Prevalence, disability, and economic impact of migraine in Spain: a nationwide population-based study

Margarita Sanchez-del-Rio[1*] , David García-Azorín[2,3], Carmen Peral[4], Beatriz Armada[4], Pablo Irimia-Sieira[5] and Jesus Porta-Etessam[6]

Abstract

Background This study updates data on migraine prevalence in Spain, examining regional variations, healthcare resource utilization (HCRU), and patient-reported outcomes (PROs).

Methods Cross sectional study using data from the 2022 National Health and Wellness Survey, an online survey of Spanish residents aged 18 or older. Respondents diagnosed with migraine by a physician and who reported at least one migraine in the past year were considered active migraine cases.

Results The study included 7,002 respondents, 930 of whom had physician-diagnosed active migraine. The estimated one-year prevalence of migraine in Spain was 13.1% (95% confidence interval [CI] 12.8–13.4%), with higher rates in females (17.7%, 95% CI 17.2–18.3%) than in males (8.2%, 95% CI 7.8–8.6%). Migraine prevalence varied across Spain's regions, ranging from 8.1% (95% CI 5.2–11.0%) in Navarre to 19.1% in Cantabria (95% CI 15.6–22.6%). Prevalence was the highest among individuals earning below the median income (14.7%, 95% CI 14.1–15.4%). In the preceding month, 75.3% of patients experienced < 4 migraine days, 15.3% 4–9 migraine days, 4.1% 10–14 migraine days, and 5.3% ≥15 migraine days. Severe disability from migraine was reported by 20.4% of respondents. One in ten people reported using a preventive treatment for migraine. The mean SF-12 scores for mental and physical health were 37.8 and 42.1, respectively, both below the general population norm of 50. The mean EQ-5D summary score was 0.8, indicating reduced quality of life and the PHQ-9 detected severe depressive symptoms in 8.8% of individuals. Work productivity was affected by migraine, with a mean work productivity loss of 35.8%. HCRU in the preceding 6 months was high, with 68.4% having visited at least once a general practitioner, 14.2% a neurologist, 45.6% the emergency room, and 11.8% being hospitalized. The annual cost per person with migraine was estimated at €6,704, primarily driven by indirect costs related to productivity loss.

Conclusions Migraine prevalence remains high in Spain, causing a substantial burden and representing a major public health problem. Despite the availability of effective treatments, their usage is limited. Improving migraine management should be prioritized to enhance health outcomes and reduce societal burden.
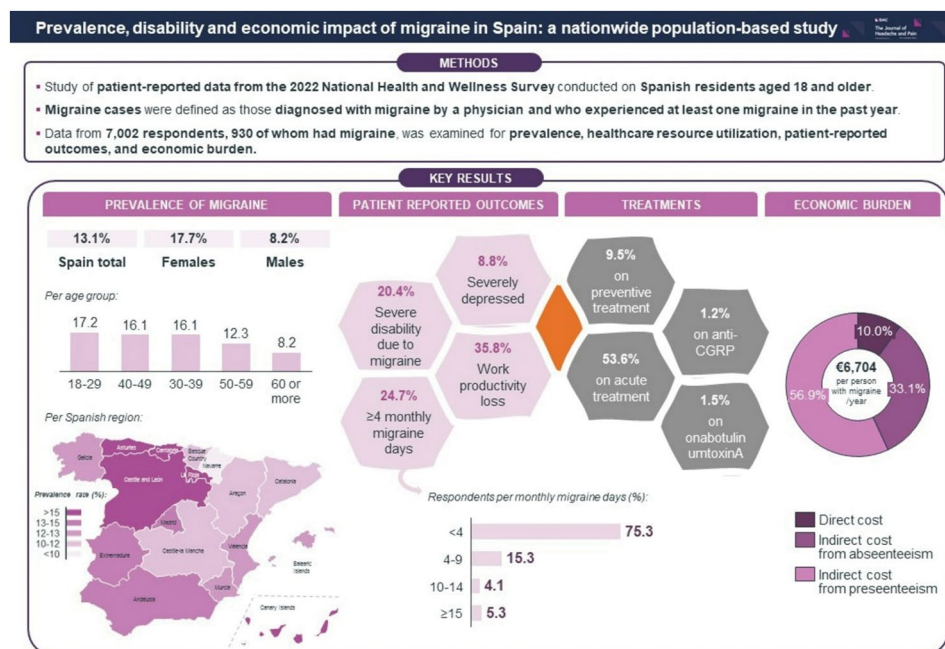
*Correspondence:
Margarita Sanchez-del-Rio
msanchezd@unav.es

Full list of author information is available at the end of the article

Graphical abstract

Keywords Headache disorders, Epidemiology, Cost of illness, Depression, Burden, Migraine

Background

Migraine imposes a significant burden on both patients and society. It is the third most prevalent disorder globally and a public health priority [1–3]. Despite its widespread occurrence, migraine remains underdiagnosed and undertreated, adversely affecting relationships, careers, and overall health [4]. The global burden of migraine has been increasing, with variations in prevalence across countries and regions [5].

Data from the 2020 National Health and Wellness Survey (NHWS), conducted during the early stages of the COVID-19 pandemic, showed a profound impact of migraine on patients' quality of life and ability to work, as well as its substantial economic costs [6–8]. In Spain, migraine was associated to a 1.7 times higher annual cost per patient [6]. The survey also revealed certain geographic variations in migraine prevalence, with Spain having a higher rate (14.0%) compared to the other four analyzed European countries (9.7-12.7%) [7].

Recent years have witnessed a revolution in migraine treatment with the introduction of novel therapies targeting the calcitonin gene-related peptide (CGRP), including the monoclonal antibodies (mAbs) and the oral small-molecule CGRP receptor antagonists (gepants) [9–12]. In Spain these treatments were only available from late 2019 onwards and were thus not captured by the 2020 NHWS: erenumab and galcanezumab were reimbursed in November 2019, fremanezumab in August 2020, eptinezumab in April 2023, rimegepant in January 2024 and atogepant in May 2024 [13] These advancements demand an updated assessment of their adoption in the Spanish clinical practice.

Timely and comprehensive epidemiological data is necessary for public health planning and health-related policies. The objective of this study is to evaluate the burden of migraine in Spain by providing updated epidemiological data, with the aim of informing future healthcare strategies. Specifically, data from the 2022 NHWS is analyzed to estimate: (1) the prevalence rates of migraine across different regions of Spain, (2) evaluate healthcare resource utilization (HCRU) among migraine patients - including visits to general practitioners, neurologists, emergency rooms, and hospitalizations - and (3) assess patient-reported outcomes (PROs), including the frequency of migraine, the disability caused by migraine, its impact on quality of life, work productivity, and the presence of comorbid conditions such as depression. Additionally, this study analyzes the socio-demographic characteristics of migraine patients, including age, sex, education, household income, and employment status.

Methods

Study design

This was a cross-sectional study using patient-reported data collected in 2022 as part of the National Health and Wellness Survey (NHWS, Cerner Enviza) from respondents located in Spain.

Study setting and period

The NHWS is a self-administered, internet-based survey conducted in multiple countries. It includes a base questionnaire for demographics and health characteristics, and disease-specific modules for those with a self-reported diagnosis. Respondents were mainly identified through opt-in online survey panels, using stratified quota sampling for country-specific representation by age and gender. Respondents were recruited through email, co-registration, e-newsletter campaigns, banner placements, and internal and external affiliate networks. Telephone recruitment using quota sampling, based on age and gender, was used to supplement online recruitment to address the insufficient internet penetration among older adults and provide an adequate sample of this demographic. Recruitment was supplemented by computer-assisted web interviews, where respondents could choose to complete the interview via phone, computer in a private center, or an emailed link. Those without internet access were invited to complete the survey using a computer in a private center. The Spanish NHWS was conducted in 2022 using a physician reviewed Spanish-language survey version.

Study population

All survey participants were Spanish residents, aged 18 or older, who consented to participate and spoke Spanish as their primary language. Respondents who reported having received a physician's diagnosis of migraine and having experienced at least one migraine episode in the past 12 months were considered migraine cases.

Data sources / measurements

The NHWS encompassed demographic variables, general health characteristics, health status, experienced and/or diagnosed comorbidities, symptoms of depression and anxiety, work productivity, and healthcare resource utilization (HCRU). All data were self-reported by respondents, with no clinical charts reviewed.

Outcomes

Demographic and clinical characteristics

The study included demographic, general health, and clinical variables such as age, sex, marital status, education, household income, and employment status. The Charlson Comorbidity Index (CCI), which predicts ten-year mortality risk for patients with specific comorbid conditions, was also calculated [14]. The CCI assigns weighted scores to 19 different conditions based on their severity and impact on mortality. Conditions such as myocardial infarction, congestive heart failure, and diabetes are each assigned a score of 1, while more severe conditions like metastatic solid tumors and AIDS are assigned higher scores. The total score is calculated by summing the individual scores for each condition, with higher scores indicating a greater risk of mortality [14]. Additionally, age is factored into the score [14]. The study variables and definitions are consistent with those in NHWS 2020, except for the regional data, which was not available in 2020 [6].

Epidemiology

Migraine prevalence was estimated across all 17 Spanish regions by projecting the survey sample to the total Spanish population, weighted by age and sex, and dividing the number of individuals with migraine by the total population, within each region.

Migraine's frequency and functional consequences

Monthly migraine days (MMD) were collected in the survey, and stratified into <4, 4–9, 10–14, and 15 or more MMD. The MIDAS (Migraine Disability Assessment) questionnaire was used to evaluate the impact of migraine on daily activities. Through five questions, it measures the number of days that migraine have affected work, school, household tasks, and social engagements, and categorizes the level of disability caused by migraine into four grades: little or no disability (0–5), mild (6–10), moderate (11–20), and severe (21+) [15].

Health-Related quality of life (HRQoL) and depression

The study used two validated tools to measure patient-reported HRQoL: the SF-12 and the EQ-5D. The SF-12 assesses general health in eight areas, providing physical and mental health scores (PCS-12 and MCS-12). Scores range from 0 to 100, with higher scores indicating better health. PCS-12 scores of 50 or below may suggest a poor physical condition, while MCS-12 scores of 42 or below may indicate clinical depression. The EQ-5D measures health across five dimensions - mobility, usual activities, self-care, pain and discomfort, and anxiety and depression -, creating a Utility Index from 0 (worst) to 1 (best). The EQ-5D Visual Analogue Scale (VAS) also rates self-perceived health on a 100-mm scale, from 0 (worst) to 100 (best) [16–19].

The Patient Health Questionnaire (PHQ-9) was used to screen for depression. Symptom frequency is measured, with scores from 0 to 27. Scores are categorized as follows: 0–4 (no/minimal depressive symptoms), 5–9 (mild depressive symptoms), 10–14 (moderate depressive symptoms), 15–19 (moderate-to-severe depressive

symptoms), and 20–27 (severe depressive symptoms) [20].

Work productivity and activity impairment

The General Health version of the Work Productivity and Activity Impairment questionnaire (WPAI-GH) was used to assess work productivity and activity impairment through four metrics. Activity impairment measures the extent to which a health problem affects productivity in regular unpaid activities on a 0 to 10 scale, while presenteeism measures its effect on productivity while working. Absenteeism expresses the percentage of work time missed due to the health problem, and overall work productivity loss provides an estimate of the combination of absenteeism and presenteeism [6]. Metrics are given as percentages, with higher values indicating greater impairment and reduced productivity.

Healthcare resource utilization

Respondents reported their HCRU over the past 6 months, including visits to primary care, neurologists, emergency room (ER), and hospitalizations. The average number of visits for each provider type and care setting was recorded. To estimate annual HCRU, the reported values were doubled, assuming constant utilization throughout the year [6].

Direct and indirect economic burden

Direct and indirect economic burden was estimated following the same methodology as in García-Azorín et al. (2024) [6]. Direct healthcare costs were calculated by multiplying the number of visits by their estimated unit costs in Spain, adjusted for inflation to 2024 values. Indirect costs from lost productivity were estimated using the human capital method with NHWS data, adjusted to 2024 values.

Statistical analysis

NHWS responses were weighted to reflect the sex and age distributions within the country. Demographic, health, and clinical characteristics were summarized using means and standard deviations for continuous variables and counts and percentages for categorical variables. Arithmetic means were chosen to report results, to better reflect the costs of treating all patients [21]. There was no formal sample size calculation, and the study was conducted including all the NHWS available included cases.

Ethical considerations

The study was conducted following the ethical principles of the Declaration of Helsinki and the local regulation, including privacy laws. The NHWS protocol and questionnaire received approval from the Pearl Institutional Review Board. All the NHWS respondents provided informed consent electronically prior to their participation.

Results

Prevalence of self-reported physician-diagnosed active migraine

Out of the 7,002 respondents (weighted $N = 39$ million) who participated in the 2022 NHWS in Spain, 930 (13.3%) reported having experienced at least one migraine episode in the past 12 months and having a physician diagnosis of migraine. This corresponds to an estimated 5.1 million people with self-reported physician-diagnosed active migraine in Spain, resulting in an estimated one-year weighted prevalence of 13.1% (95% confidence interval [CI] 12.8–13.4%). The demographic and clinical characteristics of both the total population and the subpopulation with migraine can be consulted in Table 1, along with the resulting estimated prevalence rates.

Prevalence by region

The one-year prevalence of migraine across Spain's seventeen regions ranged from 8.1% (95% CI 5.2–11.0%) in Navarre to 19.1% in Cantabria (95% CI 15.6–22.6%) (Fig. 1).

Prevalence by age and sex

The prevalence of migraine was 2.2 times higher in females (17.7%, 95% CI 17.2–18.3%) than in males (8.2%, 95% CI 7.8–8.6%). The highest prevalence rate was observed in the 18–29 age group (17.2%, 95% CI 16.2–18.2%), declining as age increases until approximately half (8.2%, 95% CI 7.7–8.7%) in individuals aged 60 years or older (Fig. 2).

Prevalence by socioeconomic status

The prevalence of migraine was higher among respondents with less than a university degree education, compared to those with a university education or higher (13.6%, 95% CI 13.1–14.0% vs. 12.4%, 95% CI 11.9–13.0%, respectively). It was also higher in individuals with incomes below the median (14.7%, 95% CI 14.1–15.4%) than those at the median (13.8%, 95% CI 13.1–14.5%) and above the median (12.3%, 95% CI 11.8–12.8%). Employed individuals had a higher prevalence (14.4%, 95% CI 14.0-14.9%) compared to those not employed (11.0%, 95% CI 10.5–11.5%) (Fig. 3).
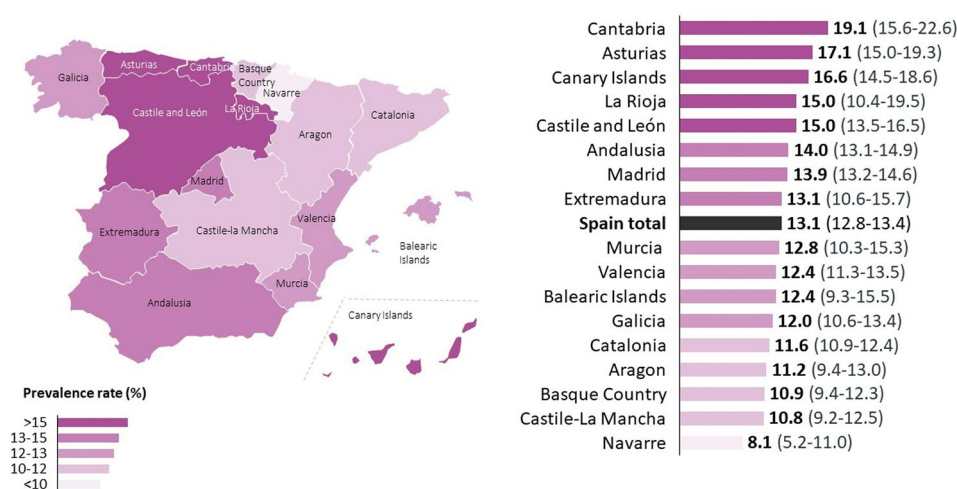
Prevalence of comorbidities

Migraine prevalence was notably higher among respondents with multiple or severe comorbid conditions, as assessed by the CCI. The prevalence rates were 11.9% (95% CI 11.6–12.3%) for individuals without

Table 1 Demographic and clinical characteristics of both the total population and the subpopulation with migraine, and estimated prevalence rates

Characteristics		Adult population (*n* = 39.0 million) Thousand people (%)	Adult population with migraine (*n* = 5.1 million)Thousand people (%)	Migraine prevalence rate (95% CI)
Sex	Male	18,861 (48.4)	1,545 (30.2)	8.2 (7.8–8.6)
	Female	20,148 (51.7)	3,571 (69.8)	17.7 (17.2–18.3)
Age	18–29	5,510 (14.1)	950 (18.6)	17.2 (16.2–18.2)
	30–39	5,684 (14.6)	917 (17.9)	16.1 (15.2–17.1)
	40–49	8,085 (20.7)	1,300 (25.4)	16.1 (15.3–16.9)
	50–59	8,164 (20.9)	1,005 (19.6)	12.3 (11.6–13)
	60 or more	11,567 (29.7)	945 (18.5)	8.2 (7.7–8.7)
Marital status	Single/not living with partner	14,013 (35.9)	1,710 (33.4)	12.2 (11.7–12.7)
	Married/living with partner	24,928 (63.9)	3,406 (66.6)	13.7 (13.2–14.1)
	Decline to answer	68 (0.2)	-	-
University education	Less than University education	24,405 (62.6)	3,312 (64.7)	13.6 (13.1–14)
	University education or higher	14,491 (37.2)	1,800 (35.2)	12.4 (11.9–13)
	Decline to answer	113 (0.3)	5 (0.1)	4.4 (0.6–8.2)
Annual household income	Below median income	10,740 (27.5)	1,583 (31)	14.7 (14.1–15.4)
	Median income	9,240 (23.7)	1,274 (24.9)	13.8 (13.1–14.5)
	Above median income	16,569 (42.5)	2,035 (39.8)	12.3 (11.8–12.8)
	Decline to answer	2,459 (6.3)	224 (4.4)	9.1 (8-10.2)
Employed (FT/PT/SE)	Yes	22,317 (57.2)	3,218 (62.9)	14.4 (14-14.9)
	No	15,991 (41)	1,764 (34.5)	11 (10.5–11.5)
	Disabled	701 (1.8)	135 (2.6)	19.3 (16.3–22.2)
Charlson comorbidity index	0	28,933 (74.2)	3,454 (67.5)	11.9 (11.6–12.3)
	1	5,710 (14.6)	910 (17.8)	15.9 (15-16.9)
	2	2,672 (6.9)	425 (8.3)	15.9 (14.5–17.3)
	3	987 (2.5)	200 (3.9)	20.3 (17.8–22.8)
	4 or more	707 (1.8)	128 (2.5)	18.1 (15.3–20.9)

CI, Confidence Interval

Cantabria	**19.1** (15.6-22.6)
Asturias	**17.1** (15.0-19.3)
Canary Islands	**16.6** (14.5-18.6)
La Rioja	**15.0** (10.4-19.5)
Castile and León	**15.0** (13.5-16.5)
Andalusia	**14.0** (13.1-14.9)
Madrid	**13.9** (13.2-14.6)
Extremadura	**13.1** (10.6-15.7)
Spain total	**13.1** (12.8-13.4)
Murcia	**12.8** (10.3-15.3)
Valencia	**12.4** (11.3-13.5)
Balearic Islands	**12.4** (9.3-15.5)
Galicia	**12.0** (10.6-13.4)
Catalonia	**11.6** (10.9-12.4)
Aragon	**11.2** (9.4-13.0)
Basque Country	**10.9** (9.4-12.3)
Castile-La Mancha	**10.8** (9.2-12.5)
Navarre	**8.1** (5.2-11.0)

Prevalence rate (%)
>15
13-15
12-13
10-12
<10

Fig. 1 One-year prevalence rates of self-reported physician-diagnosed active migraine by region (95% Confidence Interval)

comorbidities (CCI = 0), 15.9% (95% CI 15.0-16.9%) for those with a CCI of 1, 15.9% (95% CI 14.5–17.3%) for a CCI of 2, 20.3% (95% CI 17.8–22.8%) for a CCI of 3, and 18.1% (95% CI 15.3–20.9%) for a CCI of 4 or higher (Fig. 4).

Patient reported outcomes
Migraine's frequency and migraine-associated disability
Individuals with migraine reported an average of 3.2 (SD: 5.0) migraine days per month. Figure 5 depicts the frequency of MMD reported by the respondents with
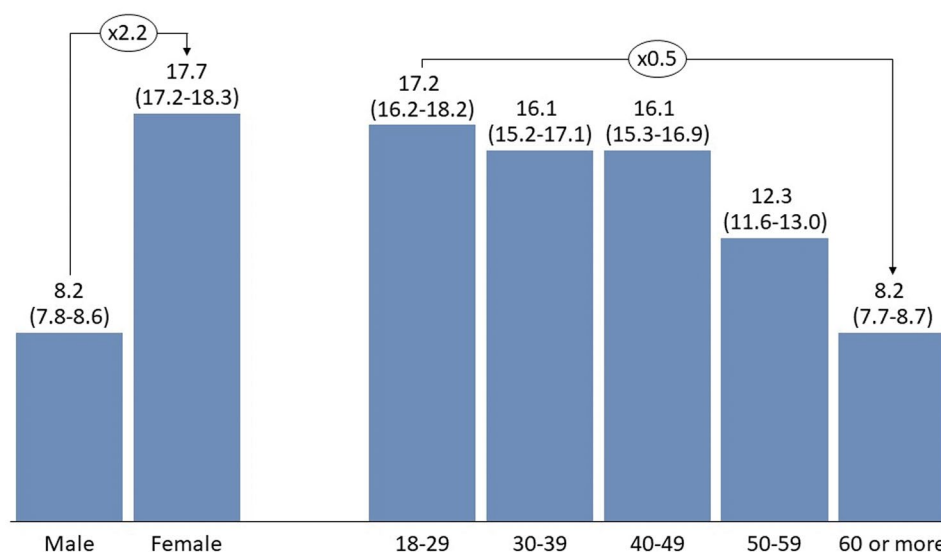
Fig. 2 One-year prevalence rates of self-reported physician-diagnosed active migraine by age groups and sex (95% Confidence Interval)
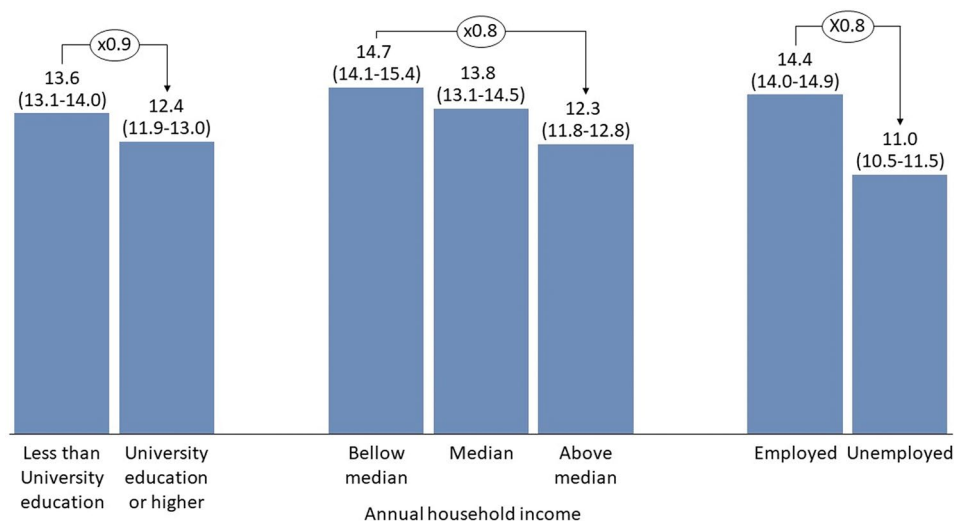

Fig. 3 One-year prevalence rates of self-reported physician-diagnosed active migraine by socioeconomic status (95% Confidence Interval)

migraine. As for migraine-associated disability, the average MIDAS score was 15.1 (SD: 28.0), indicating moderate disability. Based on the MIDAS questionnaire, 20.4% of individuals with migraine were classified as having severe disability, 14.3% moderate disability, 14.2% mild disability, and 51.0% little or no disability (Table 2).

Health-Related quality of life and depression

The SF-12 scores for people with migraine were 37.8 (SD: 10.9) for mental health and 42.1 (SD: 10.2) for physical health, both below the general population norm of 50, suggesting below-average health. The mean EQ-5D summary score was 0.8 (SD: 0.2), indicating a fair but reduced overall quality of life compared to perfect health, which is scored as 1. The mean VAS score was 63.4 mm (SD: 25.8). According to the PHQ-9 responses, 37.6% of individuals

with migraine had moderate to severe depressive symptoms, 29.3% had mild depressive symptoms, and 33.1% had none to minimal depressive symptoms.

Work productivity and activity impairment

In 62.9% of cases, respondents with migraine were employed (full-time, part-time, or self-employed). Among employed individuals, the mean work productivity loss was 35.8%. The mean percentage of absenteeism, reflecting the percentage of work time missed due to health problems, was 13.1%. Presenteeism, reflecting the percentage of impairment experienced while at work due to health problems, averaged 32.2%. Among employed individuals, the average activity impairment was 34.9%, while unemployed individuals reported a higher average
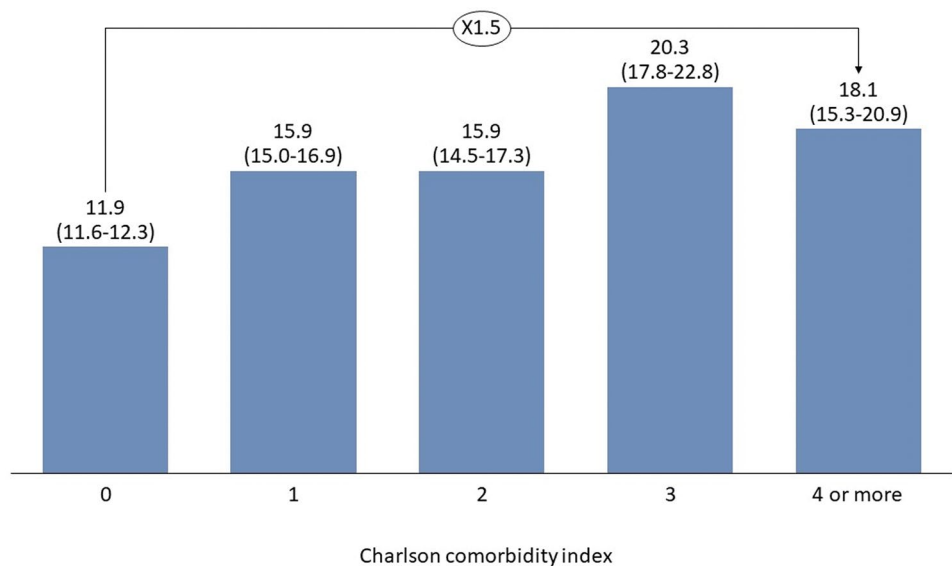
Fig. 4 One-year prevalence rates of self-reported physician-diagnosed active migraine by Charlson comorbidity index score (95% Confidence Interval)
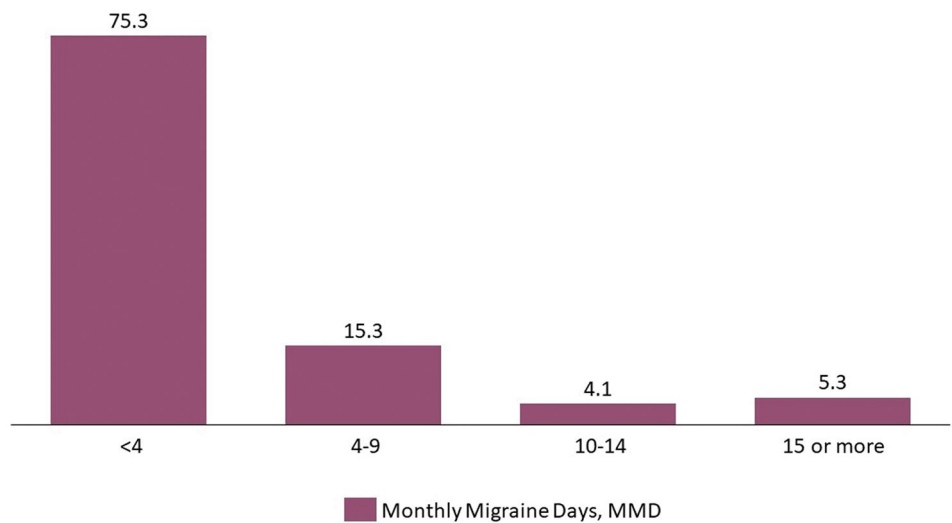

Fig. 5 Number of days with migraine per month reported by people with physician-diagnosed active migraine (% of respondents)

activity impairment of 43.8%. The total activity impairment across all respondents was 38.2%.

Pharmacologic treatment

Acute prescription treatments were used by 53.6%. NSAIDs were the most common (Fig. 6), used by 38.9% of people with migraine, followed by triptans (19.1%), opioids (12.7%), and ergots (3.2%). One in ten people reported using a preventive treatment for migraine (9.5%). Anticonvulsants were used by 4.5%, followed by beta blockers (1.6%), onabotulinumtoxinA (1.5%), CGRP monoclonal antibodies (1.2%), and calcium channel blockers (1.1%).

Healthcare resource utilization

In the previous 6 months, 68.4% of people with migraine had visited a general practitioner (GP), 14.2% a neurologist, 45.6% the emergency room (ER), and 11.8% had been hospitalized. Amongst those who used these resources, the mean number of visits over the same period was 3.0 to the GP, 1.5 to neurologists, 2.3 to the ER, and 1.6 hospitalizations. Table 2 shows the mean number of visits per person with migraine, including those who have not visited.

Direct and indirect economic burden

The annual cost per person with migraine was estimated at €6,704, with €672 (10.0%) from direct costs and €6,032 (90.0%) from indirect costs related to absenteeism and

Table 2 Summary of patient reported outcomes and healthcare resource use reported by people with migraine

Characteristics		Adult population with migraine($n=5.1$ million)
Functional disability: MIDAS	Mean MIDAS score (SD)	15.1 (28.0)
	Grade I - Little or No Disability, N_k (%)	2,609 (51%)
	Grade II - Mild Disability, N_k (%)	728 (14.2%)
	Grade III - Moderate Disability, N_k (%)	734 (14.3%)
	Grade IV - Severe Disability, N_k (%)	1,046 (20.4%)
Health-Related Quality of Life: SF-12 and EQ-5D	SF-12 MCS, mean (SD)	37.8 (10.9)
	SF-12 PCS, mean (SD)	42.1 (10.2)
	EQ-5D utility score, mean (SD)	0.8 (0.2)
	EQ-5D VAS score, mean mm(SD)	63.4 (25.8)
Depression: PHQ-9	None - Minimal depression, N_k (%)	1,691 (33.1%)
	Mild depression, N_k (%)	1,500 (29.3%)
	Moderate depression, N_k (%)	905 (17.7%)
	Moderately severe depression, N_k (%)	568 (11.1%)
	Severe depression, N_k (%)	452 (8.8%)
Work productivity and activity impairment	Absenteeism score, mean (SD)[a]	13.1 (24.8)
	Presenteeism score, mean (SD)[a]	32.2 (28.4)
	Total work productivity loss, mean (SD)[a]	35.8 (31.1)
	Activity impairment score among employed, mean (SD)[a]	34.9 (28.9)
	Activity impairment among unemployed, mean (SD)	43.8 (29.2)
	Total Activity impairment, mean (SD)	38.2 (29.3)
Healthcare resource utilization in the past 6 months	GP visits, mean (SD)[b]	2.1 (3.1)
	Neurologist visits, mean (SD)[b]	0.2 (0.6)
	ER visits, mean (SD)[b]	1.1 (1.9)
	Hospitalizations, mean (SD)[b]	0.2 (0.8)
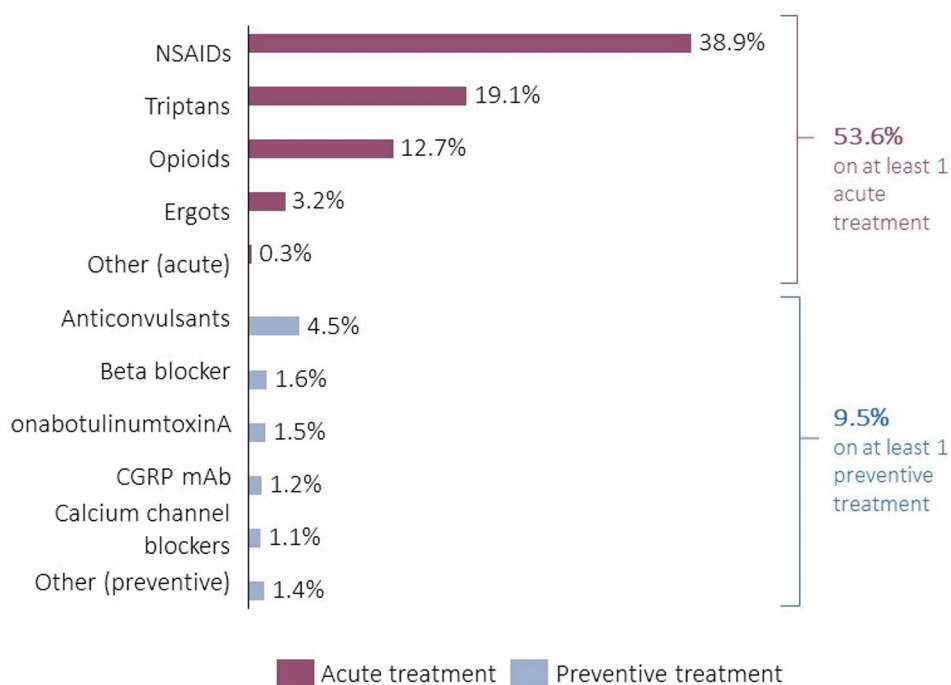
Fig. 6 Current migraine treatments reported by people with physician-diagnosed active migraine (% of respondents)
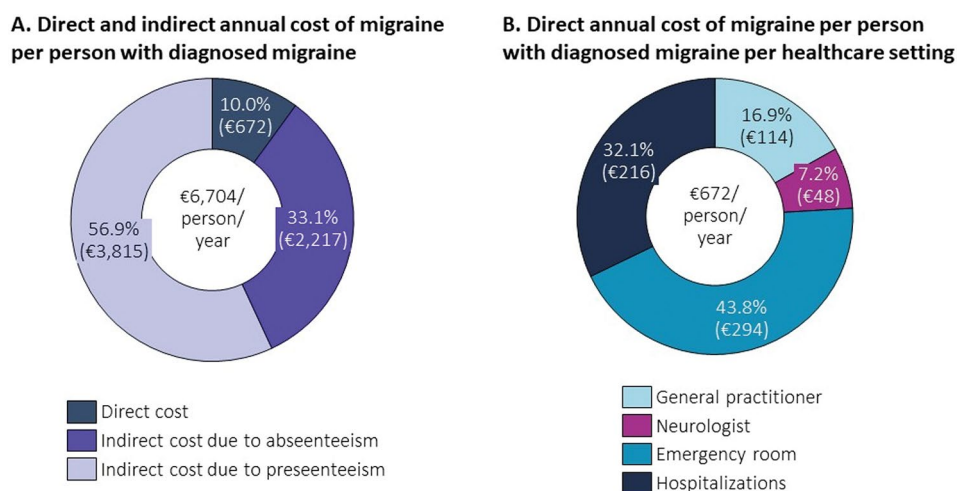
A. Direct and indirect annual cost of migraine per person with diagnosed migraine

- 10.0% (€672)
- 33.1% (€2,217)
- 56.9% (€3,815)
- €6,704/person/year

Legend:
- Direct cost
- Indirect cost due to abseenteeism
- Indirect cost due to preseenteeism

B. Direct annual cost of migraine per person with diagnosed migraine per healthcare setting

- 16.9% (€114)
- 7.2% (€48)
- 43.8% (€294)
- 32.1% (€216)
- €672/person/year

Legend:
- General practitioner
- Neurologist
- Emergency room
- Hospitalizations

Fig. 7 Direct and indirect annual cost of migraine per person with self-reported physician-diagnosed active diagnosed migraine (€)

presenteeism (Fig. 7). Considering only those employed, indirect costs per person rise to €9,591, of which 36.8% is from absenteeism and 63.2% is from presenteeism. Visits to the ER accounted for 43.8% of direct costs, followed by hospitalizations (32.1%), visits to the GP (16.9%), and visits to the neurologist (7.2%).

Discussion

This study provides an updated comprehensive analysis of the prevalence, disability, and economic impact associated with migraine in Spain, utilizing data from the 2022 National Health and Wellness Survey. Our results show that the prevalence of migraine remains high in Spain (13.1% in 2022 compared to 12.6% in 2006 [22]) and suggest that, despite the availability of treatments, migraine is still undertreated.

There were 24.7% of individuals who reported having over four migraine days per month and could thus benefit from preventive treatment according to national guidelines. However, only 9.5% were receiving preventive treatment, and anti-CGRP therapies were used by only 1.2%. The low utilization of preventive treatments, despite the high disability associated with migraine, is a concerning finding. Previous studies have also reported underutilization of preventive therapies, which may be due to factors such as lack of awareness, limited access to specialized care, lack of training to manage migraine, and restrictive reimbursement policies [23–25]. However, the share of patients reporting the use of triptans or preventive treatments for migraine is lower in our study [26]. Results reinforce the need to optimize access to preventive treatments and rethink acute treatment strategies, avoiding opioids and increasing the use of targeted treatments [27].

The prevalence of migraine was higher among individuals with lower socioeconomic status and was found to be over twice as common in females (17.7%) than males (8.2%). The higher prevalence of migraine among females and individuals with lower socioeconomic status is consistent with previous studies for Spain and well-documented in the literature [6, 22, 23, 28, 29]. This sex disparity is thought to be influenced by hormonal factors, while the association with socioeconomic status may be related to differences in access to healthcare, stress levels, and lifestyle factors [28, 30–32].

In our study, the highest prevalence was observed in the 18–29 age group, whereas Matías-Guiu et al. reported the highest prevalence in the 30–39 age group [22]. Since our study was focused on patients with a physician diagnosis of migraine and an active disease, this shift may indicate an earlier diagnosis of migraine or a change in the age of onset of migraine. It is also consistent with global trends showing a significant increase in migraine prevalence among adolescents (< 20 years) from 1990 to 2021 [5].

Patient-reported outcomes of adults with migraine in Spain using data from the NHWS for 2020 had been previously published by García-Azorín et al. (2024) [2]. One of the limitations of the NHWS 2020 survey was that it had been conducted between 30 December 2019 and 20 April 2020, thus raising the question on whether results could have been partially affected by the first wave of the COVID-19 pandemic in Spain [6]. The NHWS 2022 enabled to consolidate previous findings, as, across the different metrics, the detrimental effect of migraine on individuals was still quite evident on both mental and physical health. In 2022, all outcomes were at least slightly worse than those observed in 2020, with the exception of productivity loss [6]. A high presence of depression among individuals with migraine in Spain has been reported in previous studies, although with substantial variability, as study designs vary [6, 33–35].

When interpreting results, it should be considered that, in our study, only patients reporting a physician diagnosis and at least one migraine episode in the past 12 months were included. The estimated economic burden per person with migraine was also aligned with previous studies for Spain [6].

Limitations

Data collected in this study was self-reported and as such it may be subject to biases such as memory inaccuracies and deliberate misreporting, although the survey is naturalistic, and no incentive is given to misrepresent one's reporting. The NHWS relied on self-reported physician diagnoses to identify migraine cases. Future studies could benefit from incorporating validated screening tools like ID Migraine to enhance diagnostic accuracy. Missing data was minimized by providing "don't know" or "decline to answer" as options). The economic burden estimates may be underestimated, as only a portion of medical costs were accounted for, and the assumption of constant healthcare resource utilization throughout the year may not fully capture seasonal variations in migraine frequency and severity. On the other hand, not all HCRU from people with migraine are due to migraine. The comparison of results between the NHWS 2020 and 2022 surveys is limited due to differences in migraine case definitions and stratifications. In 2020, an active migraine case required a physician's diagnosis and at least one migraine day in the past 30 days, whereas in 2022, it required a diagnosis and at least one episode in the past 12 months. Despite efforts to ensure a representative sample, some limitations remain. The NHWS used stratified quota sampling at national level and diverse online recruitment methods to enhance representativeness. However, reliance on online sources may introduce bias, potentially excluding individuals with limited internet access or digital literacy. To mitigate this, recruitment was supplemented by computer-assisted web interviews, and responses were weighted to match population demographics. Nonetheless, the possibility of convenience sampling cannot be entirely eliminated, affecting the generalizability of the results. This potential bias should be considered when interpreting the findings, as older adults with limited computer capabilities may be underrepresented. Additionally, the lack of access to individual-level data prevented the use of alternative statistical methods, which limited our ability to perform formal comparisons between regions or stratify socioeconomic data by age or sex.

Conclusions

This nationwide study highlights the significant burden of migraine in Spain, with a one-year prevalence of 13.1%, particularly affecting females and younger adults. Notably, only 9.5% of patients were receiving a preventive treatment, despite 20.4% of patients being severely affected by migraine. The economic impact is substantial, with an annual cost of €6,704 per person, primarily driven by productivity loss. These findings suggest a need for effective management strategies and equitable access to preventive treatments. Improving migraine care can enhance the quality of life for individuals with migraine and reduce the overall societal burden. Prioritizing these actions is essential to mitigate the public health impact of this debilitating condition.

Abbreviations

BMI	Body Mass Index
CCI	Charlson Comorbidity Index
CM	Chronic migraine
EM	Episodic migraine
ER	Emergency Room
FT	Full-time
GH	General Health
GP	General Practitioner
HRQoL	Health-Related Quality of Life
HCRU	Healthcare Resource Utilization
INE	Instituto Nacional de Estadística
MCS	Mental Component Summary
MMD	Monthly migraine days
NHWS	National Health and Wellness Survey
WPAI	Work Productivity and Activity Impairment
OTC	Over the counter
SD	Standard Deviation
SE	Self-employed
SMD	Standardized Mean Difference
PCS	Physical Component Summary
PRO	Patient reported outcomes
PT	Part-time

Data availability
Survey data used in this study can be made available for non-commercial research and validation purposes only, upon request.

Declarations

Ethics approval and consent to participate
The NHWS received approval from the Pearl Institutional Review Board. All the NHWS respondents provided informed consent electronically prior to their participation.

Consent for publication
NA.

Competing interests
Within the past 24 months, Dr. García-Azorín has received personal compensation for consulting/advising from the World Health Organization. Nonprofit board membership in the Spanish Society of Neurology, and the

Author details

[1]Department of Neurology, Clínica Universidad de Navarra, Calle Marquesado de Santa Marta, 1, Madrid 28027, Spain
[2]Headache Unit, Department of Neurology, Hospital Universitario Río Hortega de Valladolid, Valladolid, Spain
[3]Department of Medicine, Dermatology and Toxicology, Faculty of Medicine, University of Valladolid, Valladolid, Spain
[4]Pfizer S.L.U, Madrid, Spain
[5]Department of Neurology, Clínica Universidad de Navarra, Pamplona, Spain
[6]University Hospital Fundación Jiménez Díaz Spain, Madrid, Spain

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