tourism in Southern and Eastern Europe, 3, 159-173.

Louzado, J., Cortes, M., Oliveira, M., Bezerra, V., Mistro, S., Medeiros, D. and Mengue, S. (2021). "Gender Differences in the Quality of Life of Formal Workers". *International Journal of Environmental Research and Public Health*, Vol 18. https://doi.org/10.3390/ijerph18115951

Marôco, J. (2021). *Análise Estatística com o SPSS Statistics*. Report, Lisboa.

Mendes, R., Martins, S., and Fernandes , L. (2020). "Diabetes em Idosos de Unidades de Convalescença: Caracterização Sociodemográfica e Clínica". *Revista Portuguesa de Endocrinologia, Diabetes e Metabolismo*, Vol 29-35. https://doi.org/10.26497/ao190038.

Nordenfelt, L. (1994). *Towards a theory of happiness: a subjectivist notion of quality of life. In Concepts and measurement of quality of life in health care*. Springer, Dordrecht.

Mühlan, H., Bullinger, M., Power, M., and Schmidt, S. (2008). "Short forms of subjective quality of life assessments from cross-cultural studies for use in surveys with different populations". *Clinical Psychology & Psychotherapy*, Vol 15(3), pp 142-153. https://doi.org/10.1002/cpp.573.

Organização Mundial da Saúde (1948). *Constituição da Organização Mundial da Saúde*. Genebra.

Pereira, M. and Canavarro, M. (2015) "Reliability and validity of the European Portuguese version of the quality-of-life index EUROHIS-QOL-8 in HIV-infected patients". *Revista portuguesa de saúde pública*, Vol 33(2), pp 183-187. https://dx.doi.org/10.1016/j.rpsp.2015.04.002.

Pereira, M., Melo, C., Gameiro, S. and Canavarro, M. C. (2011). "Estudos psicométricos da versão em Português Europeu do Índice de qualidade de vida EUROHIS-QOL-8". *Laboratório de Psicologia,* Vol 9(2), pp 109-123. https://doi.org/10.14417/lp.627.

Quintela, J. A., Costa, C. and Correia, A. (2023). "Health and Wellness Tourism in the Pursuit of Quality of Life: A Case Study Approach for Portugal and Hungary". In Global Perspectives on the Opportunities and Future Directions of Health Tourism (pp. 165-192). IGI Global.

Schmidt, S., Muhlan, H., and Power, M. (2005) "The EUROHIS-QOL-8-item index: psychometric results of a cross-cultural field study". *European Journal of Public Health,* Vol 16(4), pp 420-228. https://doi.org/10.1093/eurpub/cki155.

Siltanen, S., Ilmarinen, K., Luoma, M.-L., Leppäaho, S. and Kehusmaa, S. (2022). "Changes in older people's quality of life in the COVID-19 era: a population-based study in Finland". *Quality of Life Research,* Vol 31, pp 3177-3187. https://doi.org/10.1007/s11136-022-03210-2.

Van Hoek, G., Portzky, M. and Franck, E. (2019). "The influence of sociodemographic factors, re-silience and stress reducing activities on academic outcomes of undergraduate nursing students: A cross-sectional research study". *Nurse Education Today*, pp 90-96. https://doi.org/10.1016/j.nedt.2018.10.013.

Vaz, M., Alves, M. J., Ferreira, F., Costa, V., Rodrigues, C., Fernandes, P. O., and Nunes, A. (2022). "User's Profile of a Portuguese Thermal Establishment: Empirical Study". *International Conference on Tourism Research*, Vol 15(1), pp 449–458. https://doi.org/10.34190/ictr.15.1.133.

WHOQOL Group (1995). "The World Health Organization quality of life assessment (WHOQOL): Position paper from the World Health Organization". *Social Science and Medicine*, Vol 41(10), pp 1403- 1409. https://doi.org/10.1016/0277-9536(95)00112-k.

Winkens, B., Engelen, G. J. J. A., Verhey, F. R. J., Schols, J. M. G. A., Collet, J. and Vugt, M. E. (2017). "Well-being of nursing staff on specialised units for older patients with combined care needs". *Journal of Psychiatric and Mental Health Nursing*, Vol 25(2), pp 108-118. https://doi.org/10.1111/jpm.12445.

Zwolińska, J., Weres, A., and Wyszyńska, J. (2018). "One-year follow-up of spa treatment in older patients with osteoarthritis: a prospective, single group study". *BioMed Research International*, 2018 Article ID 7492106. https://doi.org/10.1155/2018/7492106