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Measuring general health literacy using the HLS_{19}-Q12 in specialty consultations in Spain

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Abstract

Background General health literacy (general HL) affects both individual and population health on numerous levels, with low general HL leading to increased morbidity, poor health service utilization, and increased healthcare spending. This study calculated health literacy scores of a population attending specialty consultations in the community of Aragon, Spain. It further produced a sociodemographic profile and examined the relationships between patients' scores and sociodemographic variables.

Methods A sample of 150 patients from specialty consultations completed the internationally- validated HLS_{19}-Q12 to measure adult general HL. A 4-point-Likert scale gathered information regarding 12 items of health literacy. Final scores were divided into four categorical levels: excellent, sufficient, problematic, or inadequate. Independent sample t-test, one-way ANOVA, and a generalized linear model (GLM) analysis were performed to examine key relationships with respect to sociodemographic variables and health literacy scores.

Results The survey was completed by 150 subjects aged 18 and over in specialty clinics in Aragon, Spain. 59% of respondents had inadequate or problematic general HL, while 41% had sufficient or excellent general HL. Income level had a significant effect on health literacy scores, $F = 2.129$, ($p < 0.05$), as did different work situations, $F = 3.762$, ($p < 0.001$). Patients who self-reported as having diabetes had a significantly higher health literacy score, $t = 2.356$ ($p < 0.05$) than those reporting other health conditions. According to GLM analysis, education, health status, income, and the number of appointments were the strongest predictors of the heath literacy score.

Conclusions General HL in this patient population was limited, and lower than in some comparable studies. The sociodemographic profile constructed, and associations with health literacy established, provide policy makers, healthcare administrators, and clinicians with information to consider new policies, processes and strategies to improve general HL in this specific population.

Keywords General health literacy, Health literacy scores, HLS_{19}-Q12, Patient education, Limited health literacy

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Background

Each year billions of clinical consultations take place in a variety of settings such as outpatient departments, doctors' offices, community health centers and patients' homes, via telephone and online video platforms [1, 2]. In 2023, the Spanish population made an average of 4.8 visits per person per year to a health professional. This number did not include remote consultations, consultations with advanced practices nurses, or visits to private healthcare providers [2]. Therefore, the actual number of annual visits per person is undoubtedly higher than reported. Each of these visits presents a valuable opportunity to improve the general health literacy (HL) of patients, family members, and caregivers.

As described by Sorenson, et al. for the European Health Literacy Project Consortium, health literacy entails people's knowledge, motivation and competences to access, understand, appraise, and apply health information [3]. The information may come from traditional points-of-contact such as doctors and nurses, or other sources such as the internet, digital health information, television shows or commercials, school, work, or friends and family.

HL affects the health, wellbeing and quality of life of individuals and communities [4–6]. Research has shown a link between HL and health outcomes at both patient and population levels. People with sufficient to high general HL are more likely to take advantage of preventive care, to follow the doctors' and nurses' instructions, to take medication as prescribed, and to use health information to navigate the sometimes complex health care system. Populations with higher general HL have less disparity in health outcomes, are more equitable, and more prosperous [6].

On the other hand, people with low or inadequate general HL may be less likely to use preventive services, follow doctors' instructions, take medications correctly, manage chronic conditions and seek and use medical information. This can lead to an increase in the use of emergency services, hospital readmissions and an overall increase in morbidity and mortality. People with low general HL may experience a decrease in quality of life and diminished overall feelings of wellbeing [7–9].

HL has been shown to have a relationship to sociodemographic factors, with vulnerable populations being at greater risk. The elderly, low-income, individuals with low education, and refugee or migrant populations are most at risk [6]. Low HL may continue the cycle of vulnerability because chronically ill people may experience increases in work or school absences, causing a decrease in learning and loss of income [10]. Caregivers may be required to leave the workforce to care for their ill loved ones, further threatening household earning potential. Medical costs can be expensive, which compounds the effects of illness on already financially-challenged patients and families [11–13].

Low HL may also lead to increased healthcare spending. Both private and public payors make payments for preventable use of high-cost services such as the emergency room and inpatient care [10–12, 14, 15]. In addition, government social payouts may increase in order to support those who are on disability due to prolonged illness.

Provided the robust evidence that HL is associated with health outcomes and wellbeing, it is important to study HL in varied populations. This is because certain types of populations could require additional, customized or innovative approaches to improving HL. One example of such a population are patients who regularly attend specialty consultations. The need for specialty consultations are often related to having a prolonged illness or a clinical condition that requires ongoing monitoring and care. This is a key type of patient to consider, as they are more frequently presented with health information, and will need to make decisions about their ongoing care, and how to best manage their conditions based on their understanding of the information. Thus, the objectives of this study were to measure general HL in this patient population using the HLS_{19}-Q12, and subsequently examine the relationship between the participants' sociodemographic variables and their scores.

Methods

Study design and participants

The study used a cross-sectional design, with a sample consisting of adult patients who regularly attended one of the following specialty consultations: Digestive, Cardiology, Diabetes and Ostomy. To be considered for inclusion, patients had to be 18 years of age or older, willing to complete the HLS_{19}-Q12, and have the necessity to make three visits to the specialty consultation within the 12-month study period.

The principal researcher visited each specialty consultation on predetermined days each week in order to recruit participants. The patients who had appointments on those days are the ones who were asked to participate in the study, given they met inclusion criteria. The principal researcher followed a predefined weekly schedule of visits to the four specialty clinics during a seven-month period from April – October 2023. In total, 166 participants met criteria and were invited to be in the study at the time of their appointment. All invited patients agreed to participate. They were given a written description of the study protocol, signed informed consent, and completed the HLS_{19}-Q12. Completed surveys that did not meet the required scoring criteria were removed. This resulted in 150 valid surveys to be analyzed.

Administration of the HLS_{19}-Q12 was 'face-to-face' with the patient; however, the manner in which the data was captured depended on various factors. Patients with lower literacy and vision problems preferred that the questions be read aloud by either the nurse or the primary researcher. Elderly patients had a tendency to defer to family or caregivers to mark their verbal responses on the survey. In summary, all responses were captured on paper in one of the following ways: (1) by the patient alone, (2) 'face-to-face' interview with the principal researcher, (3) patient with the help of a family member or caregiver, (4) patient with help of the principal researcher, or (5) by the specialty practice nurse. The principal researcher was available in the event that a participant requested clarification. All surveys were reviewed to verify that they were completed in full, prior to the patient leaving the appointment.

The HLS_{19}-Q12

The HLS_{19}-Q12 was chosen for the study because it had been successfully validated in 17 countries to assess and benchmark general HL in adult populations [16]. The HLS_{19}-Q12 was further an attractive measurement tool because it only consists of 12 questions, which increased the likelihood that participants would finish the survey, while also recognizing the fact that patients, caregivers, and nurses may have limited time [17]. A 4-point Likert scale allowed participants to respond to how easy or difficult they found it to complete certain health literacy-related tasks. Respondents were asked to choose, 1 "very difficult," 2 "difficult," 3 "easy," 4 "very easy," or option 5 (or 999) "I don't know." The Spanish version of the HLS_{19}-Q12 used in this study was provided by the International Coordination Centre (ICC) of M-POHL and was translated by the Hamburg Center for Health Economics, University of Hamburg, for use in the 11th wave of the European Covid Survey (ECOS) Corona Research. (Supplemental Material 1) [18].

Statistical analysis

This study used IBM SPSS 27 to analyze the survey data. Frequency analysis was used to explore general HL. We performed independent sample t-test and one-way ANOVA to examine key relationships with respect to demographics and other characteristics. We further analyzed the predictive nature of sociodemographic characteristics on patients' HL score using a generalized linear model (GLM) with a normal distribution family and an identity link function. The dependent variable (HL score) was not normally distributed as per Shapiro Wilk test. Point estimates are presented as mean ± sd.

HL scores were calculated and categorized according to instructions provided in the HLS_{19}-Q12 Instrument to Measure General Health Literacy Factsheet (2023) [19]. In accordance with Type P calculations, scores were calculated as the sum of the item's numeric values scaled to a range from 0 to 100 [16]. A response was considered invalid if the participant answered, "I don't know." If there were more than two invalid responses in a survey, that survey was disqualified from the study. Scores were then categorized based on the following scale: > 83.33 = Excellent, > 66.67 and ≤ 83.33 = Sufficient, > 50 and ≤ 66.67 = Problematic, and ≤ 50 = Inadequate. When combined, problematic and inadequate HL were considered "limited" general HL [16] p.10.

Results

The HLS_{19}-Q12 was scored for 150 participants. Table 1 summarizes the scores for each of the 12 items on the survey. Respondents found it most difficult 'to decide how you can protect yourself from illness using information from the mass media' (2.41 ± 0.83), 'to find information on how to manage mental health problems' (2.47 ± 0.85), and 'to understand advice concerning your health from family or friends' (2.83 ± .64).

The sample of patients had a median score of 67 and mean of 66 ± 13.63. As seen in Fig. 1, 59.3% of patients had HL an inadequate or problematic level of HL, while 40.7% had sufficient or excellent HL.

Relationship between patient sociodemographic profiles and general HL

ANOVA tests were used to explore whether HL scores significantly differed with respect to sociodemographics. Table 2 presents the mean HL score for different patient groups categorized by sociodemographic factors. The complete sociodemographic profile of the study population is provided in Supplemental Material 2.

Overall, the study found no significant difference in HL scores between different categories of specialty consultations ($F = 2.210$, $p = 0.100$). Patients' ages did not have a significant influence on HL score ($F = 1.436$, $p = 0.205$), however, the youngest age group (<=30 years) ($n = 16$) had significantly greater HL scores than patients aged 61–70 years and 71–80 years.

HL score was examined by sex and gender. All participants identified as cisgender. While the results indicated no significant difference in the HL scores between men and women ($t = 1.543$, $p = 0.216$), the mean HL score of women was slightly higher (68.06 ± 13.12) than for men (65.17 ± 13.84). The distribution of HL for men and women showed that 51% of the men had problematic HL while only 5.1% had excellent HL. In the case of women, 44.2% had problematic HL, while 13.5% had excellent HL (Fig. 2).

The study found a statistically significant difference in HL scores between patients with different employment situations ($F = 3.762$, $p < 0.001$). Patients who

Table 1 Descriptive results of the HLS_{19}-Q12 items

Item	On a scale from very easy to very difficult, how easy would you say it is...	Q25	Median	Q75	Min	Max	Mean	Std. Deviation
1	to find out where to get professional help when you are ill?	3.00	3.00	4.00	1	4	3.12	0.697
2	to understand information about what to do in a medical emergency?	3.00	3.00	3.00	1	4	3.09	0.601
3	to judge the advantages and disadvantages of different treatment options?	2.25	3.00	3.00	1	4	2.86	0.603
4	to act on advice from your doctor or pharmacist?	3.00	3.00	4.00	1	4	3.31	0.602
5	to find information on how to manage mental health problems?	2.00	3.00	3.00	1	4	2.47	0.854
6	to understand information about recommended health screenings or examinations?	3.00	3.00	4.00	1	4	3.17	0.587
7	to judge if information on unhealthy habits, such as smoking, low physical activity or drinking too much alcohol, are reliable?	3.00	3.00	4.00	1	4	3.18	0.695
8	to decide how you can protect yourself from illness using information from the mass media?	2.00	2.00	3.00	1	4	2.41	0.825
9	to find information on healthy lifestyles such as physical exercise, healthy food or nutrition?	3.00	3.00	4.00	1	4	3.18	0.621
10	to understand advice concerning your health from family or friends?	2.00	3.00	3.00	1	4	2.83	0.642
11	to judge how your housing conditions may affect your health and wellbeing?	3.00	3.00	3.00	1	4	3.03	0.604
12	to make decisions to improve your health and wellbeing?	3.00	3.00	3.00	1	4	2.99	0.711
Total		2.00	2.00	3.00	1	4	2.38	0.783

		Frequency	Percent
Limited general HL	Inadequate	16	10.7
	Problematic	73	48.7
	Sufficient	49	32.7
	Excellent	12	8.0
	Total	150	100.0

Fig. 1 General health literacy categories of the study population

were currently studying recorded the highest HL score (79.15±8.36), which was higher than patients working part-time, retirees with contributory pension, and patients with disability or sick leave.

Income had a statistically significant effect on HL (F=2.129, $p<0.05$). Patients within €1,501 – €2,000 net monthly income range had the highest score on average (72.30), which was significantly greater than other listed income levels.

The relationship between types of patient self-reported illness and HL score was analyzed (Table 3). Statistically significant differences in HL scores were observed with respect to diabetes (t=2.356, $p<0.05$) and digestive disease (t = -2.034, $p<0.05$). Patients who self-reported as having diabetes had significantly higher HL scores (68.40±12.61) than others (63.18±14.45). Patients who self-reported as having digestive disease had significantly lower HL scores (61.96±16.31) than others (67.36±12.59).

To determine the significance of each variable in predicting HL scores (the dependent variable), we used a generalized linear model (Table 4). The overall model was statistically significant ($\chi^2=83.484$, $p<0.01$), and the McFadden's Pseudo-R^2 value was 0.427. Education and net monthly income were highly significant predictors of HL ($p<0.01$) when other sociodemographic variables were controlled. Parameter estimates showed that the respondents with the highest educational qualification, i.e., doctorate, had significantly greater HL scores than other educational qualifications. In the case of net monthly income, respondents within the income range €1,501 – €2,000 had significantly greater HL scores than others. Work status was a statistically significant predictor of HL score ($p<0.05$). Having 5–6 outpatient appointments was significantly associated with a lower HL score compared to having more than six appointments ($p<0.05$). With respect to self-stated heath status, patients who self-reported their health as 'very good' had significantly higher HL scores than all other categories (very bad, bad, regular, and good) ($p<0.05$).

Discussion

This study used the HLS_{19}-Q12 to calculate HL score and determine general HL of a patient population attending specialty consultations in the region of Aragon, Spain. It further created a sociodemographic profile and examined relationships between those variables and HL scores. It is believed that this was the first time the HLS_{19}-Q12 has been used in Spain, and in the Spanish language.

The comprehensive project describing results of the HLS_{19}-Q12 across large general populations in 17 countries reported a median HL score of 64 with a mean of 65 [16]. This study population had a median score of 67 and mean score of 66, which is in alignment with the findings from the 17 country study. Our results showed that 59% of respondents had HL categorized as inadequate or problematic, while 41% had sufficient or excellent HL.

Table 2 Patient sociodemographic profiles and general health literacy scores: ANOVA tests

	N	Mean	Standard Deviation	95% Confidence Interval for Mean		Min	Max	F	*p* value
				Lower	Upper				
Specialty clinic									
Diabetes	71	68.58	12.86	65.54	71.63	36.11	100.00		
Cardiology	14	66.63	11.87	59.77	73.48	45.45	88.89		
Digestive	20	66.40	12.31	60.64	72.17	47.22	91.67		
Ostomy	45	62.12	15.23	57.54	66.70	2.78	91.67		
Total	150	66.17	13.62	63.97	68.37	2.78	100.00	2.12	0.100
Survey completed by									
Patient alone	104	67.83	12.55	65.39	70.27	36.11	100.00		
By the nurse	3	66.46	8.25	45.96	86.96	60.00	75.76		
Patient with help	26	63.33	18.22	55.97	70.69	2.78	91.67		
Face to face interview	16	60.33	11.31	54.30	66.36	42.42	88.89		
Total	150	66.17	13.62	63.97	68.37	2.78	100.00	1.47	0.214
Age									
<= 30	16	72.90	12.30	66.34	79.45	44.44	88.89		
31–40	10	70.55	14.91	59.88	81.21	47.22	96.67		
41–50	16	66.92	10.02	61.57	72.26	47.22	80.56		
51–60	26	67.23	18.54	59.75	74.72	2.78	100.00		
61–70	44	64.61	13.99	60.35	68.86	36.11	93.94		
71–80	24	61.61	7.54	58.42	64.79	44.44	80.56		
81+	14	65.26	12.37	58.12	72.41	50.00	91.67		
Total	150	66.17	13.62	63.97	68.37	2.78	100.00	1.44	0.205
Sex									
Woman	52	68.06	13.12	64.41	71.72	44.44	93.94		
Man	98	65.17	13.84	62.39	67.94	2.78	100		
Total	150	66.18	13.63	63.98	68.37	2.78	100.00	1.543	0.216
Marital status									
Widowed	17	67.78	12.64	61.28	74.29	51.52	93.94		
Never married	26	67.42	19.06	59.72	75.12	2.78	100.00		
Married/domestic partner	94	66.36	12.33	63.84	68.89	36.11	96.67		
Divorced	12	59.62	10.76	52.79	66.46	38.89	80.56		
Total	150	66.17	13.62	63.97	68.37	2.78	100.00	0.81	0.522
Education									
ESO (Secondary)	14	70.52	9.87	64.82	76.22	45.45	81.82		
Student	25	69.18	13.21	63.72	74.63	44.44	96.67		
High school	11	67.34	9.79	60.76	73.91	52.78	80.56		
Master's degree	9	66.91	8.35	60.49	73.34	54.55	80.56		
Vocational training	33	65.69	13.76	60.81	70.57	41.67	91.67		
Primary education	57	63.27	15.22	59.23	67.31	2.78	100.00		
Total	150	66.17	13.62	63.97	68.37	2.78	100.00	1.51	0.179
Living situation									
Parents	14	68.54	22.40	55.60	81.47	2.78	88.89		
Partner & family	38	68.38	13.99	63.78	72.98	47.22	91.67		
Children	12	65.61	17.79	54.30	76.92	38.89	93.94		
Nobody	23	65.61	10.86	60.91	70.30	54.55	100.00		
With my partner	60	64.75	10.68	61.99	67.51	36.11	96.67		
Other family members	3	62.12	17.91	17.62	106.61	41.67	75.00		
Total	150	66.17	13.62	63.97	68.37	2.78	100.00	0.47	0.798
Work									
Currently studying	7	79.14	8.36	71.41	86.88	63.89	88.89		
Retiree with a non-contributory pension	10	72.07	8.09	66.28	77.86	63.89	91.67		
Unemployed	13	70.76	13.09	62.85	78.67	52.78	93.94		

Table 2 (continued)

	N	Mean	Standard Deviation	95% Confidence Interval for Mean		Min	Max	F	*p* value
				Lower	Upper				
Work full-time	38	69.41	12.31	65.37	73.46	47.22	96.67		
Disability or sick leave	12	65.57	12.66	57.52	73.62	47.22	91.67		
Retiree with contributory pension	64	61.79	14.39	58.19	65.38	2.78	100.00		
Work part-time	6	58.67	9.00	49.22	68.11	44.44	69.70		
Total	150	66.17	13.62	63.97	68.37	2.78	100.00	3.76	0.002
I would classify my health as									
Very good	7	71.94	8.20	64.35	79.54	60.61	83.33		
Good	69	66.78	15.66	63.02	70.55	2.78	100.00		
Regular	59	65.80	11.69	62.75	68.85	36.11	91.67		
Bad	14	62.57	12.65	55.27	69.88	38.89	80.56		
Total	150	66.17	13.62	63.97	68.37	2.78	100.00	0.75	0.559
Net monthly income									
< 600 €	13	69.89	10.56	63.50	76.27	55.56	91.67		
601–800 €	8	54.25	22.40	35.52	72.98	2.78	77.78		
801–1000 €	14	61.78	14.11	53.63	69.93	44.44	100.00		
1001–1.200 €	16	71.12	11.16	65.16	77.07	55.56	93.94		
€1.201 – €1.500	19	62.20	11.52	56.64	67.75	44.44	80.56		
€1.501 – €2.000	18	72.29	14.75	64.95	79.63	36.11	96.67		
> €2.001	26	68.00	11.75	63.26	72.75	52.78	91.67		
I don't know	8	68.69	19.35	52.51	84.88	38.89	88.89		
Spouse's pension	2	68.33	2.35	47.15	89.51	66.67	70.00		
I'd rather not answer	26	63.19	10.67	58.88	67.50	41.67	84.85		
Total	150	66.17	13.62	63.97	68.37	2.78	100.00	2.13	0.031
How many appointments have you had in this outpatient clinic not including today?									
1–2	54	67.07	13.27	63.45	70.69	36.11	91.67		
3–4	30	65.72	12.08	61.21	70.24	44.44	100.00		
5–6	12	61.17	21.56	47.47	74.87	2.78	80.56		
> 6 visits	54	66.63	12.75	63.15	70.11	44.44	96.67		
Total	150	66.17	13.62	63.97	68.37	2.78	100.00	0.64	0.588

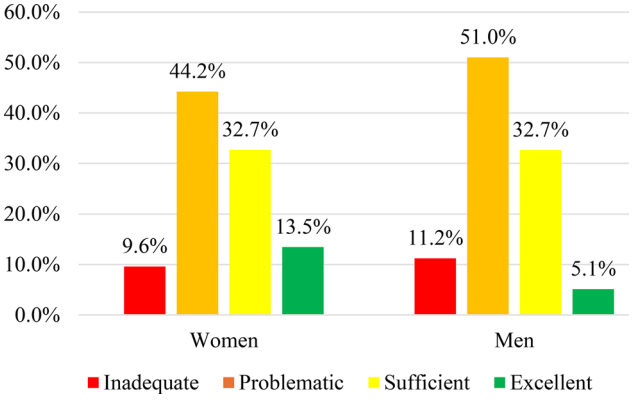

Fig. 2 Distribution of general HL categories for women and men (cisgender)

Table 3 Self-reported illness and general health literacy score

Self-Reported Illness		*N*	Mean	Standard Deviation	*p* value
Hypertension	Yes	45	65.61	9.81	0.699
	No	105	66.42	15.00	
Diabetes	Yes	86	68.40	12.61	0.020
	No	64	63.18	14.45	
Cardiovascular disease	Yes	32	68.00	14.68	0.394
	No	118	65.68	13.35	
Respiratory disease	Yes	9	60.21	9.04	0.176
	No	141	66.56	13.80	
Digestive disease	Yes	33	61.96	16.31	0.044
	No	117	67.36	12.60	
Cancer	Yes	40	65.95	12.70	0.905
	No	110	66.26	14.00	

In comparison, a study using the HLS_{19}-Q12 in Portugal reported notably higher HL with only 30% of the population categorized as inadequate or problematic, and 70% possessing sufficient or excellent HL [20].

The study found a statistically significant difference in the HL between patients with different work situations. The category of "studying" was included in the choices of work situation. Patients who were currently studying recorded the highest HL scores. This could be

Table 4 Generalized linear model – parameter estimates

Parameter	B	Std. Error	Lower Interval	Upper Interval	*p* value
(Intercept)	110.265	15.893	79.116	141.415	0.000
Specialty clinic					
Cardiology	3.486	4.188	-4.723	11.695	0.405
Digestive	-1.638	3.490	-8.478	5.203	0.639
Diabetes	3.694	2.648	-1.496	8.884	0.163
Ostomy	-				
Age					
<= 30	6.630	8.552	-10.132	23.391	0.438
31–40	-0.927	6.621	-13.904	12.050	0.889
41–50	-3.579	5.639	-14.632	7.474	0.526
51–60	1.994	5.111	-8.024	12.012	0.696
61–70	-4.362	4.099	-12.397	3.672	0.287
71–80	1.500	4.406	-7.135	10.136	0.733
81+	-				
Sex					
Woman	1.827	2.253	-2.589	6.243	0.417
Man	-				
Marital status					
Married/domestic partner	-1.821	4.752	-11.134	7.492	0.702
Widowed	1.518	5.355	-8.977	12.013	0.777
Divorced	-7.158	5.380	-17.702	3.386	0.183
Separated	12.592	13.273	-13.422	38.607	0.343
Never married	-				
Education					
Primary education	-33.229	11.672	-56.105	-10.353	0.004
ESO (Secondary)	-26.787	11.907	-50.124	-3.450	0.024
High school	-32.837	11.776	-55.917	-9.757	0.005
Vocational training	-35.773	11.604	-58.516	-13.030	0.002
Student	-33.170	11.499	-55.707	-10.632	0.004
Master's degree	-47.520	12.623	-72.260	-22.780	0.000
Doctorate	-				
Origin					
Spain	-5.946	4.914	-15.576	3.685	0.226
Other	-				
Living Situation					
Nobody	10.629	8.277	-5.595	26.852	0.199
With my partner	9.135	8.296	-7.124	25.395	0.271
Partner & family	9.714	8.550	-7.043	26.471	0.256
Children	12.068	9.658	-6.862	30.997	0.211
Parents	-2.752	8.330	-19.079	13.575	0.741
Other family members	-				
Work					
Unemployed	-0.427	5.633	-11.466	10.613	0.940
Work full-time	-3.213	4.523	-12.078	5.651	0.477
Work part-time	-10.396	7.209	-24.524	3.733	0.149
Retiree with contributory pension	-10.277	4.509	-19.115	-1.439	0.023
Retiree with a non-contributory pension	-3.240	5.820	-14.647	8.167	0.578
Currently studying	7.623	8.002	-8.060	23.306	0.341
Disability or sick leave	-				
Residence					
Rural	-3.666	2.445	-8.458	1.127	0.134
Urban	-				

Table 4 (continued)

Parameter	B	Std. Error	Lower Interval	Upper Interval	*p* value
I would classify my health as					
Very Bad	-32.823	14.047	-60.354	-5.291	0.019
Bad	-13.536	5.799	-24.902	-2.171	0.020
Regular	-11.542	4.967	-21.277	-1.806	0.020
Good	-10.194	4.963	-19.921	-0.467	0.040
Very Good	-				
Net monthly income					
< 600 €	8.510	4.390	-0.093	17.113	0.053
601–800 €	-7.880	4.697	-17.086	1.325	0.093
801–1000 €	1.850	4.125	-6.234	9.935	0.654
1001–1.200 €	9.421	3.838	1.898	16.943	0.014
€1.201 – €1.500	-0.083	3.585	-7.111	6.944	0.981
€1.501 – €2.000	13.309	3.858	5.747	20.871	0.001
> €2.001	5.926	3.831	-1.583	13.435	0.122
Spouse's pension	1.864	8.884	-15.548	19.275	0.834
Others	-				
How many appointments have you had in this outpatient clinic not including today					
1–2	1.684	2.542	-3.297	6.665	0.508
3–4	-1.185	2.832	-6.735	4.365	0.676
5–6	-9.963	4.313	-18.417	-1.509	0.021
> 6 visits	-				
(Scale)	105.72[a]	12.208	84.311	132.574	
Overall Results					
Omnibus Test (Likelihood Ratio Chi-Square)	83.484				0.001
R^2McF	0.427				

Dependent Variable: HLS_{19}_Q12p_score_1

Model: (Intercept), Specialty clinic, Age, Sex, Marital Status, Education level, Income, Origin, Living situation, Work, Residence, Health Status, Numbers of appointments in outpatient clinic

"-" represents the reference category

a. Maximum likelihood estimate (Type III)

Distribution Family = Normal; Link function = Identity

that individuals who are already in learning mode and are actively exploring new ideas and concepts are more open or receptive to processing current and new health information.

The ANOVA results showed that income had a relationship to HL score. A study in Valencia, Spain found that population subgroups such as low-income individuals presented with a higher degree of inadequate or problematic HL [8]. Our findings support this and other studies that suggest a relationship between low-income levels and limited HL [7, 9, 11].

Numerous studies cite the relationship between age and HL, stating that older individuals generally have lower scores [8, 21–23]. Our results did not support previous findings. The influence of older age could have been diminished by the presence of younger family members and caregivers at the appointment during which the survey was completed. The principal researcher noted that older participants frequently deferred to the opinions or help of the person accompanying them during the visit when completing the survey.

As shown in Table 4, individuals who reported their health status as 'very good' had significantly higher HL than those who reported their health status as any of the inferior categories. This finding is in keeping with a large European study by Sorensen et al. (2015) which found that people who reported their health status as 'very bad' or 'bad' experienced the highest proportion of limited HL.

In total, 56% of participants found it difficult or very difficult to decide how to 'protect themselves from illness using information from the mass media.' This was the survey item with the second lowest mean score. These findings are in line with research that shows public uncertainty and distrust with "fake news," social media, and artificial intelligence [11, 24–26], and highlights the

need to ensure that individuals are equipped to identify health misinformation received from mass media sources.

There was no statistically significant relationship between the number of times the patient had visited the specialty consultation and their HL score, except in the case of those who had 5–6 prior appointments. Patients who had 5–6 appointments had a significantly lower HL score than those who had>6. This is noteworthy, as it suggests that the quantity of visits does not necessarily reflect the quality of those encounters. A mere visit does not necessarily mean that patients are understanding, learning, and better equipped to manage and act upon healthcare information.

Results further showed that patients who self-reported as having diabetes had significantly higher mean HL scores than those who reported having cardiovascular disease, digestive illness, hypertension, cancer, or respiratory conditions. This is not surprising, as people with diabetes often require quarterly condition management appointments, and many attend educational sessions regarding medication management, nutrition, and lifestyle practices. It is also a condition that normally requires lifelong management [27]. This suggests that frequent interactions with healthcare providers where health information is exchanged over long periods of time may improve patient HL.

Limitations and future research

This study presents both valuable opportunities as well as weaknesses. The sample size for this study was small, and we recommend the additional use of the HLS_{19}-Q12 in Spain on a sample size similar to those in the 17 country validation studies ($n>1{,}000$) [16]. We surveyed a non-randomized sample of patients in a specialized care setting. The HLS_{19}-Q12 should further be administered to a randomized sample of patients in a more general care setting. Finally, as no other studies could be found that specifically measured the HL of patients in specialty consultations, our ability to make direct comparisons was limited.

While various studies have measured general HL, reinforced that HL is often low, and determined that a relationship exists between certain sociodemographic variables and general HL, more studies are needed to explore the solutions to these identified problems [7, 9, 11, 21, 22, 28]. One worthy direction for future research is to explore the HL awareness and skills of healthcare providers themselves. This is essential to determine if healthcare providers understand the concept of HL, the role it plays in health outcomes, and whether they possess the necessary skills to transmit health information in ways that are understandable and meaningful to patients [4, 29–31].

Since it has been shown that HL affects populations, further research is warranted on what countries can do at the systems level to increase general HL. Health policies, literacy campaigns, amending or creating service design and healthcare delivery should continue to be explored [6, 32]. In the private sector, hospitals and care networks are often more agile and able to restructure services to meet users' needs in innovative and alternative ways. Thus, studies should determine how HL is or can be addressed in these private care settings [33].

Given the rapidly increasing use of virtual care settings and telemedicine, it is necessary to continue to analyze how these venues affect general HL, as well as how a person's general HL influences their use of such care settings. When healthcare providers choose these care mediums, the actual HL of patients, in addition to opportunities to improve general HL, should be considered in the design, functionality and ease of use.

Finally, increasing numbers of people are looking to the internet and even using social media to diagnose and treat their medical concerns. Our results showed that people struggled with trusting health information from mass media. Therefore, while the study of e-health literacy has become more frequent, we recommend continued research that identifies ways to minimize disinformation and improve both general and e-health literacy when using the internet [34, 35].

Conclusion

This study contributes to an important and growing examination of HL in Europe. The results of the HLS_{19}-Q12 in this specific Spanish population provide a unique view into the HL of patients in specialty consultations, which can be used for comparison in current and future HL studies. It further provides actionable HL data for decision makers in this health sector of Aragon, Spain, and highlights a need to measure HL on a larger population scale. Results show which sociodemographic variables are associated with HL. This information allows policymakers as well as healthcare management to better tailor HL strategies taking into account those variables.

Supplementary Information

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Supplementary Material 1

Supplementary Material 2

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Author contributions
A.M.: conceptualization, methodology, formal analysis, investigation, data curation, writing – original draft, writing – review & editing. All authors reviewed the manuscript. A.G.: Conceptualization, Methodology, Writing – review & editing, Supervision. All authors reviewed the manuscript. J.M.: Conceptualization, Methodology, Writing – review & editing, Supervision. All authors reviewed the manuscript.

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Data availability
Data and materials available on request to the primary author.

Declarations

Ethics approval and consent to participate
The study was approved on 16 March 2023 by the Government of Aragon, Department of Health, CEICA following law 14/2007, 13 July for Biomedical Investigations and Applicable Ethics Principles. It was also approved on 23 February 2023 by the Aragones Health Services (SALUD) to be conducted in the Hospital Clínico Universitario "Lozano Blesa" Sector Zaragoza. Written informed consent was obtained by all study participants.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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