



**Medical Economics and
Digitization of Health Care**

Maria Daniela GIAMMANCO,
Lara GITTO,
Slaveyko DJAMBAZOV

**IMPACT OF UNCERTAINTY, ANXIETY,
AND DEPRESSION ON ONCOLOGY
PATIENTS' QUALITY OF LIFE:
SOME EVIDENCE FROM BULGARIA AND ITALY**

Abstract

The objective of the present paper is to assess health-related quality of life (HQOL) of oncological patients. The treatment of cancer and of other invalidating and chronic pathologies cannot neglect the patients' personal dimensions, let alone the uncertainty surrounding therapies and their effectiveness. Simultaneous consideration of all these factors makes it possible to identify the patients' needs concerning their hospital experience, together with self-perceived health status, and to isolate crucial factors that improve patients' satisfaction. For this purpose, health related quality of life (HQOL) was measured through the Visual Analogue Scale (VAS) and the EuroQOL-5D questionnaire for the sample of 600 cancer patients who live in two countries (300 in Italy and 306 in Bulgaria). Another validated scale employed in the research explored uncertainty through the

© Maria Daniela Giammanco, Lara Gitto, Slaveyko Djambazov, 2023.

Giammanco, Maria Daniela, MA, Associate Professor of Applied Economics, University of Catania, Italy. ORCID: 0000-0001-8677-5314 Email: maria.giammanco@unict.it
Gitto, Lara, PhD, MSc, Associate Professor of Political Economics, University of Messina, Italy. ORCID: 0000-0002-0510-9238 Email: lara.gitto@unime.it
Djambazov, Slaveyko, PhD, MD, Faculty of Pharmacy, Medical University of Pleven, Bulgaria. ORCID: 0000-0002-9224-9588

Mishel Uncertainty in Illness Scale – MUIS, while other aspects related to cancer were measured through a tool developed by the European Organization for Research and Treatment of Cancer (EORTC). In the estimated Tobit model, a dummy variable was included among the regressors to control for the place of residence. The econometric analysis highlighted the need to account for relational and uncertainty-in-illness factors in the management of oncological diseases. Since both national sub-groups were not representative of the whole sample, we re-ran the same analysis for colorectal cancer, i.e., the most frequent type of cancer in Italy and Bulgaria both. The results of this second model only partially confirmed the main regression results, while the national effect lost its statistical significance. This suggests that the nature of the face-to-face relationships and the type of cancer under consideration matter more than the national institutional setting in providing a person-centered care.

Key Words:

quality of life; cancer patients; Italy; Bulgaria; Tobit model.

JEL: I10; I19; C24.

8 tables, 31 references.

Problem Statement

In the past few years, Health Quality of Life (HQOL) has become a relevant topic in the development of programs aimed at maintaining patients' satisfaction as one of the methods of measuring the latter. Taking the patients' needs into consideration has become essential, especially for cancer patients, whose experience of their illness is unavoidably accompanied by a change in daily routines that some may find difficult to manage.

Chronic, long term and multi-morbid illnesses greatly diminish patients' HQOL, impacting not only the somatic but also the mental dimension (Miles &

Asbridge, 2014; 2016). Taking into consideration the needs of an individual experiencing cancer in all aspects of their life is paramount. Therefore, eliciting the patient's HQOL may be of major importance for academic and political actors in their quest to design actions capable not only of improving patients' health but also of ensuring their full satisfaction with the oncological care delivery process (Bottomley, 2002). Continuous improvement in the quality of oncology care should be driving the choices of health decision-makers in Europe (Osoba, 1994; Velikova et al., 1999; Coleman et al., 2008). Enquiries on cancer patients' HQOL stem from the need to guarantee high standard assistance and innovative care (Sawka et al., 2012). Measuring HQOL increases the knowledge required to provide high quality healthcare: an evaluation of what oncology patients go through because of their illness should guide the choice of standards and procedures (Husson et al., 2011; Miles, 2015).

A careful administration of HQOL questionnaires and an analysis of the factors likely to impact perceived quality of life are the first steps towards achieving these objectives. Hence, this contribution tackles specific aspects of the oncology patients' hospital experience which determine their self-perceived changes in HQOL. The study is based on data from two European countries (Italy and Bulgaria), collected at eight oncology centers.

The paper is organized as follows: the next section briefly describes the institutional settings of the enquiry; then, the tools employed to collect the information on the investigated dimensions (uncertainty, anxiety and depression, personal experiences while accessing the health services and, overall, HQOL) are presented; descriptive statistics about the observed sample of cancer patients from Italy and Bulgaria and a presentation of the econometric model follow. The same analysis is performed and presented for the subset of patients suffering from colorectal cancer, the most frequent type of cancer in the entire sample. A discussion of the results and some final comments and remarks conclude the paper.

Background: cancer care in Italy and Bulgaria

The number of annual new cases and deaths as well as survival rates for all types of cancer vary among member states of the European Union (see <https://www.esmo.org/>). Incidence and mortality rates reflect a wide range of social and epidemiological factors in the member states. These include cancer primary prevention programs; screening programs; cancer control plans; individual lifestyles and occupational exposures; existence and accessibility of health care facilities and technological infrastructure; availability of human, financial and material resources for health and economic development (International Atomic Energy Agency, 2011). All these factors may result in reduced mortality, improved life expectancy and a better quality of life for cancer survivors (Milosavljevic et al., 2010).

Cancer care varies across Europe based on several factors, such as the proportion of GDP spent on health care. However, systems characterized by the presence of a national health service present similar intervention strategies. The present study deals with oncological patients' uncertainty in illness and expectations in facing cancer, considering potential differences stemming from institutional variety but not focusing on this specific aspect.

In Italy, cancer care is provided mainly in hospitals according to the *Piano Oncologico Nazionale* (The Ministry of Health of Italy, 2023). A key role is played by General Practitioners in all the phases of the disease (diagnosis, therapy choice, monitoring, residential and palliative care). Hospitals, both public or private, are obligated to keep all records of the diagnosis and treatment of tumors in cancer registries.

In terms of incidence rates, in Italy, around 391,000 new cases of cancer were diagnosed in 2022 (205,000 males and around 186,000 females): the most widespread tumor was breast cancer (14,3%), followed by colorectal cancer (12,3%), lung cancer (11,2%), prostatic cancer (10,4% of males) and bladder cancer (7,5%)¹. Compared to 2020, new cancer cases are estimated to have increased by about 1.4 percent for men and 0.7 percent for women. This may be due to the postponement of planned screenings as a result of the Covid-19 pandemic (Mayo et al., 2021).

In Bulgaria, an oncological patient is assisted in hospital using clinical paths (integrated actions carried out by the medical staff such as targeted actions of diagnosis, admission, acute care, surgery, recovery, etc.), while outpatients are assisted using clinical procedure (the same series of predefined and targeted actions mentioned above but applied to patients who do not stay in the hospital). A fixed amount of money is paid, regardless of the stage, severity, or outcomes of the disease. Inpatient care is paid for by central government, local government, health insurance companies (this is the most common method), and patients' families.

Cancer incidence in Bulgaria is a little below the average registered in South-Eastern Europe. Data available from the World Health Organization, referring to 2020, show 36,451 new oncological cases (WHO, 2020). The most frequent types of tumors are prostate cancer in males (24.3% of all cancer cases) and breast cancer in females (25.5% of all cancer cases).

¹See: <https://www.airc.it/cancro/informazioni-tumori/cose-il-cancro/numeri-del-cancro>

Methodology

In Italy, data was obtained by conducting interviews at four operating units of a public hospital the ARNAS Garibaldi located in Catania. The units were the Reception of the Oncology Centre, the Day Hospital Division, the Medical Oncology Division, and the Weekly Surgery Division. The analysis involved 300 consecutive cancer patients, who responded to a questionnaire aimed at collecting epidemiological and socio-demographic data. The duration of the survey was, on average, 30–35 minutes. The questionnaire consisted of several parts aimed at assessing the various dimensions of the patient's experience of the disease, in relation to the oncological hospital service.

In Bulgaria, data and information for the research were collected at four oncology centers: Serdika Medical Centre in Sofia, Nadejda Medical Centre in Varna, University Hospital Tsaritzha Yoanna – ISUL in Sofia, and Central Onco-Hospital in Plovdiv). These centers assist about 5,000 patients every year. A total of 400 patients were contacted for the research; 306 patients agreed to take part in the interview during their hospital stay².

Overall, more than 600 patients (300 from Italy and 306 from Bulgaria) enrolled for the study took part in a survey consisting of different questionnaires (the EuroQOL 5D-5L (EQ-5D-5L) with Visual Analogue Scale (VAS) and the Mishel Uncertainty in Illness Scale), including an internationally validated scale (EQ-5D, n.d.).

The EQ-5D-5L (2009 version) is based on five health attributes, each one rated from 1 to 5 (no problems/extreme problems) and related to mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. The Visual Analogue Scale (VAS) is the simplest direct elicitation method deriving from the psychometric tradition (Parkin & Devlin, 2006; Badia et al., 1999). The respondent has to place their health state on a gradual scale. The maximum value, 100, indicates perfect health, while its lowest value, 0, indicates the «worst imaginable health».

The Mishel Uncertainty in Illness Scale (MUIS) consists of 33 items, identifying four different dimensions of uncertainty: Ambiguity concerns «[T]he cues about the state of illness that are vague and indistinct and tend to blur and overlap»; Inconsistency refers to the information received «that either changes frequently or is not in accord with information previously received»; Complexity

² The rate of response and the interest in the research were quite high. In Bulgaria, for example, the average response rate was 76.5%, with slight differences among oncology centers (in particular, the Serdika Medical Centre response rate was 78%; the Nadejda Medical Centre response rate was 74%; the ISUL response rate was 77%; and the Central Onco Hospital response rate was 73%).

takes into account «[T]he cues about the treatment and the system of care that are multiple, intricate and varied»; Unpredictability refers to «the lack of contingency between illness and treatment cues and illness outcome» (Mishel, 1981; 1997).

The EORTC, also used in the survey, is a 32-item questionnaire to measure patients' appraisal of hospital doctors and nurses as well as various aspects of care organization and services (EORTC, n.d.). The investigated dimensions included exchange of information, comfort/cleanliness, general satisfaction, doctors' technical skills (3 items), doctors' interpersonal skills (3 items), doctors' information provision (3 items), doctors' availability (2 items), nurses' technical skills (3 items), nurses' interpersonal skills (3 items), nurses' information provision (3 items), nurses' availability (2 items), other hospital personnel kindness (3 items), waiting time (2 items), access (2 items) (Bredart et al., 2005).

Research Results

Table 1 presents the descriptive statistics about patients' characteristics, together with the average scores of specific items subsequently employed in the econometric analysis that used a Tobit model.

Table 1

Patients' characteristics

Variable	Mean	Std. Deviation	Min	Max
Age	62,80	10.94	28	88
Gender (female =1; male = 0)	0.508	0.504	0	1
Residence (Italy = 1; Bulgaria = 0)	0.495	0.500	0	1
Married	0.763	0.426	0	1
Graduate education	0.332	0.471	0	1
Time from diagnosis (months)	14.384	18.753	1	180
Comorbidities	0.544	0.498	0	1
Pharmacological treatment	0.761	0.427	0	1
VAS score before diagnosis	81.778	14.600	30	100
VAS score	52.758	19.470	0	100
Anxiety/Depression (EuroQOL)	2.306	1.199	0	5
EORTC 27 (general satisfaction)	3.846	1.016	1	5
EORTC 28 (feeling of participation)	3.334	1.113	0	5

Variable	Mean	Std. Deviation	Min	Max
MUIS 20 (It is not clear what is going to happen to me)	2.637	1.037	1	5
MUIS 31 (I can depend on the nurses to be there when I need them)	1.861	0.687	1	4
MUIS 33 (The doctors and nurses use everyday language so I can understand what they are saying)	2.691	1.149	1	5

Patients are almost 63 years old on average (age in the sample ranges from 28 to 88 years old). The sample is gender balanced. More than three quarters of the people in the sample are married and follow a pharmacological therapy; one third has graduated.

As the observed sample is a convenience sample and it is not representative of Italian and Bulgarian populations, due to a potential imbalance in the number of pathologies within each country subsample, we also present the descriptive statistics for both subsamples separately.

Table 2

**Descriptive statistics for the Italian subsample
(number of observations = 300)**

Variable	Mean	Std. Deviation	Min	Max
Age	59.14	11.35	28	86
Gender (female =1; male = 0)	0.55	0.505	0	1
Married	0.813	0.390	0	1
Graduate education	0.107	0.310	0	1
Time from diagnosis (months)	18.11	25.134	1	180
Comorbidities	0.357	0.480	0	1
Pharmacological treatment	0.973	0.161	0	1
VAS score before diagnosis	81.933	11.757	40	100
VAS score	62.55	15.601	0	100
Anxiety/Depression (EuroQOL)	1.387	0.964	0	5
EORTC 27 (general satisfaction)	3.137	0.785	1	5
EORTC 28 (feeling of participation)	3.017	0.981	0	5

Variable	Mean	Std. Deviation	Min	Max
MUIS 20 (It is not clear what is going to happen to me)	2.562	0.926	1	5
MUIS 31 (I can depend on the nurses to be there when I need them)	2.140	0.597	1	4
MUIS 33 (The doctors and nurses use everyday language so I can understand what they are saying)	1.940	0.570	1	5

Table 3

**Descriptive statistics for the Bulgarian subsample
(number of observations = 306)**

Variable	Mean	Std. Deviation	Min	Max
Age	66.382	9.234	41	88
Gender (female =1; male = 0)	0.467	0.450	0	1
Married	0.711	0.454	0	1
Graduate education	0.561	0.497	0	1
Time from diagnosis (months)	10.582	6.183	2	30
Comorbidities	0.729	0.445	0	1
Pharmacological treatment	0.552	0.499	0	1
VAS score before diagnosis	81.793	16.988	30	100
VAS score	42.575	17.629	0	90
Anxiety/Depression (EuroQOL)	2.738	1.253	0	5
EORTC 27 (general satisfaction)	4.541	0.683	2	5
EORTC 28 (feeling of participation)	3.644	1.148	2	5
MUIS 20 (It is not clear what is going to happen to me)	2.917	0.716	2	4
MUIS 31 (I can depend on the nurses to be there when I need them)	1.861	0.687	1	5
MUIS 33 (The doctors and nurses use everyday language so I can understand what they are saying)	2.691	1.149	2	5

The dependent variable of the Tobit model was obtained by calculating the difference between the VAS score attributed by the patient to the health status at the time when the questionnaire was administered and the VAS score attributed by the patient to their health status before the diagnosis. As the majority of patients recorded a worsening of their HQOL, a linear transformation was performed in order to obtain positive values of the dependent variable. Hence, the higher the value of the transformed variable, the smaller the recorded reduction in HQOL since the diagnosis.

For the purpose of the analysis, a crucial role is played by the patients' experiences and by factors likely to influence it, such as anxiety/depression, uncertainty in illness and personal experience (one example of this is the item «EORTC27», which represents the level of satisfaction from the assistance received).

The estimation was based on a Tobit model. In such model (Tobin, 1958), the dependent variable Y is a censored or truncated version of a variable Y^* not directly observable.

$$y_i^* \text{ if } y_i^* > 0$$

$$Y_i =$$

$$0 \text{ if } y_i^* \leq 0$$

The dependent variable is the variation in the VAS score, as specified above.

The underlying hypothesis is as follows: may the variation in HQOL, measured through the VAS, depend on some control variables (age, gender, place of residence, education level), on the time elapsed from the disease onset, on the presence of co-morbid factors, on anxiety/depression measured through the EuroQOL, on the satisfaction from the assistance received and the feeling of participation (EORTC27, EORTC28), on uncertainty, measured through the MUIS, and on the information concerning the therapy given by physicians and nurses?

The estimated equation is:

$$\text{VAS variation} = \beta_0 + \beta_1 \text{ age} + \beta_2 \text{ gender} + \beta_3 \text{ residence in Italy} + \beta_4 \text{ education} + \beta_5 \text{ time from diagnosis} + \beta_6 \text{ co-morbid factors} + \beta_7 \text{ pharmacological treatment} + \beta_8 \text{ anxiety/depression} + \beta_9 \text{ EORTC27} + \beta_{10} \text{ EORTC28} + \beta_{11} \text{ MUIS19} + \beta_{12} \text{ MUIS30} + \beta_{13} \text{ MUIS32} + \beta_{14} \text{ Information from physicians} + \beta_{15} \text{ Information from nurses} + u_i$$

u is the error term, assumed to be normally distributed:

$$u_i \sim N(0, \sigma^2)$$

The results of the estimation can be seen in Table 4.

Table 4

Estimation results

Dependent variable: variation in VAS score	Coefficient (standard errors in brackets)
Age	0.171* (0.090)
Gender (female =1; male = 0)	0.045 (1.705)
Residence (Italy = 1; Bulgaria = 0)	8.467** (3.812)
Education level	-0.052 (1.143)
Time from disease onset	-0.036 (0.043)
Comorbidities	7.218*** (2.0237)
Pharmacological treatment	10.893*** (2.462)
Anxiety/Depression (EuroQOL)	-3.255*** (0.755)
EORTC 27 (general satisfaction)	-3.935*** (1.137)
EORTC 28 (feeling of participation)	1.447** (0.779)
MUIS 20 (It is not clear what is going to happen to me)	2.314** (0.862)
MUIS 31 (I can depend on the nurses to be there when I need them)	2.728** (1.267)
MUIS 33 (The doctors and nurses use everyday language so I can understand what they are saying)	-1.928** (0.969)
Relevant therapy information from physicians	0.855 (2.037)
Relevant therapy information from nurses	4.785*** (1.645)
Constant	52.898*** (10.339)
Number of observations (uncensored) = 549; LR $\chi^2(11)$: 273.87; Prob > χ^2 = 0.000	
Log likelihood = -2378.2096; Pseudo R ² = 0.0542	
*** significant at 99%; **significant at 95%; *significant at 90%	

Many regressors show a good level of significance.

As for the control variables, Age is positively correlated with the dependent variable and weakly significant, i.e., with aging, patients perceive a smaller deterioration in their health status. This result could be interpreted in the following way: aged people may expect to be less healthy than younger ones and be more likely to accept the deterioration in their health status caused by their illness, hence, elderly patients tend to evaluate any change in their health status less dramatically.

Gender is not significant, although female gender is inversely correlated with the dependent variable.

The coefficient of the dummy variable for Italy is high and significant, i.e., Italian oncological patients report a lesser degree of deterioration in their HQOL compared to their Bulgarian peers. While data showed that the average HQOL score of Bulgarian patients before the cancer diagnosis is very close to that of the Italians (81.79 vs. 81.93), the HQOL score of Bulgarian patients after the diagnosis is much lower than that of Italian patients (42.575 vs. 62.55), even though the average time from the disease onset is longer for Italian patients (10.58 months for Bulgarians vs. 18.11 months for Italians). Bulgarian patients' worsening might be explained not only by clinical conditions but also by the institutional setting (Encheva-Malinova et al., 2020) and other cultural reasons (for example patients' attitude towards the disease). All these factors play a part in influencing HQOL and are likely to be further studied. In the next subsection we will try to tackle this issue by isolating a subsample of patients affected by a specific cancer type – colorectal.

Bulgarian patients report higher level of anxiety/depression than Italian respondents (average score of 2.738 vs 1.387); nevertheless, they report a higher level of satisfaction with the service (average EORTC 27 score 4.541 vs. 3.137) and a higher feeling of participation (average EORTC 28 score 3.644 vs. 3.017). On average, Bulgarian patients seem as aware of what is going to happen to them as Italians (average MUIS 20 score 2.917 vs. 2.562); they state they can depend on nurses less than the Italian patients (average MUIS 31 score 1.861 vs. 2.140) and feel that the medical personnel use everyday language more than the Italians (average MUIS 33 score 2.691 vs. 1.940).

Time from disease onset is not significant; however, both the presence of comorbidities and the need of pharmacological treatment are correlated with lower deterioration in the HQOL. The inverse correlation with anxiety/depression is highly significant: it shows that the more anxious/depressed the patient, the higher the deterioration in their health status. This is in line with a wide strand of literature (see Skarstein et al., 2000).

The variable related to the satisfaction for the assistance received (EORTC 27) shows a negative and significant correlation. This is a seemingly

odd result, because it would indicate that the higher the patient's satisfaction with the service, the higher the perceived deterioration in their health status. However, this correlation might suggest that people who have perceived the highest change in their life because of cancer are also the people who highly appreciate the hospital care received (the panel character of our data does not allow us to establish the casual link between the two variables, therefore this result calls for further analysis).

The patient's feeling of participation (EORTC 28, which implies the patient being involved in choices concerning their own health) is positively and significantly correlated. This shows that the patients' perception of a deterioration in their health is reduced when they feel they are taking part in this process of health co-production.

The impact of Uncertainty is measured through three items of the MUIS. MUIS 20 refers to the statement «It is not clear what is going to happen to me», related to the dimension of Ambiguity and shows a positive and significant correlation with the perceived worsening of health conditions. This result can be controversial as it appears to suggest a preference for a blurred scenario. However, this interpretation seems to be in line with the negative sign of MUIS 33 referring to (un)Complexity that states: «The doctors and nurses use everyday language so I can understand what they are saying». MUIS 31 refers to the item «I can depend on the nurses to be there when I need them», which concerns Complexity and has a positive and significant correlation with the dependent variable: a perceived lower deterioration of the HQOL is associated with a higher appreciation of the nurses' readiness to respond to patients' needs.

Finally, receiving information concerning the therapy by physicians has a positive but not significant coefficient, while declaring to have received important pieces of information concerning the therapy by nurses correlates with experiencing a lower deterioration in health conditions. This might be explained by arguing that the patients who feel accompanied in their therapeutic path by interacting with professional figures perceived as more familiar and closer to them feel in better health. Within the patient-nurse relation, it should be possible to enquire about any difficulties around the performance of everyday actions and new routines associated to the oncological therapy path. These may not be immediately observable clinically but the patient may be experiencing them anyway. Therefore, it is necessary to manage them appropriately by eliciting and listening carefully to the feedback provided by patients so as to support them in their daily routines (Miles & Asbridge, 2016).

Tables 2 and 3 suggest differences between the two subsamples; for this reason, we have isolated the most frequent pathologies within our entire sample: Colorectal, Breast and Lung cancer (Table 5).

Table 5

Types of cancer: patients' characteristics

	Colorectal Obs.120 Italy 62.5%; Bulgaria 37.5%				Breast Obs.97 Italy 52.6%; Bulgaria 47.4%				Lung Obs.94 Italy 44.7%; Bulgaria 55.3%		
	Mean	Std.dev.	Min	Max	Mean	Std.dev.	Min	Max	Mean	Std.dev.	Min
VAS	59.45378	15.71448	0	100	55.05376	18.11039	20	90	43.93617	21.63818	10
VAS Variation	-22.84034	20.09637	-100	30	-31	21.98567	-80	5	-36.62366	27.01606	-90

The colorectal cancer was identified as the most frequent group of pathologies; therefore, we have calculated the descriptive statistics for each sub national sample (colorectal cancer in Italy and Bulgaria separately, tables 6 and 7), and then rerun the same model on this restricted sample of observations. The results of this last Tobit regression are presented in Table 8. The estimations have been carried out with the software package Stata (StataCorp, 2007).

Table 6

Descriptive statistics for the Italian subsample of patients with colorectal cancer

Variable	Mean	Std. Deviation	Min	Max
Age	62.84	8.47	35	77
Gender (female =1; male = 0)	0.36	0.483	0	1
Time from diagnosis (months)	14.52	14.525	1	84
Comorbidities	0.3387	0.490	0	1
Pharmacological treatment	0.987	0.115	0	1
VAS score before diagnosis	81.4	14.416	40	100
VAS score	63.8	15.787	0	100
VAS variation	-17.6	17.5	-100	30
Anxiety/Depression (EuroQOL)	1.693	0.822	1	4

Table 7

Descriptive statistics for the Bulgarian subsample of patients with colorectal cancer

Variable	Mean	Std. Deviation	Min	Max
Age	68.11	8.57	53	88
Gender (female =1; male = 0)	0.40	0.595	0	1
Time from diagnosis (months)	10.667	5.377	3	28
Comorbidities	0.733	0.447	0	1
Pharmacological treatment	0.467	0.505	0	1
VAS score before diagnosis	83.812	15.330	50	100
VAS score	52	12.495	30	70
VAS variation	-31.773	21.141	-60	10
Anxiety/Depression (EuroQOL)	2.636	1.203	1	5

Table 8

Results of the Tobit model run for the subsample of colorectal cancer patients

Dependent variable: variation in VAS score	Coefficient (standard errors in brackets)
Age	-0.253 (0.187)
Gender (female =1; male = 0)	-7.279** (3.044)
Residence (Italy = 1; Bulgaria = 0)	9.880 (6.573)
Education level	2.230 (2.013)
Time from disease onset	-0.291** (0.117)
Comorbidities	0.698 (3.560)
Pharmacological treatment	17.489*** (4.864)
Anxiety/Depression (EuroQOL)	-4.397*** (1.540)
EORTC 27 (general satisfaction)	1.394 (2.244)

Dependent variable: variation in VAS score	Coefficient (standard errors in brackets)
EORTC 28 (feeling of participation)	-3.828** (1.728)
MUIS 20 (It is not clear what is going to happen to me)	3.855*** (0.862)
MUIS 31 (I can depend on the nurses to be there when I need them)	-5.607** (2.837)
MUIS 33 (The doctors and nurses use everyday language so I can understand what they are saying)	-5.382** (2.433)
Relevant therapy information from physicians	-18.700*** (4.874)
Relevant therapy information from nurses	-7.742*** (2.300)
Constant	123.575*** (20.335)
Number of observations (uncensored) = 108; LR $\chi^2(15)$: 85.47; Prob > χ^2 = 0.000	
Log likelihood = -446.00333; Pseudo R ² = 0.0874	
*** significant at 99%; **significant at 95%; *significant at 90%	

Results only partially confirm the principal model results: some control variables gain / lose statistical significance (age is no longer statistically significant, together with comorbidities, while gender and time from disease onset gain significance). A relevant result is that nationality (Italian vs. Bulgarian) is no longer relevant. Therefore, the difference in institutional setting does not matter, suggesting that once patients are grouped for a specific type of cancer, the psychological and relational aspects become paramount.

As far as EORTC and MUIS items are concerned, the following changes can be noticed: EORTC 27 (general satisfaction) loses statistical significance, while EORTC 28 (feeling of participation) and MUIS 31 (I can depend on the nurses to be there when I need them) are significant but change sign. Relevant therapy information from physicians and information from nurses are now both significant but with a negative sign. For this group of oncological patients, this controversial reflection on the preference of a blurred scenario seems to be prevalent, meaning that patients do not want to be informed. These interesting results suggest that participation and information, together with uncertainty in illness, may affect the patient quality of life according to a specific cancer type.

This consideration calls for further analysis to be conducted separately, for different categories of cancer, taking into account mortality and survival probabil-

ity for each cancer type. If every patient is a unique individual and must be treated as such, the possibility of isolating different cancer experiences related to the type of cancer might help to better respond to the human dimensions of the patients' subjective experience of chronic illness, leading to the development of new services or a reconfiguration of existing ones.

Discussion and Conclusions

The present paper is part of a wider research project aimed at assessing the impact of uncertainty, anxiety/depression and personal experiences on cancer patients accessing the health services (Djambazov et al., 2019; 2022; Giammanco and Gitto, 2019).

Since the beginning of the research project, despite the differences in the health systems considered, numerous similarities have become apparent. This confirms the need to develop common guidelines for oncology patients, based on the specific cancer type. Therefore, if the hospital personnel (doctor and nurses) play a relevant role in conveying information, specific paths must be searched to recognize and answer the specific cancer patients' queries (James et al., 2016), which may vary according to the type of cancer affecting the patients.

Patients living in two different European countries – Italy and Bulgaria – have been observed: the variation in their HQOL, summarized through the VAS scores, was the dependent variable in a Tobit model employing various socio-economic factors as regressors. The conducted econometric analysis emphasized the role of health professionals in guaranteeing an adequate level of assistance to patients.

The main conclusions of the study could be summarized as follows: healthcare professionals should be actively engaged in quality efforts in different countries and interprofessional collaborative teams between physicians might be formed around quality improvement efforts. Nurses, who play a major role in this framework, should be trained not only to assist patients but also to help them in their everyday therapy actions. In fact, nurses' role can be pivotal in producing a tailored experience, empowering each oncological patient to achieve the highest results in terms of HQOL.

The second part of the analysis that studied colorectal cancer seems to contradict the main model results, suggesting therefore that there is no such thing as «an oncological patient» but a patient who is facing the experience of a specific cancer type. Therefore, if health professionals' role matters in conveying information, specific strategies must be implemented to recognize and answer the specific cancer patients' queries.

Our results must be considered as a first step on an intriguing path leading to the understanding of the determinants of oncology patients' HQOL. For this reason, a necessary extension of this analysis is repeat research with diverse oncology pathology patients, so that specific actions for each cancer type can be mapped. Further in-depth analysis may consider the study of other cultural and clinical determinants of perceived deterioration of patients' health.

In considering HQOL, the Financial Toxicity (FT) – an aspect that refers to the detrimental effects of the excess financial strain caused by the diagnosis of cancer on the well-being of patients, their families and society (Desai & Gyawali, 2020) – could be investigated. While a diagnosis of cancer does not necessarily result in economic difficulties, especially when there exists a national health service that provides assistance to cancer patients, the latter may perceive the arising financial difficulties (reduced work productivity, non-refundable care costs, etc.) and develop a certain degree of toxicity. Hence, it is essential to identify the factors leading to financial toxicity alongside other tools – some of which, developed in the literature, should serve to measure the methods of psychological adaptation to the problem. In Italy, a tool to measure financial toxicity was developed over a period of three years and was based on discussions with various groups of patients, caregivers, oncologists, and other health professionals (Riva et al., 2019)³. It is a questionnaire called PROFFIT (Patient Reported Outcome for Fighting Financial Toxicity) that contains 16 questions. In Bulgaria, to our knowledge, similar tools have not been developed so far.

Overall, this contribution identifies real potential to drive important and long overdue changes in the way clinical services are delivered to people living with chronic illnesses. Improving communication with patients, giving more information about therapies, creating a friendly environment where the patient knows they can receive support – these are the first steps to solving critical issues and guaranteeing high-quality healthcare.

³The need for such a tool emerged from the answers given by 3,700 cancer patients to the question of whether the disease or the treatment had caused economic difficulties. Patients who had reported a financial difficulty caused by the disease and the treatment ran a higher risk of worsened quality of life; patients who experienced financial toxicity during treatment, also had a higher risk of mortality in later years.

The researchers identified seven questions whose answers allow them to construct an FT-score. The items of PROFFIT relate to the ability to meet monthly household expenses without difficulty, the concern for economic problems that may occur in the future due to the disease, the expenses incurred for private visits, supplementary medicines, or supplementary care such as physiotherapy or psychotherapy, the costs of transport to reach the treatment centre.

Acknowledgments

The authors would like to thank Maria Avanzato and Chiara Gerratana for conducting the interviews and collecting the data. Usual caveats apply.

Since the study was focused on interviews directed at patients who answered a survey comprised of the questionnaires described in the study without administering drugs or carrying out medical procedures, a formal approval by the ethical committee was not required, although the ethical committees were informed. Patients' anonymity was guaranteed.

References

- Badia, X., Monserrat, S., Roset, M., & Herdman, M. (1999). Feasibility, validity and test-retest reliability of scaling methods for health states: The visual analogue scale and the time trade-off. *Quality of Life Research*, 8(4), 303-310. <https://doi.org/10.1023/A:1008952423122>
- Bottomley, A. (2002). The cancer patient and quality of life. *The Oncologist*, 7(2), 120-125. <https://doi.org/10.1634/theoncologist.7-2-120>
- Brédart, A., Bottomley, A., Blazeby, J. M., Conroy, T., Coens, C., D'Haese, B., Chie, W. C., Hammerlid, E., Arraras, J. I., Efficace, F., Rodary, C., Schraub, S., Costantini, M., Costantini, A., Joly, F., Sezer, O., Razavi, D., Mehlitz, M., Bielska-Lasota, M., & Aaronson, N. K. (2005). An international prospective study of the EORTC cancer in-patient satisfaction with care measure (EORTC IN-PATSAT32). *European Journal of Cancer*, 41(14), 2120-2131. <https://doi.org/10.1016/j.ejca.2005.04.041>
- Coleman, M. P., Alexe, D. M., Albrecht, T., & McKee, M. (eds.). (2008). *Responding to the challenge of cancer in Europe*. Institute of Public Health of the Republic of Slovenia. <https://apps.who.int/iris/bitstream/handle/10665/107879/9789616659208-eng.pdf?sequence=4&isAllowed=y>
- Desai, A., & Gyawali, B. (2020). Financial toxicity of cancer treatment: Moving the discussion from acknowledgment of the problem to identifying solutions. *eClinical Medicine, The Lancet Discovery Science*, 20, 100269. <https://doi.org/10.1016/j.eclinm.2020.100269>
- Djambazov, S. N., Giammanco M. D., & Gitto, L. (2019). Factors that predict overall patient satisfaction with oncology hospital care in Bulgaria. *Value in Health Regional Issues*, 19, 26-33. <https://10.1016/j.vhri.2018.11.006>

- Djambazov, S. N., Giammanco, M. D., & Gitto, L. (2022), Econometric analysis of oncology patients' Health-Related Quality of Life determinants in Bulgaria. *Central European Journal of Public Health*, 30(3), 160–165. <https://doi.org/10.21101/cejph.a7095>
- Encheva-Malinova, M., Djambazov, S., Mitova, R., & Vekov, T. (2019). EuroQol-5D assessed health-related quality of life in cancer patients vs. general population in Bulgaria. *Value in Health*, 22(Suppl 3), S526. <https://doi.org/10.1016/j.jval.2019.09.655>
- EORTC. (n.d.). *Satisfaction with in-patient cancer care*. <https://qol.eortc.org/questionnaire/satisfaction-with-in-patient-cancer-care/>
- EQ-5D. (n.d.). *Explaining the EQ-5D in about two-and-a-half-minutes* [Video]. EuroQol Research Foundation. Retrieved December 31, 2020 from <https://euroqol.org/eq-5d-instruments/>
- Giammanco, M. D. & Gitto, L. (2019). Patient satisfaction and uncertainty in illness in oncology: Which are the relevant aspects when planning a qualitatively adequate assistance? In A. Bianco, P. Conigliaro & M. Gnaldi (Eds.), *Italian Studies on Quality of Life* (Social Indicators Research Series, vol 77, pp. 349-360). Springer, Cham. https://doi.org/10.1007/978-3-030-06022-0_23
- Husson, O., Mols, F., & van de Poll-Franse, L. V. (2011). The relation between information provision and health related quality of life, anxiety and depression among cancer survivors: A systematic review. *Annals of Oncology*, 22(4), 761–772. <https://doi.org/10.1093/annonc/mdq413>
- International Atomic Energy Agency. (2011). Inequity in cancer care: A global perspective. *IAEA Human Health Reports No.3*. http://www-pub.iaea.org/MTCD/publications/PDF/Pub1471_web.pdf
- James, T. A., Wong, S. L., & Carp, N. Z. (2016), Quality in cancer care: A critical need for clinician engagement. *American Journal of Medical Quality*, 31(5), 389–391. <https://doi.org/10.1177/1062860616639639>
- Mayo, M., Potugari, B., Bzeih, R., Scheidel, C., Carrera, C., & Shellenberger, R. A. (2021). Cancer screening during the COVID-19 pandemic: A systematic review and meta-analysis. *Mayo Clinic Proceedings: Innovations, Quality & Outcomes*, 5(6), 1109-1117. <https://doi.org/10.1016/j.mayocpiqo.2021.10.003>
- Miles, A. (2015). From EBM to PCH: always predictable, now inexorable. *Journal of Evaluation in Clinical Practice*, 21(6), 983-987. <https://doi.org/10.1111/jep.12525>
- Miles, A., & Asbridge, J. E. (2014). Clarifying the concepts, epistemology and lexicon of person-centeredness: an essential pre-requisite for the effective operationalization of PCH within modern healthcare systems. *European*

- Journal for Person Centered Healthcare*, 2(1), 1-15. <http://dx.doi.org/10.5750/ejpch.v2i1.857>
- Miles, A., & Asbridge, J. E. (2016). The chronic illness problem. The person-centered solution. *European Journal for Person Centered Healthcare*, 4(1), 1-5. <http://dx.doi.org/10.5750/ejpch.v4i1.1206>
- Milosavljevic, T., Kostic-Milosavljevic, M., Jovanovic, I. & Krstic, M. (2010). Gastrointestinal and liver tumours and public health in Europe. *European Review for Medical and Pharmacology Science*, 14(4), 259-262. <https://www.europeanreview.org/wp/wp-content/uploads/734.pdf>
- Mishel, M. H. (1981). The measurement of uncertainty in illness. *Nursing Research*, 30(5), 258-263. <https://doi.org/10.1097/00006199-198109000-00002>
- Mishel, M. H. (1997). Uncertainty in acute illness. *Annual Review of Nursing Research*, 15(1), 57-80. <https://doi.org/10.1891/0739-6686.15.1.57>
- Osoba, D. (1994). Lessons learned from measuring health-related quality of life in oncology. *Journal of Clinical Oncology*, 12(3), 608-616. <https://doi.org/10.1200/JCO.1994.12.3.608>
- Parkin, D., & Devlin, N. (2006). Is there a case for using visual analogue scale valuations in cost-utility analysis? *Health Economics*, 15(7), 653-664. <https://doi.org/10.1002/hec.1086>
- The Ministry of Health of Italy. (2023). *National Oncology Plan: Planning document and guidelines for the prevention and fight against cancer 2023-2027* [in Italian]. https://www.salute.gov.it/imgs/C_17_pubblicazioni_3291_allegato.pdf
- Riva, S., Bryce, J., De Lorenzo, F., Del Campo, L., Di Maio, M., Efficace, F., Frontini, L., Giannarelli, D., Gitto, L., Iannelli, E., Jommi, C., Montesarchio, V., Tracò, F., Vaccaro, C. M., Gallo, C., & Perrone, F. (2019). Development and validation of a patient-reported outcome tool to assess cancer-related financial toxicity in Italy: A protocol. *BMJ Open*, 9(9), e031485. <https://doi.org/10.1136/bmjopen-2019-031485>
- Sawka, C., Ross, J., Srigley, J., & Irish, J. (2012). The crucial role of clinician engagement in system-wide quality improvement: the Cancer Care Ontario experience. *Healthcare Quarterly*, 15(Special Issue), 38-41. <https://doi.org/10.12927/hcq.2012.23157>
- Skarstein, J., Aass, N., Fosså, S. D., Skovlund, E., & Dahl, A.A. (2000). Anxiety and depression in cancer patients: Relation between the Hospital Anxiety and Depression Scale and the European Organization for Research and Treatment of Cancer Core Quality of Life Questionnaire. *Journal of Psychosomatic Research*, 49(1), 27-34. [https://doi.org/10.1016/s0022-3999\(00\)00080-5](https://doi.org/10.1016/s0022-3999(00)00080-5)

StataCorp. (2007). *Stata statistical software (Release 10)*. College Station, StataCorp LP. <https://www.stata.com/stata10/>

Tobin, J. (1958). Estimation of relationships for limited dependent variables. *Econometrica*, 26(1), 24-36. <https://doi.org/10.2307/1907382>

Velikova, G., Stark, D., & Selby, P. (1999). Quality of life instruments in oncology. *European Journal of Cancer*, 35(11), 1571–1580. [https://doi.org/10.1016/S0959-8049\(99\)00193-8](https://doi.org/10.1016/S0959-8049(99)00193-8)

World Health Organization. (2020). *Noncommunicable Diseases Progress Monitor 2020*. <https://www.who.int/publications/i/item/9789240000490>

Received: March 29, 2023.

Reviewed: April 16, 2023.

Accepted: May 29, 2023.