

# Exploring the relationship between economic status, quality of life and anxiety among Moroccan patients with multiple sclerosis

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## Abstract

**OBJECTIVE:** Young individuals in the prime of their lives are often affected by multiple sclerosis. The correlation between socio-economic status and the quality of life (QoL) in persons with multiple sclerosis remains insufficiently explored and is not studied within North Africa society. The aim of our study is to analyse and understand the influence of economic status on the QoL and anxiety of patients with multiple sclerosis (MS).

**METHODS:** The study was carried out on a sample of 90 MS patients. Data were collected using a sociodemographic and clinical questionnaire. QoL was assessed using Multiple Sclerosis Quality of Life 54 (MSQoL-54), Hospital Anxiety and Depression scale (HADS) and Patient Determined Disease Steps (PDDS) questionnaires.

**RESULTS:** The mean age at diagnosis of the patients was 28.04 years, with a sex ratio of 3:09 (F/M). Around 17% (n = 15) reported a very low level of income, while 32.2% (n = 29) indicated a very high economic level. A significantly positive correlation was observed between higher economic status and better QoL, both, mentally ( $p = 0.000$ ) than physically ( $p = 0.013$ ). Thus, a highly significant differentiation in mean scores for the QoL composite was found according to income levels (PHC:  $p < 0.001$ ; MHC:  $p < 0.000$ ) and for HADS-A ( $p < 0.031$ ) among patients in our study. Moreover, maintaining a stable economic status was also associated with higher QoL scores.

**CONCLUSION:** These results underline the importance of guaranteeing access to economic resources for the management of MS and the improvement of patients' QoL.

## INTRODUCTION

Multiple sclerosis (MS) is emerging as one of the major chronic neurological diseases, affecting individuals worldwide (Reich *et al.* 2018). It more frequently affects a young population, generally beginning around the age of 30 years (20-40 years) (Naseri *et al.* 2021) with a higher incidence in women (sex ratio 3:1) (El Harchaoui *et al.* 2023a), and has a significant influence on different aspects of patients' lives, encompassing psychological, social, occupational and family dimensions. The incidence of MS affects millions of people worldwide (Dobson & Giovannoni, 2019). This autoimmune disease of the central nervous system presents considerable challenges, affecting the mobility, cognition and quality of life (QoL) of those affected (El Harchaoui *et al.* 2023b; Moghaddam *et al.* 2021). It leads to a wide range of neuropsychological disorders, including depression, anxiety and low self-esteem (El Harchaoui *et al.* 2023a), cognitive disorders, loss of autonomy, pain, fatigue and social problems (Mitchell *et al.* 2005).

Besides to the medical aspects, the economic situation is an often overlooked but crucially important factor in understanding the patient experience. A persons' financial resources play a decisive role in their ability to access care, maintain a decent standard of living and, consequently, influence their QoL in the face of MS.

Several previous studies have suggested that socio-economic factors such as economic status, educational level, social support and employment activity may play a crucial role in how individuals live with MS (Moghaddam *et al.* 2021). Similarly, economic status can determine access to care, effective treatments and support services that are essential to improving the QoL of patients with MS (De Judicibus & McCabe, 2007).

Although the economic burden of MS has been extensively studied in high-income countries, information on the costs of MS in low- and middle-income countries remains limited or scarce (Dahham *et al.* 2021). Furthermore, no study has been carried out to evaluate the cost of MS in these countries.

This study will therefore examine the impact of economic situation on the QoL of MS patients, exploring the different facets of this complex relationship. By understanding how economic factors interact with the challenges posed by MS, we could develop more holistic and inclusive approaches to improving the overall wellbeing of these individuals, while highlighting the importance of considering socio-economic dimensions in caring for and improving the wellbeing of this vulnerable disease population.

## METHODS

**Research design:** The study is observational, descriptive and cross-sectional.

**Study setting:** This descriptive study involved 90 patients representing two Morocco regions. The first data collection was carried out before the arrival of CoVid-19. It was devoted to a group of 55 cases admitted to the neurology department at the Ibn Sina University Hospital in Rabat, during a period of 12 months from January 2019. And the second data collection was carried out after the arrival of CoVid-19. it involved a study of 35 cases admitted to the SEPAnouir association; under the aegis of the Moroccan Multiple Sclerosis Society (SMASEP), it brings together MS patients admitted to the various neurology departments in the Casablanca region over a six-month period from July 2022.

**Study population:** this study involved 90 patients, collecting socio-demographic and clinical data using questionnaires and using scales such as the PDDS (Patient Determined Disease Steps) and the MSQOL-54 (Multiple Sclerosis Quality of Life 54).

**Inclusion criteria:** All individuals diagnosed with multiple sclerosis who attended the department during the study period were included in the study.

**Exclusion criteria:** Individuals with unconfirmed multiple sclerosis, severe cognitive impairment, or those who did not consent to participate in the study were excluded.

### *Measuring instruments*

**Sociodemographic data:** The study utilized individual questionnaires completed by each participant to gather data. The questionnaire aimed to collect socio-demographic information, including current age, age at diagnosis, gender, and socio-economic status (low, middle and high). Additionally, clinical characteristics such as the MS phenotype were recorded.

**Patient Determined Disease Steps (PDDS):** The PDDS scale, developed by Hohol, *et al.* (1995), is used to assess MS-related disability (Hohol *et al.* 1995). The PDDS has been adapted from the steps of the disease diagnosed by the doctor (Hohol *et al.* 1995, 1999) in order to be a substitute for EDSS (Marrie & Goldman, 2007). The PDDS has nine ordinal levels ranging from 0 (normal) to 8 (bedridden) (Lo *et al.* 2005); and PDDS scores can be converted into EDSS scores and classify disability as mild, moderate or severe (de David *et al.* 2019; Solà-Valls *et al.* 2019).

**Hospital Anxiety and Depression Scale (HADS):** The Hospital Anxiety and Depression Scale (HADS) consists of 14 items assessing both anxiety (7 items subscale) and depression (7 items subscale). Each item is rated on a 4-level scale ranging from 0 to 3, yielding maximum scores of 21 for both anxiety and depression. A score of 0 to 7 is considered normal, a score of 8 to 10 is interpreted as a borderline case, and a score of 11 to 21 is interpreted as a case (of either anxiety or depression) (Zigmond & Snaith, 1983).

**Multiple Sclerosis Quality of Life (MSQoL):** We will assess quality of life using the MSQoL-54-item

**Tab. 1.** Description of socio-demographic and clinical characteristics

Variables	Effective	Percentage (%)	Mean (SD)	Min-Max
Gender	Female	68	75.6	
	Male	22	24.4	
Economics level	Low	15	16.7	
	Medium	46	51.1	
	High	29	32.2	
Age (years)	Current		35.17±10.193	21-67
	Diagnosis		28.04±7.870	16-50
MS phenotype	RR	60	66.7	
	SP	23	25.5	
	PP	7	7.8	
PDDS			2.57±1.581	0-6.0
	PDDS<4	70	77.8	
	PDDS≥4	20	22.2	
PHC			48.75±1.486	22.06 -78.29
MHC			43.19±1.641	13.47 -84.79

**RR:** Relapsing-remitting; **SP:** Secondary Progressive; **PP:** Primary Progressive; **MSQOL:** Multiple Sclerosis Quality of Life; **PDDS:** Patient Determined Disease Steps; **PHC:** Physical Health Composite; **MHC:** Mental Health Composite; **Min.** minimum; **Max.** maximum

questionnaire. This questionnaire includes the SF-36 (Short form-36 items) as a general QoL assessment instrument (Stuifbergen *et al.* 2000), plus 18 additional questions specific to MS patients. The examination result contains two composite score domains, reflecting physical health (PH) and mental health (MH), independent of each other. A separation of domains and components has been adapted from the original version of the MSQoL-54 proposed by Vickrey *et al.* in 1995 (Vickrey *et al.* 1995). In our study, we used the French-Canadian version (Acquardo *et al.* 2003).

Each dimension is evaluated by a score. The responses are recoded and appear as an average with a value between 0 and 100. A score of 0 represents the worst possible QoL, while 100 represents the best. The mean score for an axis is defined as the sum of the scores for each item divided by the number of items. The MSQoL-54 axes with 54 items give rise to two composite scores (Ziaie *et al.* 2021): the physical Health composite score and the mental health composite.

**Statistical analysis:** The various parameters collected on the farm return were entered on an Excel sheet and the statistical analyses were carried out using SPSS ver. 25 (Statistical Package for Social Science) software. We presented the mean ± standard deviation (SD) as well as the minimum and maximum values for quantitative variables and the percentage for qualitative variables. We also used the z-score, the Chi-square test was used for comparing the categorical variables, the Anova test was used for comparing the continuous variables. The correlations between the variable were analysed by Spearman's rank correlation analysis. Vari-

ables with a *p*-value <0.05 were considered statistically significant.

## RESULTS

### *Socio-demographic and clinical characteristics of the study populations*

Our study involved 90 patients, 75.6% (*n* = 68) of whom were women and 24.4% (*n* = 22) men. The sex ratio was 3.09 in favour of females.

In terms of the economic level of patients revealed that 51.1% had an average income, 32.2% had a high income and 16.7% had a low income. The current age distribution of our population is 35.17±10.193 years, with a minimum of 21 years and a maximum of 67 years. The average age at diagnosis was 28.04±7.870 years, with a minimum of 16 years and a maximum of 50 years [Table 1].

The table illustrates the high proportion of patients with the Relapsing-remitting (RR) clinical form: 66.7% (*n* = 60), followed by 25.5% (*n* = 23) with the Secondary Progressive (SP) form and 7.8% (*n* = 7) with the Primary Progressive (PP) form.

Analysing the PDDS scores descriptively indicates an average score of 2.57±1.581. When the disability level is below 4, indicating that patients can move independently, the table illustrates that 77.8% (*n* = 70) fall into this category. Additionally, the remaining 22.2% experienced limitations in their mobility.

For the examination of the Physical Health Composite (PHC), we will focus on its score. According to our calculations, the average score of this composite is

**Tab. 2.** Association between quality of life categories and economics level in patients with multiple sclerosis

Characteristic	Modality	Class MSQOL-54 (n=90) (%)			Total	Khi2 p-value
		Poor n (%)	Moderate n (%)	Excellent n (%)		
Economic level	Low	5 (33.33)	10 (66.67)	0	15	10.38* (p < 0.035)
	Middle	6 (13.04)	30 (65.22)	10 (21.74)	46	
	High	1 (3.45)	23 (79.31)	5 (17.24)	29	

(%). Percentage ; \*. Correlation is significant at the 0.05 level.

**Tab. 3.** Comparison of average scores for physical and mental health based on economic status

Characteristic		Level of income Mean ± SD			Fisher	p-value
		Low	Middle	High		
MSQOL	PHC	36.80±7.90	50.73±12,07	51.39±15.02	7,409	p < 0.001**
	MHC	29.15±9.97	47.73±13.90	44.91±15.69	8,974	p < 0.000**
HADS-A		13.87±4.34	10.14±4.711	10.85±4.336		p < 0.031*

**SD:** Standard deviations; **MSQOL-** Multiple Sclerosis Quality of Life; **PHC:** Physical Health Composite; **MHC:** Mental Health Composite

\*\* Correlation is significant at the 0.01 level, \* Correlation is significant at the 0.05 level

48.74 ± 1.49, with a minimum of 22.06 and a maximum of 78.29. Meanwhile, the study of the Mental Health Composite (MHC) involves the examination of its mean score. The latter is 43.19 ± 1.64, with a minimum of 13.47 and a maximum of 84.79. (Table 1)

Association between economic level and quality of life categories

The table below (2) presents the results of the chi-square test between the MSQOL-54 categories and the variables described above; it confirms the existence of a significant relationship. The economic level is significantly linked to the MSQOL-54 categories (p < 0.035). In fact, 33.33% of patients with a low income and 3.45% with a high income had a poor QoL.

Comparison of income levels according to quality of life composites

The mean scores for physical health and mental health in low-income patients (36.80±7.90; 29.15±9.966) are notably lower than those in middle-income (50.73±12.077; 47.73±13.903) and high-income groups, respectively (51.38±15.024; 44.91±15.692). There is

a highly significant disparity in both physical health (p < 0.001) and mental health (p < 0.000) scores. This suggests that as the income of patients decreases, the QoL scores related to the physical and mental health of MS patients also decrease.

The average HADS-A for patients with low income (13.87±4.34) is higher than those with moderate- and high-income levels (10.14±4.711; 10.85±4.336) respectively, showing a significant difference (p < 0.031). This indicates that patients with lower income levels experience more significant anxiety than those with moderate or higher economic status. (Table 3)

Correlation between economic status and composite health-related quality of life

The table depicts a positively significant correlation between economic status and both components of quality of life. This implies that as economic satisfaction increases, so does physical health (r = 0.262) and, particularly, mental health (r = 0.386). (Table 4)

**DISCUSSION**

In our study, we found that 16.7% of patients had a low income, 51.1% an intermediate income and 32.2% a high income. By way of comparison, a study carried out in Tunisia showed that 72% had a low income, compared with 15% with a high income (Damak et al. 2014). We are, then, in a relatively similar geographical and political continuum.

In a study of the effect of income on the QoL of MS patients, it was found that 20.9% had a low income, 53.5% a middle income and 25.6% a high income (Lindberg et al. 2022). These studies concluded that the level of income is a major factor, in that it provides

**Tab. 4.** Correlation between economic status and anxiety disorders as well as the composite quality of life

Variables	Economics level	
	R	p-value
PHC	0.262*	p < 0.013**
MHC	0.386**	p < 0.000**

**PHC:** Physical Health Composite; **MHC:** Mental Health Composite

\*\* Correlation is significant at the 0.01 level, \* Correlation is significant at the 0.05 level

information on the possibilities for prompt support and lifelong care. We know that MS entails the cost of hospitalisation, tests (biomedical, MRI, transport, etc.) and the purchase of medication, etc (Bebo *et al.* 2022; Kavaliunas *et al.* 2022; Rezaee *et al.* 2022).

It is undeniable that such a comparison has not taken place in African, Maghreb, and especially Moroccan society in recent decades. While in high-income countries, address the direct and indirect costs of the disease, in our country, there are still patients without income who rely on minimal financial support from their family environment for diagnosis, hospitalization, and medication treatment. These patients, after being diagnosed with MS, will have a great opportunity to be released from their position. A study in nine European countries (Kobelt *et al.* 2006). revealed that a substantial percentage of patients had to quit their jobs due to MS.

MS imposes a significant financial burden on the individual, the family, the health services and society; and these costs increase as MS progresses. Hence the importance of making a financial effort in terms of care for the persons with MS and their families.

Finally, costs vary between direct medical costs (e.g., hospitalization, consultations, medication costs, medical tests) and non-medical costs (e.g., home and car improvements, professional home care, informal family and friends' care, patient travel expenses to healthcare facilities and home and community services), as well as indirect costs associated with decreased productivity due to MS. Experts have focused on increasing funding for services, while individuals with MS have focused on improving financial support. These findings underscore the need for professionals to consider the financial pressures associated with the disease and the impact of these pressures on the QoL of individuals with MS and their families (De Judicibus & McCabe, 2007).

The socio-economic consequences of MS are not negligible. A low income has been found to have an impact on the progression of disability (Kavaliunas *et al.* 2022) ; which in turn affects the QoL directly or indirectly. Additionally, patients who receive early treatment experience a better QoL compared to those who receive treatment later (Cerqueira *et al.* 2018; Tinelli *et al.* 2018). Chen *et al.* found that individuals with MS receiving highly effective disease-modifying treatment experienced significant increases in burden, presence, and productivity at work compared to those using first-generation injectable treatment (Chen *et al.* 2018).

This reality prompts us to closely examine the connection between an individual's financial situation and MS, as this condition imposes a significant economic burden due to the indirect and informal costs of care, even in a population with low physical disability (García-Domínguez *et al.* 2019). Indeed, a cross-sectional study was carried out in European countries demonstrated the impact of the economic burden on the QoL of patients and their close ones; it concludes

that this burden increases once the disease is diagnosed (Kobelt *et al.* 2006, 2017).

Another study Systematic highlighted the economic impact on QoL and the specific economic burden that MS imposes on society, considering health insurance with varying coverage rates (Dahham *et al.* 2021). A higher economic status would, therefore, promote a better QoL, without overlooking the roles of age and the prolonged duration of MS, which are significant factors in reducing QoL (Karakiewicz *et al.* 2010).

As patients' disability increases, they become dependent on their families to carry out their daily routines and activities, inevitably leading to a decline in their QoL. Even in a population with low physical disability, MS imposes a significant economic burden due to the indirect and informal costs of care (García-Domínguez *et al.* 2019; Ruíz Beato *et al.* 2018).

A study conducted in the United States found that the yearly per-patient total cost, including medical, non-medical, and indirect expenses, for Parkinson's disease was \$49,997 in 2017 (Yang *et al.* 2020). This figure was lower than the estimated cost for MS in 2019, which amounted to \$88,132 (Bebo *et al.* 2022). Additionally, another study reported costs of \$63,693 for Amyotrophic Lateral Sclerosis, \$50,952 for Duchenne muscular dystrophy, and \$32,236 for myotonic dystrophy (Larkindale *et al.* 2014).

Professionals, family members (children, partners, etc.), and individuals affected by MS have discussed various ways in which the financial costs of MS negatively impact their QoL. The primary concern is the economic pressure associated with the inability to meet financial obligations. In the early stages of MS, individuals often report experiencing a financial crisis that has not yet adjusted to their situation. Following their diagnosis of MS, individuals, who were previously committed to their normal standard of living, must now adapt to a lower income, causing significant stress. Newly diagnosed individuals and their loved ones consequently experience heightened anxiety and stress due to the challenges posed by MS (De Judicibus & McCabe, 2007).

A recent study found that people with MS and low economic status are more likely to suffer from depression and anxiety, inversely related to self-esteem (El Harchaoui *et al.* 2023a). These observations underline the importance of improving access to medical care for financially disadvantaged patients.

## CONCLUSION

The economic status of people with MS has a significant impact on their physical and mental health, influencing their overall QoL. A global approach is crucial to support and accompany these patients, taking into account their economic status. QoL, which is closely linked to financial status, particularly in terms of mental rather than physical health, requires recognition of these complex

interactions. Targeted and equitable interventions are needed to improve the QoL of people with MS.

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