

# Health and disability in patients undergoing treatment with chemotherapy

*Saúde e deficiência em pacientes em tratamento com quimioterapia*

*Salud y discapacidad en pacientes en tratamiento con quimioterapia*

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**ABSTRACT** | Chemotherapy can negatively influence the functional capacity and quality of life of oncology patients. This investigation aims to assess the health and disability of patients undergoing chemotherapy by a cross-sectional study with 117 oncology patients. The Brazilian 36-item version of the World Health Organization Disability Assessment Schedule (WHODAS 2.0) and the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) were used. Patients were classified according to their age and the tumor location and time of diagnosis. Spearman's correlation was performed to verify the correlation between health and disability and quality of life. The "life activities" domain was the most impaired whereas "getting along" was the least. No differences were observed according to tumor location. The time of diagnosis and patient's age did not show homogeneity in the results. Health and disability were little correlated with quality of life and suffered slight impairment. Impairments are unaffected by tumor location, time of diagnosis, and patient's age, and unrelated to quality of life.

**Keywords** | Neoplasms; Disabled Persons; Health Evaluation.

**RESUMO** | A quimioterapia pode influenciar negativamente na capacidade funcional e na qualidade de vida de pacientes oncológicos. A fim de avaliar a saúde e deficiência em pacientes oncológicos em tratamento com quimioterapia, foi realizado

um estudo transversal com 117 pessoas. Foi utilizada a versão brasileira de 36 itens do *World Health Organization Disability Assessment Schedule* (WHODAS 2.0) e o *Medical Outcome Survey Short-Form 36* (SF-36). Os indivíduos foram classificados de acordo com a localização do tumor, tempo de diagnóstico e idade. Para verificar a correlação entre a saúde e deficiência e a qualidade de vida, foi realizada análise de correlação de Spearman. Observou-se maior deficiência no domínio "atividade de vida" e o menor comprometimento no domínio "relações interpessoais". Por fim, foram notadas poucas correlações entre a saúde e deficiência e a qualidade de vida. A amostra apresentou baixo comprometimento na saúde e deficiência. Além disso, os comprometimentos não foram influenciados pela localização do tumor, tempo de diagnóstico e idade e não estão correlacionados com a qualidade de vida do paciente.

**Descritores** | Neoplasias; Pessoas com Deficiência; Avaliação em Saúde.

**RESUMEN** | La quimioterapia puede influir negativamente en la capacidad funcional y la calidad de vida de los pacientes con cáncer. Con el objetivo de evaluar la salud y discapacidad de pacientes oncológicos sometidos a quimioterapia, se realizó un estudio transversal con 117 personas. Se utilizaron la versión brasileña de 36 ítems del Cuestionario para la Evaluación de la Discapacidad de la

Study conducted in the Oncology Sector of Hospital São Vicente de Paulo in Guarapuava (PR), Brazil.

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Organización Mundial de la Salud (WHODAS 2.0) y el *Medical Outcome Survey Short-Form 36* (Cuestionario de Salud SF-36). Se clasificaron a los sujetos según la ubicación del tumor, el tiempo transcurrido desde el diagnóstico y la edad. Para verificar la correlación entre la salud y discapacidad y la calidad de vida, se realizó el análisis de correlación de Spearman. El dominio “actividad de vida” tuvo mayor discapacidad, y el dominio “relaciones interpersonales”

menos deterioro. Se encontraron pocas correlaciones entre la salud y discapacidad y la calidad de vida. La muestra mostró bajo deterioro de la salud y discapacidad. Además, el deterioro no estuvo influenciado por la ubicación del tumor, el tiempo transcurrido desde el diagnóstico y la edad, tampoco correlacionado con la calidad de vida del paciente. **Palabras clave** | Neoplasias; Personas con Discapacidad; Evaluación en Salud.

## INTRODUCTION

Cancer is currently considered a public health problem because of its high prevalence. A worldwide projection for 2030 estimates 27 million new cases and 17 million deaths from the disease. In Brazil, 625,000 new cases of cancer are expected to emerge each year of the triennium 2020–2022<sup>1</sup>.

Chemotherapy<sup>2</sup> is a chemical and systemic treatment used to control and fight cancer. However, its indiscriminate aggression to cells causes several toxicities that can negatively influence functional capacity, which is closely related to quality of life<sup>3</sup>. Even before chemotherapy treatment, one's quality of life is already affected at diagnosis, representing a negative event in their life<sup>4</sup>.

To know if the individual will be able to work and to perform the daily activities needed to fulfill their role at home, at work, at school, or in other social areas is as important as to identify the disease<sup>5</sup>. The adaptation to cancer and its changes in a person's life depend on several factors, including: representations, psycho-emotional implications, and specific clinical characteristics of the disease and its evolution; sociocultural context; adverse treatment reactions; level of participation; and activity and occupation before diagnosis<sup>4</sup>. Although treatments prolong survival, they can also damage the organs in the long term, resulting in functional disability<sup>6</sup>.

Functionality is negatively affected by clinical manifestations, including pain, fatigue, nausea, and depression, and by geographic, economic, and social barriers, since patients need access to health services and support from health care professionals, family members, and other support networks. Moreover, the musculoskeletal system suffers loss or reduction of range of motion, strength, and muscular endurance. Patients undergo changes in sense, perception, cognition, motor control, and balance. All these symptoms can manifest throughout treatment<sup>7</sup>. Many who survive

cancer show a good recovery, but several people continue with physical, emotional, and social problems that can become chronic or persistent. These long-term effects of cancer or its treatment may cause losses that decrease the individual's social participation<sup>8</sup>.

Because of the several repercussions of chemotherapy, a comprehensive and multidirectional assessment of functionality—addressing health and disability—could be useful to establish the health status of cancer patients during chemotherapy. Thus, this study aims to assess health and deficiency in patients undergoing chemotherapy. The secondary objectives were to identify if health and disability are influenced by the location of the tumor, the time of diagnosis, and age, and if they are correlated with quality of life.

## METHODOLOGY

### Study design

A cross-sectional study was conducted in the oncology sector of Hospital São Vicente de Paulo in Guarapuava, Paraná. Assessments took place from July to September 2017.

### Participants and recruitment

The sample was formed by convenience, based on spontaneous demand, with no sampling criteria. Individuals of both sexes, aged over 18 years, and undergoing chemotherapy were included. Individuals with difficulty in verbal and written communication were excluded. Sample recruitment and assessment was performed while individuals awaited consultation or received chemotherapy treatment. All patients eligible during the study period were included and those who agreed to participate received clarifications and signed an informed consent form.

## Measuring instruments

A questionnaire with sociodemographic and clinical data was elaborated by the authors and contained the following variables: age, gender, time of diagnosis, location of the tumor, living condition, family income, schooling level, marital status, and occupation.

To assess health and disability, the Brazilian 36-item version of the World Health Organization Disability Assessment Schedule (WHODAS 2.0)<sup>5</sup> was used, developed by the World Health Organization (WHO), a generic instrument which provides a standardized method of measuring health and disability in a cross-cultural way. WHODAS 2.0 assesses functionality level in six life domains: cognition (understanding and communication), mobility (movement and locomotion), self-care (self-hygiene and dressing, eating, and staying alone), interpersonal relationships (interactions with other people), life activities (domestic and work), and participation (participation in community activities and society). WHODAS 2.0 scores range from 0 to 100, with the highest scores indicating major deficiencies. For scoring, the complex scoring method based on the “item response theory” was used<sup>5</sup>.

To assess quality of life, the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) questionnaire was used, translated into and validated for the Brazilian Portuguese<sup>9</sup>. The SF-36 is a generic instrument easy to administrate and understand to evaluate quality of life. This multidimensional questionnaire includes 36 items, subdivided into eight scales or components: functional capacity, physical aspects, pain, general health status, vitality, social aspects, emotional aspects, and mental health. Its final score ranges from 0 to 100, in which the “0” corresponds to the worst overall state of health and “100” to the best overall state of health<sup>10</sup>.

## Statistical analysis

Data were submitted to descriptive statistical analysis. Only domestic activities were considered for “life activities” scores because few individuals reported work activity (only nine answered questions regarding work activity). The total WHODAS 2.0 scores were grouped according to tumor location, time of diagnosis, and patient’s age. Since the data did not have normal distribution, the Kruskal-Wallis test was used, followed by Dunn’s post-hoc test considering  $p < 0.05$  as significant to verify if at least two of the populations had different distribution functions.

Spearman’s correlation analysis was performed to verify the correlation between health status and disability (WHODAS 2.0) and quality of life (SF-36). According to Hinkle et al., as cited by Mukaka<sup>11</sup>, correlation values between 0.90 and 1.00 (–0.90 and –1.00) are interpreted as extremely high positive (negative) correlation; between 0.70 and 0.90 (–0.70 and –0.90), a high positive correlation (negative); between 0.50 and 0.70 (–0.50 and –0.70), moderate positive correlation (negative); between 0.30 and 0.50 (–0.30 and –0.50), low positive (negative) correlation; and between 0.00 and 0.30 (0.00 and –0.30), no correlation.

The analyses were conducted in the softwares GraphPad InStat version 3.05 and Statistical Package for the Social Sciences version 19.

## RESULTS

A total of 117 individuals who met the pre-established inclusion criteria were approached. Table 1 shows the characteristics of the sample.

Table 1. Sociodemographic and clinical characteristics

Age (years), mean ± SD	56.3±12.6
Schooling (years) ± SD	7.2±4.5
Sex, n (%)	
Female	69 (59)
Male	48 (41)
Marital status, n (%)	
Single	14 (12)
Currently married	63 (53.8)
Separated	12 (10.3)
Divorced	7 (6)
Widower or Widow	18 (14.5)
Living together	3 (2.6)
Living condition, n (%)	
Independent in the community	81 (69.2)
Lives with assistance	29 (24.8)
Hospitalized	1 (0.9)
Not informed	6 (5.1)
Work activity, n (%)	
Paid work	8 (6.8)

(continues)

Table 1. Continuation

Self-employed	4 (3.4)
Housewife	5 (4.3)
Retired	35 (29.9)
Unemployed (for health problems)	17 (14.5)
Unemployed (for other reasons)	6 (5.1)
Others (health aid/benefit)	42 (35.9)
Time since diagnosis (months), (min-max)	2-320
Tumor location, n (%)	
Breast	34 (29.1)
Gastrointestinal	31 (26.5)
Lung	12 (10.3)
Hematologic	11 (9.4)
Genitourinary	10 (8.5)
Gynecological	9 (7.7)
Head and neck	6 (5.1)
Bone	3 (2.6)
Skin	1 (0.9)

SD: standard deviation; min: minimum value identified; max: maximum value identified.

In the analysis of WHODAS 2.0, the “domestic life activity” domain showed greater deficiency and “interpersonal relationships” showed lower impairment. Considering the means and medians of the scores of each WHODAS 2.0 domain, both domestic and work life activities showed the greatest impairments (Table 2).

Table 2. WHODAS 2.0 scores

	WHODAS 2.0	Mean ± SD	Median	min-max
Domain	Cognition	16.67±21.28	10.0	0-95
	Mobility	29.38±30.39	18.8	0-100
	Self-care	20.77±27.67	10.0	0-100
	Interpersonal relationships	11.68±14.48	8.3	0-92
	Life activities Domestic	42.22±37.81	30.0	0-100
	Work	32.54±36.09	35.7	0-100
	Participation	28.31±19.22	25.0	0-83
	Total score	22.85±17.37	21.7	0-80

SD: standard deviation; min: minimum value identified; max: maximum value identified.

According to Table 1, 10 groups were identified regarding tumor location: breast (n=34, 29.1%), gastrointestinal (n=31, 26.5%), lung (n=12, 10.3%), hematological (n=11, 9.4%), genitourinary (n=10, 8.5%), gynecological (n=9, 7.7%), head and neck (n=6, 5.1%), bone (n=3, 2.6%), and skin (n=1, 0.9%). No significant differences were observed in scores per domain and in total scores when individuals were classified according to tumor location ( $p>0.05$ ).

A comparison between individuals with less than 6 months of diagnosis and those diagnosed between 6 and 12 months showed that time of diagnosis influenced “self-care” and “total score” domains (Table 3). On the other hand, age influenced the “cognition” domain of individuals aged between 30–39 years more than that of individuals aged 40–49 years and 70–79 years (Table 4).

Health and disability (WHODAS 2.0) and quality of life (SF-36) had few correlations, most of them low and moderate (Table 5).

Table 3. WHODAS 2.0 domain profile by groups according to time of diagnosis / median (minimum-maximum)

	≤6 months (n=41)	>6≤12 months (n=31)	>12 months (n=45)	p-value
Cognition	5.0 (0-80.0)	5.0 (0-80.0)	15.0 (0.0-95.0)	0.2922
Mobility	31.3 (0.0-100.0)	12.5 (0.0-100.0)	18.8 (0.0-100.0)	0.0497
Self-care	20.0 (0.0-100.0) <sup>a</sup>	0.0 (0.0-100.0)	10.0 (0.0-100.0)	0.0374
Interpersonal relationships	8.3 (0.0-50.0)	8.3 (0.0-41.7)	8.3 (0.0-91.7)	0.8677
Domestic life	40.0 (0.0-100.0)	10.0 (0.0-100.0)	40.0 (0.0-100.0)	0.1911
Participation	29.2 (0.0-70.8)	16.7 (0.0-62.5)	25.0 (0.0-83.3)	0.2715
Total score	23.9 (0.9-62.0) <sup>a</sup>	14.2 (0.0-64.1)	21.7 (0.0-80.4)	0.0307

Significant difference in the comparison between pairs in Dunn's post-hoc test ( $p>0.05$ ) <sup>a</sup>≤6 months × >6≤12 months.

Table 4. WHODAS 2.0 domain profile by groups according to age / median (minimum-maximum)

	20–29 years old (n=3)	30–39 years old (n=10)	40–49 years old (n=19)	50–59 years old (n=28)	60–69 years old (n=42)	70–79 years old (n=15)	p-value
Cognition	0.0 (0.0-35.0)	0.0 (0.0-5.0) <sup>ab</sup>	15.0 (0.0-80.0)	2.5 (0.0-80.0)	10.0 (0.0-80.0)	20.0 (0.0-65.0)	0.0162
Mobility	18.8 (0.0-31.3)	18.8 (0.0-100.0)	18.8 (0.0-81.3)	15.6 (0.0-93.8)	15.6 (0.0-100.0)	25.0 (12.5-100.0)	0.4618
Self-care	0.0 (0.0-20.0)	35.0 (0.0-80.0)	10.0 (0.0-100.0)	5.0 (0.0-100.0)	0.0 (0.0-100.0)	20.0 (0.0-100.0)	0.1748
Interpersonal relationships	8.3 (0.0-16.7)	0.0 (0.0-16.7)	8.3 (0.0-50.0)	0.0 (0.0-5.0)	8.3 (0.0-50.0)	16.7 (0.0-25.0)	0.2803
Domestic life	0.0 (0.0-5.0)	100.0 (0.0-100.0)	50.0 (0.0-100.0)	40.0 (0.0-100.0)	30.0 (0.0-100.0)	30.0 (0.0-100.0)	0.4325
Participation	16.7 (12.5-25.0)	39.6 (4.2-66.7)	25.0 (8.3-45.8)	20.8 (0.0-70.8)	18.8 (0.0-70.8)	37.5 (0.0-62.5)	0.0542
Total	14.1 (5.4-21.7)	28.3 (11-56.5)	21.7 (4.4-64.1)	20.1 (0.0-60.9)	17.4 (0.0-60.9)	27.2 (6.5-62.0)	0.1649

Significant difference in the comparison between pairs in Dunn's post-hoc test ( $p > 0.05$ ) <sup>a</sup>30-39 years old × 40-49 years old; <sup>b</sup>30-39 years old × 70-79 years old.

Table 5. Correlation between the Brazilian version of WHODAS 2.0 and the SF-36

	WHODAS 2.0 domains						
	Cognition	Mobility	Self-care	Interpersonal relationships	Domestic life	Participation	Total score
SF-36							
Functional capacity	-0.321*	-0.806*	-0.638*	-0.247*	-0.699*	-0.564*	-0.782*
Physical aspects	-0.223**	-0.398*	0.381*	-0.216**	-0.479*	-0.562*	-0.561*
Pain	0.235**	0.548*	0.441*	0.113	0.576*	0.546*	0.615*
General health status	0.037	0.164	-0.081	0.070	0.208**	0.163	0.132
Vitality	0.047	-0.051	-0.067	-0.085	0.029	-0.004	-0.008
Social aspects	-0.088	-0.117	-0.123	-0.024	-0.122	-0.127	-0.143
Emotional aspects	-0.258*	-0.273*	-0.175	-0.268*	-0.296*	-0.471*	-0.402*
Mental health	-0.185**	-0.120	0.019	-0.162	-0.023	-0.207**	-0.166

\* $p < 0.01$ ; \*\* $p < 0.05$ .

## DISCUSSION

Our study aims to evaluate the health status and disability of cancer patients undergoing chemotherapy and to identify whether the severity of the impairment, the location of the tumor, the time of diagnosis, and age influence the health status and disability of these individuals. Moreover, we found a correlation between the patient's health status and disability and their quality of life.

For the "cognition" domain of WHODAS 2.0, patients reported impairments of several magnitudes, ranging from 0 to 95, on a scale from 0 to 100. However, considering the median observed (10.0), this domain had

little impairment. The literature reports a different result, showing that the cognition of cancer patients undergoing chemotherapy is significantly impaired<sup>12</sup>. About 13% to 70% of patients receiving chemotherapy are estimated to have an impaired cognitive domain, which can remain like such for a long time, even after treatment ends<sup>12</sup>. During chemotherapy, patients may show decreased attention and concentration, difficulty with focused research, and problems with filtering relevant information and completing tasks<sup>12</sup>. Although the mechanisms of cognitive impairment from chemotherapy are unclear, the neurotoxicity seems to cause sustained attention deficit and short-term memory and planning<sup>13</sup>, which can

negatively affect cancer patients regarding daily routine, quality of life, and ability to work<sup>14</sup>.

The 18.8 median of mobility shows a low degree of impairment in the sample. Cancer and its treatment can cause sensory alterations that do not favor the coordination and precision of movement, although they do not prevent them, either<sup>15</sup>. Besides pain and decreased quality of life and aerobic resistance capacity, cancer patients often have limited neuromuscular function<sup>16</sup>. Patients undergoing recent chemotherapy (in the last 12 months) have balance deficits, impaired lower limbs strength, and increased frequency of fall. The risk of falls seems to increase with chemotherapy cycles. Patients with breast cancer undergoing chemotherapy have weaker lower limbs and postural stability than individuals without cancer<sup>16</sup>. Those who survive cancer experience treatment-related side effects, including loss of muscle mass and fatigue. These conditions are believed to be associated with impairments in physical performance and functionality<sup>6</sup>.

Moreover, the mobility deficit reduces chances of getting a job, which is closely related to aspects of life activities<sup>6</sup>. The highest median (35.7) and, consequently, the worst performance of the participants was in the work domain. Cancer and its treatments can affect the development of occupational roles, compromising the quality and organization of daily, work, and family activities<sup>7</sup>. Since cancer treatment is quite complex and long, it can keep patients from their functions (basic and/or instrumental activities of daily life, work, and leisure) temporarily or definitively<sup>17</sup>. A Finnish study found that 26% of cancer patients reported deteriorated physical working capacity and 19% reported deteriorated mental working capacity two to six years after diagnosis<sup>8</sup>. Most (60%) cancer survivors have their needs unmet because of the limitations of work, since 75% of patients with head and neck cancer were removed from work after diagnosis and 52% reduced their working hours. Only half of the patients reported returning to work after treatment<sup>6</sup>. Others can even live well, although they may continue to have long-lasting problems such as fatigue, pain, and depression. Therefore, cancer is a major cause of absence from work, unemployment, and early retirement.

The “domestic life activities” domain had the second highest median (30.0). Zhao et al.<sup>18</sup> reported that this domain was one of the most compromised for Chinese breast cancer patients receiving chemotherapy. The impact from diagnosis and the implications of treatment affect the individual’s daily activities, autonomy,

and independence. Dependence and loss of identity thus cause anguish and fears, impairing emotional function and quality of life<sup>19</sup>.

On the other hand, some individuals had low impairment in the self-care domain (median 10.0). Disease-related fatigue is reported by up to 90% of cancer patients, and besides having decreased energy and a sense of loss in physical capacity, patients also have decreased self-care and self-esteem<sup>20-22</sup>.

“Interpersonal relationships” had the lowest median (8.8), showing that this domain was almost unimpaired. This is a positive fact because it indicates that social interaction was not significantly affected. However, the literature shows evidence of social isolation and decreased interaction. According to Fangel et al.<sup>19</sup>, cancer patients almost always perform leisure activities with family members or alone, in a home environment, so that they do not socially interact with strangers. Cancer diagnosis forces a restructuring of expectations and daily life, changing interpersonal relationships and the individual’s self-perception. Patients begin to fear pain, body mutilation, the future, and death, and their psychological balance is threatened by changes brought by the progression of the disease and treatment<sup>23</sup>, including social isolation<sup>19</sup>.

The “participation” domain had a higher median (25.0) than others, which however does not indicate significant impairment. On the other hand, a Chinese study using WHODAS 2.0 concluded that this domain is one of the most compromised in breast cancer patients undergoing chemotherapy<sup>18</sup>. Reduced daily activities, depression and anxiety, a deteriorated social life, and decreased physical and mental capacity could be caused by chronic pain syndromes related to cancer treatment<sup>24</sup>. Lee et al.<sup>6</sup> reported that the “interpersonal relationships” and “participation” domains were the most impaired. The authors justify that participating in social life and maintaining cordial relationships usually require self-confidence and sufficient capacity to speak, listen, and write, but these are partially deteriorated by the disease or by treatment-related side effects<sup>6</sup>.

Finally, our study also sought to verify if health and disability, assessed by WHODAS 2.0, were correlated to quality of life, assessed by SF-36. Most domains in WHODAS 2.0 were correlated only to “functional capacity”, “physical aspects”, “pain”, and “emotional aspects” domains of the SF-36. No correlations were observed for the domains “vitality” and “social aspects”. According to Silva et al.<sup>25</sup>, the SF-36 is one of the instruments used in the WHODAS 2.0 validation process. But although

these instruments show similarity of constructs regarding quality of life and functionality, WHODAS 2.0 measures objective performance whereas quality of life is a subjective well-being assessment<sup>5</sup>. Thus, the application of the two instruments is suggested: the SF-36, to assess the subjective perception of quality of life; and WHODAS 2.0, for an objective measurement of disability.

Regarding the limitations of this study, the number of chemotherapy sessions and the occurrence of adverse events were not recorded. Moreover, the study was conducted in only one chemotherapy center in a single city in Southern Brazil and, therefore, different results can be found in other countries or regions. Lastly, we included patients with different cancer stages, which may show different functional levels, patients of various age groups, of both sexes, and with different tumor topographies, which made the sample population extremely heterogenous and difficult to compare.

## CONCLUSION

The evaluated sample showed low health impairment and reported disability. These impairments were not influenced by tumor location and time of diagnosis or patient's age. Moreover, functionality and quality of life have a low and moderate correlation, and only in the "functional capacity" and "physical aspects" domains.

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