

## Health literacy assessment: translation and cultural adaptation to the Portuguese population

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Complete List of Authors:	<p>Espírito-Santo, Margarida; Universidade do Algarve Escola Superior de Saude; Centro de Estudos e Desenvolvimento em Saúde (CESUALg), University of Algarve, Faro, Portugal</p> <p>Nascimento, Tânia; Universidade do Algarve Escola Superior de Saude; Centro de Estudos e Desenvolvimento em Saúde (CESUALg), University of Algarve, Faro, Portugal</p> <p>Pinto, Ezequiel; Universidade do Algarve Escola Superior de Saude; Centro de Estudos e Desenvolvimento em Saúde (CESUALg), University of Algarve, Faro, Portugal</p> <p>De Sousa-Coelho, Ana Luísa; Universidade do Algarve Escola Superior de Saude; Universidade do Algarve Centro de Investigacao em Biomedicina; Algarve Biomedical Center - University of Algarve; Centro de Estudos e Desenvolvimento em Saúde (CESUALg), University of Algarve, Faro, Portugal</p> <p>Newman, Jeff; Cranfield Health</p>
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Abstract:	<p>Rationale, aims, and objectives: Health literacy (HL) has been widely referenced as a determinant of health outcomes, and making the assessment of low health literacy a fundamental step to plan educational interventions. This study aimed to translate and adapt the SAHL S&amp;E questionnaire into European Portuguese.</p> <p>Methods: The SAHL S&amp;E questionnaire was translated using the recommendations of the International Society for Pharmacoeconomics and Outcomes Research. Subjects (n=153) aged 18 years and older, native Portuguese speakers, were included in this study, enrolled among users of community pharmacies in the Algarve region (Portugal).</p> <p>Results: Over a third of subjects (37.9%) achieved a score <math>\leq 14</math>, which is indicative of low health literacy. The translation of the questionnaire used showed a good internal consistency (Cronbach's alpha: 0.812), and a statistically significant (<math>F=5.05</math> <math>p&lt;0.001</math>) interrater reliability.</p> <p>Conclusion: This tool, intended to be used in the European Portuguese population, can be used for screening and identify low health literacy subjects.</p>

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3 *Health literacy: translation and cultural adaptation*

4 **Authors:**

5 Margarida Espírito-Santo<sup>1,2,3</sup>, PhD;

6 Tânia Nascimento<sup>2,3</sup>, PhD;

7 Ezequiel Pinto<sup>2,3</sup>, PhD;

8 Ana Luísa De Sousa-Coelho<sup>2,3,4,5</sup>, PhD;

9 Jeff Newman<sup>1</sup>, PhD.

10 <sup>1</sup> Cranfield University, Cranfield, United Kingdom

11 <sup>2</sup> School of Health – University of Algarve, Faro, Portugal

12 <sup>3</sup> Centro de Estudos e Desenvolvimento em Saúde (CESUAlg), University of Algarve,  
13 Faro, Portugal

14 <sup>4</sup> Centre for Biomedical Research (CBMR), University of Algarve, Faro, Portugal

15 <sup>5</sup> Algarve Biomedical Center (ABC), University of Algarve, Faro, Portugal

16 Correspondence: Margarida Espírito-Santo; ESSUAlg, Campus de Gambelas, Gabinete  
17 F3, 8000-510 Faro, Portugal; mfesantoalg.pt; +351 919881706

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33 and identify low health literacy subjects.

34 **Keywords:** Literacy, health literacy, assessment

## 35 Introduction

36 A lack of health literacy (HL) has been associated to difficulties in interpreting  
37 information about health in general, including medicines' use.<sup>1,2</sup> In 2004, the term "health  
38 literacy" was defined by the Institute of Medicine Committee on Health Literacy as "*the*  
39 *degree to which individuals have the capacity to obtain, process, and understand basic*  
40 *health information and services needed to make appropriate health decisions*".<sup>3</sup> Among  
41 health interventions, the use of medicines became more frequent, patients therefore need  
42 to have the adequate skills for their responsible use.<sup>4</sup> In 2011, King *et al.* proposed a  
43 definition for "pharmacotherapy literacy", which was defined as "*an individual's*  
44 *capacity to obtain, evaluate, calculate, and comprehend basic information about*  
45 *pharmacotherapy and pharmacy related services necessary to make appropriate*  
46 *medication-related decisions, regardless of the mode of content delivery (e.g. written,*  
47 *oral, visual images and symbols)*", drawing a special attention to these specific skills  
48 required for proper medicines' use.<sup>5</sup>

49 Medication adherence can also be negatively affected in patients presenting a low HL,  
50 with non-adherence more than 1.33 times higher among these subjects, as found in a study  
51 carried out in Switzerland, taking into account the analysis of health insurance data and a  
52 survey.<sup>6</sup> This may contribute to higher medication costs ( $p < 0.05$ ), as evidenced in a group  
53 of Swiss type 2 diabetes patients for individuals presenting low health literacy.<sup>7</sup>

54 Likewise, a low HL has also been pointed out as a barrier to both accessing health care,  
55 following instructions from a Physician, and understanding medical information.<sup>8</sup>

56 Negative health outcomes were also correlated to low HL, leading to outcomes such as  
57 more hospitalizations and increased use of emergency care, poorer use of health care  
58 services including mammography screening and influenza vaccine, poorer ability to have  
59 an appropriate use of medication, together with worse overall health status and higher  
60 mortality incidence among elderly subjects.<sup>9</sup>

61 In the United States of America it has been estimated that 90 million adults have trouble  
62 understanding and acting on health care information.<sup>3</sup> An exploratory study performed in  
63 Portugal (2009) suggested that most users of the Imaging Service of Lisbon Central  
64 Hospital did not have the desirable literacy but only minimally adequate, identifying a  
65 need to rely on other people to help them read hospital flyers. Increased difficulties in  
66 reading patient information leaflet were found for those individuals who have only  
67 completed four years of education.<sup>2</sup>

68 The index of health literacy in Portugal shows a lower rate than other countries in Europe,  
69 and this is either verified at disease prevention, promotion and health care level.<sup>10</sup>  
70 Although in the last decade illiteracy was reduced in Portugal, according to the 2011  
71 census, there are still about 500.000 residents (~5%), aged 10 years or older, who cannot  
72 read or write, i.e., unable to read and comprise written words or writing a complete  
73 sentence.<sup>11</sup> In Southern Portugal (Algarve region) about 11% of the population is  
74 illiterate, and about 25% has only 4 years of education.<sup>11</sup>  
75 Only a few number of tools are currently available to assess health literacy, with several  
76 different methodologies used. Moreover, most of them have been validated to be  
77 applicable only in English spoken subjects. The following tools are the ones that are  
78 available to be used: REALM (Rapid Estimate of Adult Literacy in Medicine)<sup>12</sup>, WRAT  
79 (Wide Range Achievement Test)<sup>13</sup>, TOFHLA (Test of Functional Health Literacy in  
80 Adults)<sup>14</sup>, NVS (Newest Vital Sign)<sup>15</sup>, SAHLSA-50 (Short Assessment of Health  
81 Literacy for Spanish Speaking Adults)<sup>16</sup>. The REALM methodology tests word  
82 recognition and pronunciation of 66-item, evaluating the vocabulary domain, but it is not  
83 a reading comprehension instrument; it is expected to take about 3-4 minutes to apply this  
84 instrument.<sup>12</sup> The REALM-R is a shorter version of REALM, including only 7-item to be  
85 applied in research programs.<sup>17</sup> The TOHFLA was identified as a reliable indicator  
86 of patient ability to read health related materials, including 50-item reading  
87 comprehension and 17-item numerical (filling blank spaces of a text using words from a  
88 list), taking about 22 minutes to be applied.<sup>14</sup> A shorter version (S-TOFHLA) was also  
89 developed, including 4 numeracy items and 2 prose passages (12 minutes to be applied).<sup>18</sup>  
90 The NVS (Newest Vital Sign) is an instrument to assess health literacy base on six (6)  
91 questions regarding a food nutrition label, with scores from 0 to 6, which has been  
92 validated to be used in the United Kingdom.<sup>19</sup>  
93 In 2009, Salgado *et al.* evaluated the utility of the NVS instrument as a proxy for  
94 medication adherence in community-dwelling Portuguese older adults, enrolling users of  
95 12 daycare centers in Amadora (Portugal). However, since the results showed a high  
96 prevalence of wrong answers from participants, which were about 90% for all questions,  
97 this tool proved to be not appropriate to screening for low health literacy among older  
98 subjects.<sup>20</sup> Later, Paiva *et. Al* (2017), validated the NVS tool to the Portuguese  
99 population, tough with a prevalence of 72.9% for limited health literacy.<sup>21</sup>  
100 The SAHLSA-50 instrument was developed from REALM, to be used in Spanish-  
101 speaking population, allowing an evaluation of subject's comprehension of medical terms

102 commonly used in clinical and public health settings. This tool includes 50 items, for  
103 which one a keyword (correct choice) and a distractor (plausible but incorrect choice).  
104 The subject is asked to identify the correct word for the item, or the interviewer may  
105 identify the answer as “Don’t know”.<sup>16</sup> The results obtained during the SAHLSA-50  
106 validation suggested that it is a useful instrument to identify Spanish speakers with low  
107 health literacy. Afterward, the SAHL-S&E test was constructed based on the methods  
108 used for SAHLSA-50, but containing 18 items selected from REALM. This methodology  
109 showed good reliability and its results indicated that it may be useful to recognize  
110 individuals with low levels of health literacy ( $\alpha > 0.90$ ), and to be used in subjects  
111 speaking both Spanish and English.<sup>22</sup> SAHLSA-50 has been already adapted and  
112 validated to Brazilian Portuguese by Apolinario *et al.* (2012)<sup>21</sup>, including 18 items  
113 selected from the 50 initial from SAHLSA-50.<sup>23</sup> Nevertheless, due to the syntactic  
114 differences between Brazilian Portuguese and European Portuguese and also due to the  
115 cultural differences that can have an impact in the questionnaire’s understanding, the  
116 Brazilian Portuguese version of SAHLSA-50<sup>23</sup> is bound to biased results if used in  
117 Portugal. Considering that inadequate HL may lead to negative outcomes on patient’s  
118 health, screening subjects with low HL could allow the identification of specific  
119 individual needs. This information could be an asset when establishing intervention  
120 programs to improve patient’s health outcomes. It is, therefore, important to choose tools  
121 that allow us to signal subjects with low HL. Thus, there is a need for an easy-to-use tool,  
122 directed to Portuguese subjects, and that could allow the identification of low HL.  
123 The aim of this study was the translation and cultural adaptation of the “Short Assessment  
124 of Health Literacy - Spanish and English (SAHL-S&E)”<sup>22</sup> into European Portuguese.

## 125 **Methods**

### 126 **Translation:**

127 This study was developed following the guidelines for translation and cultural adaptation  
128 recommended by Wild et al (2005)<sup>24</sup>, including the steps summarized in Figure 1.

129 The original version of SAHL S&E<sup>22</sup> in Spanish was translated into Portuguese language  
130 by two independent researchers, leading to T1 and T2, which were then combined in the  
131 Version 1 (V1). This version was back translated to Spanish language by two independent  
132 translators. A group of two pharmacists, one physician and five subjects (age  $\geq$  18 years)  
133 participated in the cognitive debriefing. After, the Version 2 (V2) was achieved, and was  
134 applied in a pilot sample of 20 subjects, aiming the identification of difficulties in the  
135 practical application of the questionnaire. Subjects included were  $\geq$  18 years, and fluent  
136 in Portuguese language. No difficulties were registered during this application of the  
137 questionnaire and, therefore, this version was used as the final version (FV) of the cultural  
138 adaptation of this instrument - SAHL-PT (Short Assessment of Health Literacy –  
139 Portuguese language).

140 The FV included 18 medical terms in Portuguese language, and its application was  
141 conducted using 10.5 x 14.8 cm (A6) cards, and specific instructions followed by the  
142 interviewer. The maximum score that could be achieved was 18, corresponding to 1 point  
143 for each correct answer for the items included in the questionnaire. Subjects who obtained  
144 a score equal or under 14 had a greater chance of having “low health literacy”. Besides  
145 applying the SAHL-PT, a brief set of questions regarding socio-demographic, clinical,  
146 and pharmacological therapy variables were also included in the data collection stage.

147

148 *Please insert Figure 1 here*

149

### 150 **Study Design:**

151 This study was carried out in customers of eight pharmacies in the Algarve region  
152 (Portugal). All subjects were aged 18 years and older, and fluent in Portuguese. Subjects  
153 with cognitive impairment and presenting serious vision or hearing problems were  
154 excluded. The recruitment period lasted for two (2) weeks. All subjects who met inclusion  
155 criteria and accepted voluntarily to participate in this study were enrolled. Data collection  
156 was conducted through structured interviews, by three (3) trained interviewers, based in  
157 a procedure manual that was created prior to the data collection.

158 **Ethical approval**

159 Ethical approval was obtained from the Cranfield University Ethics (Reference:  
160 CURES/840/2016). Subjects' data was collected anonymously, without identifying the  
161 participants.

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**163 Statistical analysis**

164 Data were analysed with IBM-SPSS software version 24.0 (SPSS Inc., Chicago, IL, USA)  
165 and AMOS 24.0 (SPSS Inc., Chicago, IL, USA). All quantitative data were analysed  
166 using descriptive statistics presented as mean, median, standard deviation, minimum and  
167 maximum. The qualitative variables were described by counts (n) and percentages (%).  
168 Reliability was examined using Cronbach's  $\alpha$  test. The reliability for the measurements  
169 was analysed using the intraclass correlation coefficient (ICC). A confirmatory factor  
170 analysis (CFA) using the maximum likelihood estimator (ML) method was used to  
171 confirm unidimensionality of the scale.

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172 **Results:**

173 A total of 153 subjects (Table 1) was enrolled in this study, including 58.2% female  
174 subjects, with a mean age of  $66.7 \pm 12.3$  years. Their ages ranged between 35 and 93 years  
175 and presented a median of 69 years. Almost one third (28.1%) of the subjects presented  
176 4 years of education or less, and only 7.8% had 12 or more years of education. Most  
177 subjects were 65 years or older (56.8%), were retired (58.8%), and 34.0% had a  
178 professional activity. Subjects were using a mean of  $3.53 \pm 2.75$  medicines per day, mostly  
179 on a daily basis (91.5%). For those taking daily medicines, around one third (28.8%) were  
180 using 5 or more medicines, and  $4.61 \pm 3.1$  units per day (between 1 and 15 units per day).

181

182 *Please insert Table 1 here*

183

184 The mean score obtained for health literacy, using the SAHL-PT, was  $14.48 \pm 3.03$ , where  
185 the lowest score was 4. The median of the 25<sup>th</sup> and 75<sup>th</sup> percentiles was respectively, 12  
186 and 17 points. A low HL score was achieved by 37.9% of subjects (score  $\leq 14$ ) (Table 2).

187

188 *Please insert Table 2 here*

189

190 The items which were responsible for the higher number of incorrect answers were item  
191 13 “directed” (32.7%), item 18 “syphilis” (32.0%), item 7 “dose” (21.6%) and item 11  
192 “nutrition” (20.3%) (Table 3). Subjects indicated “Don’t know” more often in the  
193 following items: item 18 “syphilis” (24.2%), item 5 “kidney” (18.3%) and item 9  
194 “constipation” (17.0%). Only 10.5% (n=16) of the subjects indicated all the correct  
195 answers for the 18 items.

196

197 *Please insert Table 3 here*

198

199 The HL score was higher for younger subjects ( $p < 0.001$ ), for those using a lower number  
200 of daily medicines ( $p = 0.009$ ) or taking a decreased number of daily medicines’ units  
201 ( $p = 0.013$ ) and using medicines more frequently ( $p = 0.012$ ) (Table 3). A lower HL score  
202 was achieved by subjects with less qualifications ( $p < 0.001$ ) (Table 4). Moreover, older  
203 subjects ( $\geq 65$  years) presented a lower score of HL ( $p < 0.001$ ), having a mean score of  
204  $13.4 \pm 3.2$  (median=14.0), while younger subjects ( $< 65$  years) obtained a mean score of  
205  $15.95 \pm 1.96$  (median=16.5). Polymedicated subjects, using 5 (five) or more medicines,

206 showed a lower score of health literacy ( $p=0.027$ ), presenting an average score of  
207  $13.98\pm 3.0$  (median=14.0), and subjects using less than 5 medicines presented an average  
208 score of  $14.94\pm 3.0$  (median=16.0).

209

210 *Please insert Table 4 here*

211

212 The internal consistency of the data was analysed using Cronbach's alpha ( $\alpha$ ), resulting  
213 in a value of 0.812, when considering the 18 items of the questionnaire (Table 5).  
214 Concerning the stability of the measurements, the intraclass correlation coefficient (ICC)  
215 showed a value of 0.802 (95%CI 0.75-0.85) which suggests an excellent, statistically  
216 significant ( $F=5.05$   $p<0.001$ ), interrater reliability.

217

218 *Please insert Table 5 here*

219

220 We also analysed the psychometric properties of the scale by performing a CFA in order  
221 to confirm unidimensionality, which occurs in the original version of the SAHL S&E. In  
222 this analysis, our results were similar to the ones obtained in the original SAHL S&E  
223 validation and showed a clear difference in the eigenvalue for the first factor, pointing  
224 to unidimensionality in the scale and to a common factor associated with all the items.  
225 The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.807, which  
226 indicates that our data can be submitted to CFA.<sup>25</sup> The qui-square test, used as a  
227 significance test of the minimized discrepancy function during model fitting, was  
228 statistically significant ( $p<0.001$ ) and the Root-Mean Square Error of Approximation  
229 (RMSEA) was 0.08. According to the criteria proposed by Bentler and Byrne, these  
230 results show that the unidimensional model has a good fit for the observed data.<sup>26</sup>

## 231 **Discussion**

232 The main goal of this study was the translation and adaptation of the SAHL S&E into  
233 Portuguese, aiming to achieve a tool that could be useful to identify patients with low  
234 health literacy, since it is a relevant factor that can affect subject's health outcomes.<sup>27-30</sup>

235 Our questionnaire showed good internal consistency (0.812), indicating that reliability of  
236 the test scores was similar among the sample.<sup>31-34</sup> Moreover, a positive correlation was  
237 achieved for the score test and subject's qualifications, mirroring what was also found in  
238 the validation of the Short Assessment of Health Literacy - Spanish and English (SAHL-  
239 S&E), for Spanish-speaking and English-speaking populations.<sup>22</sup> These results show that  
240 our version of the SAHL is suitable for use in Portuguese speaking population.

241 We found a low HL level in 37.9% of the subjects. This was consistent with the expected  
242 outcome, considering the qualifications of the subjects included in this study, where  
243 28.1% of the subjects presented 4 years or less of education. However, it is important to  
244 emphasize that in Portugal, 12 years was defined as the minimum education since 2009<sup>34</sup>,  
245 which leads to older participants having less years of formal education. Education has  
246 been widely identified as a predictive factor for health literacy. Older subjects also  
247 presented increased prevalence of low health literacy in Portugal, on a similar way as  
248 other European countries.<sup>10</sup> According to the Health Literacy Portuguese report (2015),  
249 20.4% of the Portuguese population has 6 or less years of education and an inappropriate  
250 level of health literacy.<sup>10</sup>

251 Low health literacy is often correlated to negative health outcomes, such as identified by  
252 Souza *et al.* (2014) in a Brazilian older population with type 2 diabetes, where an  
253 association between low HL and patients showing an increased HbA1c values was  
254 found.<sup>35</sup>

255 The SAHL-PT test uses the literary ability and readability for terms associated with  
256 health, and can be considered a good instrument for screening low health literacy subjects.

257 We propose that this test is an useful resource to identify low health literacy, which may  
258 be important information to plan interventional programs, such as the ones involving a  
259 pharmacist intervention. An improvement in patients' medication adherence can be  
260 reached, among those presenting low health literacy, due to pharmacist intervention.<sup>36,37</sup>

261 When planning interventional programs aiming to improve patient's outcomes, it is  
262 important to provide a tool which allows to identify patients at risk of negative outcomes,  
263 such as those presenting a low score for HL. Rather than classifying subject's degree of  
264 HL, it will be useful only to be able to pinpoint those who may have low score of HL.

265 For the Portuguese population, up to the date this study was carried out, there were no  
266 other validated instruments available to assess HL with the same purpose of this test.  
267 Therefore, it was not possible to determine correlations with other measuring instruments.  
268 Only during the final preparation of the current manuscript, another article was published,  
269 referring a validation of a short, self-administered health literacy assessment tool for  
270 European Portuguese-speaking adults, but adapted from the 18-item Short Assessment of  
271 Health Literacy for Brazilian Portuguese-speaking adults (SAHLPA-18).<sup>38</sup>□  
272 Unfortunately, it was not possible to compare our results with those obtained with this  
273 tool in a timely manner. Therefore, the tool we constructed (SAHL-PT) is easy to apply,  
274 requires a short amount of time to be completed, and is appropriate to screen Portuguese  
275 subjects in regard to low health literacy.

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281 **Conflict of interest**

282 All authors declare to have no conflicts of interest associated with this publication, and  
283 there has been no financial support for this work that could have influenced the outcomes.

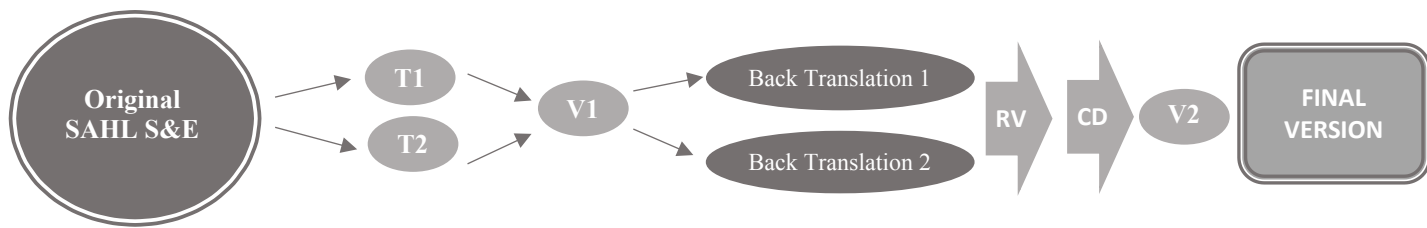
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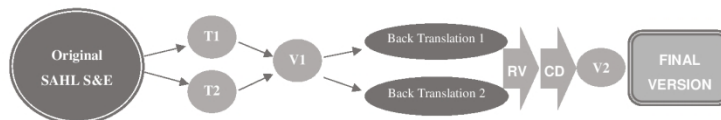


**Fig. 1** Process of translation and cultural adaptation of the SAHL S&E into Portuguese language.

*BT: Back translation; CD: Cognitive Debriefing; RV: Review; T1: Translation 1; T2: Translation 2; V1: Version 1;*

*V2: Version 2.*

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**Fig. 1** Process of translation and cultural adaptation of the SAHL S&E into Portuguese language.

BT: Back translation; CD: Cognitive Debriefing; RV: Review; T1: Translation 1; T2: Translation 2; V1: Version 1; V2: Version 2.

Process of translation and cultural adaptation of the SAHL S&E into Portuguese language.

210x297mm (200 x 200 DPI)

**Table 1:** Subjects' sociodemographic characterization.

Characteristic	Description	N	%
<b>Gender</b>	Male	64	41.8
	Female	89	58.2
<b>Age</b>	[18 – 49y]	19	12.4
	[50 – 64y]	47	30.7
	[65 – 79y]	40	26.1
	[> 80 y]	47	30.7
<b>Qualifications</b>	Can read or write without formal education	12	7.8
	4 years	31	20.3
	6 years	7	4.6
	9 years	58	37.9
	Professional / Technological course	7	4.6
	12 years	26	17.0
	Higher education	12	7.8
<b>Professional situation</b>	Retired	90	58.8
	Retired with activity	7	4.6
	Unemployed	9	5.9
	Employed (self)	19	12.4
	Employed (by others)	26	17.0
	Without professional activity	2	1.3

*Legend: y – years.*

**Table 2:** Health literacy (HL) score.

Score	% (n)	Score	% (n)	Score	% (n)	Score	% (n)
<b>4.0</b>	0.7 (1)	<b>8.0</b>	2.6 (4)	<b>12.0</b>	6.5 (10)	<b>15.0</b>	15.7 (24)
<b>5.0</b>	0.7 (1)	<b>9.0</b>	2.0 (3)	<b>13.0</b>	3.3 (5)	<b>16.0</b>	16.3 (25)
<b>6.0</b>	0.7 (1)	<b>10.0</b>	4.6 (7)	<b>14.0</b>	11.1 (17)	<b>17.0</b>	19.6 (30)
<b>7.0</b>	1.3 (2)	<b>11.0</b>	4.6 (7)			<b>18.0</b>	10.5 (16)
<b>Total (low HL)</b>					<b>37.9 (57)</b>	<b>Total</b>	<b>62.1 (96)</b>

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**Table 3:** Description of subject's answers to SAHL-PT.

	<b>Correct answer</b>	<b>Incorrect answer</b>	<b>Don't know</b>
<b>Item</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>
Occupation	90.2 (138)	9.8 (15)	0.0 (0)
Seizure	77.1 (118)	14.4 (22)	8.5 (13)
Infection	87.6 (134)	8.5 (13)	3.9 (6)
Medication	98.0 (150)	1.3 (2)	0.7 (1)
Alcoholism	66.7 (102)	15.0 (23)	18.3 (28)
Kidney	94.1 (144)	2.6 (4)	3.3 (5)
Dose	72.5 (111)	21.6 (33)	5.9 (9)
Miscarriage	89.5 (137)	8.5 (13)	2.0 (3)
Constipation	73.2 (112)	9.8 (15)	17.0 (26)
Pregnancy	94.1 (144)	5.9 (9)	0.0 (0)
Nerves	77.8 (119)	20.3 (31)	2.0 (3)
Nutrition	79.7 (122)	15.7 (24)	4.6 (7)
Directed	57.5 (88)	32.7 (50)	9.8 (15)
Hormones	76.5 (117)	16.3 (25)	7.2 (11)
Abnormal	88.9 (136)	7.8 (12)	3.3 (5)
Diagnosis	90.2 (138)	9.2 (14)	0.7 (1)
Haemorrhoids	92.2 (141)	3.3 (5)	4.6 (7)
Syphilis	43.8 (67)	32.0 (49)	24.2 (37)

**Table 4:** SAHL-PT score and subject's characteristics correlations.

Subject's characteristics	R	p value
Age	-0.504	<0.001
Marital status	-0.188	0.02
Qualifications	0.262	0.001
Number of medicines daily units / day	-0.211	0.013
Number of daily medicines	-0.220	0.009
Frequency of medicine's use (rarely, often, daily)	0.203	0.012

*Legend: Daily - taking at least one medicine per day, during last 3 months; Often - taking medicines 3 or more days per month in occasional situations; Rarely - using medicines maximum 1-3 days, no monthly use.*

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**Table 5:** Reliability analysis based on Cronbach's alpha.

SAHL-PT Items	Scale Mean if item deleted	Scale Variance if item deleted	Cronbach's Alpha if item deleted
1	21.5621	20.853	.807
2	21.3464	17.609	.779
3	21.4967	19.107	.791
4	21.6340	20.405	.799
5	21.1438	17.716	.794
6	21.5686	19.681	.796
7	21.3268	18.050	.783
8	21.5359	19.737	.796
9	21.2222	17.727	.793
10	21.6013	20.373	.800
11	21.4183	19.127	.792
12	21.4118	18.744	.790
13	21.1373	18.264	.792
14	21.3529	17.519	.775
15	21.5163	18.765	.785
16	21.5556	19.209	.787
17	21.5359	19.829	.800
18	20.8562	18.203	.803
Cronbach's alfa for all items: 0.812			