Measuring Health Literacy in Southern Italy: A cross-sectional study

Sara Schiavone, Francesco Attena*

Department of Experimental Medicine, University of Campania “Luigi Vanvitelli”, Naples, Italy
* francesco.attena@unicampania.it

Abstract

Introduction
Health Literacy (HL) is an important determinant of individual health. Limited HL is an increasing problem affecting the general population. This study aims to assess the level of HL in patients attending outpatient medical facilities in general medicine located in Naples and Caserta and investigate the association of HL with health behaviours and health status.

Materials and methods
The study involved patients attending outpatient medical facilities in general medicine. The questionnaire had four sections—the sociodemographic information, the 16-items version of the European Health Literacy Survey questionnaire, the general self-efficacy scale (GSE) and the health status scale (EQ-VAS). Univariate and multivariate analyses were performed to investigate the sociodemographic determinants of HL. The Pearson correlation coefficients were determined to compare HL with health behaviours (GSE) and health status (EQ-VAS).

Results
The study showed that 61.6% of 503 patients had a low level of HL. After the multivariate analysis, HL was found to be higher among patients with higher education level and general self-efficacy score ≥30. There were no differences in HL between the age groups and people with or without chronic diseases. HL was stronger correlated with GSE than with EQ-VAS (0.53 vs 0.27).

Conclusion
This is the first study on HL for Southern Italy. It showed a low level of HL. As the sample was not representative of the reference population, we cannot derive a corresponding conclusion for the general population of Southern Italy. Therefore, more data in Italy are needed to plan actions for improving HL.
Introduction

Health Literacy (HL) is an important determinant of individual health [1–3]. HL refers to ‘the knowledge, motivation and competence to access, understand, appraise and apply health information in order to make judgement and take decisions in everyday life concerning health care, disease prevention and health promotion, to maintain or improve quality of life throughout the course of life’ [1, 2, 4]. HL can be briefly defined as the capability to make informed health decisions in daily life [5]. A high level of HL means being able to make reasonable judgement and explain the health problem and personal concerns that make a medical consultation necessary [6]. In addition, HL provides the capability to change one’s beliefs if necessary [6]. Conversely, limited HL is an increasing problem affecting the general population [7–15]. A low level of HL leads to the misuse of available health resources and inappropriate access to care, which is defined as the degree of adaptation between patient skills and health-care system requirements [12, 16, 17].

HL covers three different areas—health care, disease prevention and health promotion. According to the European Health Literacy Survey, almost every second, EU citizen has limited HL and therefore perceived difficulties in accessing, understanding and using health information [4, 8, 18, 19].

HL has gained increasing attention in public health research, as well as health services reform processes, as an essential determinant of individual health and health service use [15, 19–24]. The evaluation of HL in Italy is important to ensure the sustainability of the healthcare service system [12, 21, 25].

General practitioners, also called family doctors, are the first contact for health concerns in the Italian health system. They have different responsibilities for their patients: solving health problems, controlling adherence to treatment, ensuring continuity of care, identifying the correct path within the complexity of the health service and carrying out health education for promoting health and well-being. Therefore, the general practitioner should be the first contact person in the health literacy process.

In Italy, as in other European countries, the population of old people and therefore the prevalence of chronic diseases is rapidly increasing [26]. This indicates the need for a more complex health service, as several studies have suggested that HL decreases with age [27–29]. The decline in HL in older age groups is associated with decreasing cognitive function and potential health impairments [8, 17]. Globally, HL has been an important topic in public health research over the past decades [30]. However, in Italy, data on HL among the general population are still scarce [11, 12, 31].

This study aims to assess the level of HL in patients attending outpatient medical facilities in general medicine located in Naples and Caserta using the 16-items version of the European Health Literacy Survey questionnaire (HLS-EU-Q16) and investigate the association of HL with health behaviours and health status. The HLS-EU-Q16 questionnaire was recently developed and validated in the Italian language with a Cronbach’s alpha of 0.799 [31]. This short version made measuring HL in the general population easier [11, 31].

Materials and methods

Study design and setting

This study used a cross-sectional design in which data collection was carried out between April 2019 and May 2019. Fifteen general practitioners working in outpatient medical facilities in general medicine located in Naples and Caserta were randomly selected from the register of the Local Health Authority of Naples and Caserta. Five of the selected general practitioners did not consent to participate. The participating patients were citizens enrolled in these outpatient...
medical facilities. The study was, therefore, conducted in the waiting room of the remaining 10 medical facilities (5 in Naples and 5 in Caserta). The outpatient medical facilities in general medicine normally open five times a week, between mornings and afternoons, at the discretion of the general practitioner based on the total number of patients, up to a maximum of 1,500 patients for each general practitioner. According to the regulations of the National Healthcare Service and the Constitution of the Italian Republic, every Italian and foreign resident over the age of 18 years has to be registered in an outpatient medical facility in general medicine [5]. Ethical approval was obtained from the Ethics Committee of the University of Campania ‘Luigi Vanvitelli’ (Prot. N 302/2019).

**Sample size**

The sample size was estimated to be at least 400 subjects, assuming a 50% of expected prevalence of the main outcome (high/low level of HL), with precision of 5% and level of significance of 95%.

**Study participants and data collection**

The study population comprised patients attending outpatient medical facilities in general medicine. The inclusion criteria were patients who could speak Italian and were at least 18 years old. The patients waiting for a medical consultation were advised of the research project by the secretary of the general practitioner. They were informed that participation was voluntary and that they could withdraw from the study at any time with no subsequent consequences. The medical researcher was available to the participants to answer questions relating to the protocol. The questionnaire was self-administered and the participants were asked to sign the informed consent form. The exclusion criteria were patients with cognitive impairment, severe psychiatric diseases and end-stage diseases. All the data were collected anonymously.

**Questionnaire**

The questionnaire had sections such as sociodemographic information (age, sex, education level and chronic diseases), the HLS-EU-Q16, the general self-efficacy scale (GSE), the Euro-Qol visual analogue scale (EQ-VAS) [31–33] and an Italian version of the PEN-13 (not evaluated because still under the Italian validation) [34]. The total number of questions was 44. The average duration to fill the questionnaire was 20 minutes.

The HLS-EU-Q16 contained 16 items, which was used to measure HL in the study populations. Each of the respondents was asked to give their opinion on a 4-point Likert scale—‘very difficult’, ‘difficult’, ‘easy’ and ‘very easy’. The questionnaire covered the conceptual model proposed by Sorensen et al. [4] by investigating the ability of individuals to access or obtain, understand, process and use health information.

Beside HLS-EU-Q16, two other questionnaires have been used to investigate the association of HL with health behaviours and health status.

The GSE is a standardised measurement tool consisting of 10 items that capture the overall self-efficacy in a one-dimensional way. Each of the respondents was asked to give their opinion on a 4-point Likert scale—‘Not at all true’, ‘Hardly true’, ‘Moderately true’, ‘Exactly true’ [32].

EQ-VAS is a visual analogue scale for assessing a subject’s view on global health status from 0 to 100 [33].

**Statistical analysis**

Descriptive analysis was performed to evaluate the level of HL in the study population. To calculate the score of the HLS-EU-Q16, the answers were dichotomised into two categories with
two scores—easy (easy or very easy) and difficult (difficult or very difficult). The HL score is a
sum score and three levels have been defined—inadequate HL (0–8), problematic HL (9–12)
and adequate HL (13–16). The categories were dichotomised into adequate and not adequate
(inadequate and problematic). This approach has been utilised previously [7, 11, 20, 31]. The
category with adequate HL is assumed to have high level of HL, the category with not adequate
is assumed to have low level of HL.

Age was recorded in years and categorised into three groups (18–45 years, 46–65 years and
≥65 years). Education level was assessed using the International Standard Classification of
Education (ISCED 2011), which allows for cross-national comparisons of education levels and
is dichotomised into two groups (ISCED 0–2 and ISCED 3–8) [35].

To investigate the sociodemographic determinants of HL, univariate analysis was per-
formed and the results were expressed in terms of odds ratio, confidence interval and \( p \)-value.
\( P \)-value ≤ 0.05 was considered statistically significant. Variables that showed a \( p \)-value ≤ 0.25
in the univariate analysis were included in the multivariate logistic regression.

The Pearson correlation coefficients for continuous variables were determined to compare
HL level with health behaviours (from GSE) and health status (from EQ-VAS). Correlations
with a coefficient from 0.1 to below 0.3 were considered as low, from 0.3 to below 0.5 as
medium and from 0.5 and above as strong [36]. We assumed a high positive correlation
between the HL level and the GSE score. This assumption is based on the fact that believing in
the achievement of desired health outcomes leads a more active and self-determined life [12,
37–39]. We assumed a moderate positive correlation between HL score and the assessment of
personal health status using EQ-VAS. Poor HL skills were associated with lower self-perceived
health status [12]. Patients with low HL reported higher hospitalisation rates and greater use of
health services [12, 23, 40]. In contrast, people with high HL skills are less likely to smoke or
consume alcohol, and, generally, have a better health status [12].

The statistical analysis was carried out using the IBM Statistical Package for Social Science
(version 21).

Results

Sociodemographic characteristics

In total, 503 patients completed the questionnaire and 42 (7.7%) declined to participate. The
sociodemographic characteristics of the participants are reported in Table 1. There were more
females (60.2%) than males (39.0%); most of the patients were more than 45 years (67.8%) and
62.8% had a high level of education. Among the patients, 50.7% had one or more chronic
diseases.

Health Literacy

The analysis of the 503 questionnaires and the dichotomisation of the responses into two cate-
gories showed that 61.6% of the patients had a low level of HL (Table 2). In Table 2, the socio-
demographic characteristics were reported in comparison to the level of HL. There was no
difference in HL between the males and the females. We found a higher level of HL among
younger patients and those with a higher level of education. Moreover, patients who had no
chronic diseases showed a higher level of HL (48.0%) compared to patients with one or more
chronic diseases (30.6%). In the multivariate analysis, two variables remained associated with
high HL: high education level and general self-efficacy score \( ≥30 \). Using a stratified analysis,
we found that level of education was the main confounder of the association between age and
HL because a lower level of education was more frequent in older patients (Table 3).
Pearson correlation

We correlated the HLS-EU-Q16 score with GSE and EQ-VAS scores. The coefficient of correlation between the scores is shown in Table 4. HL was stronger correlated to general self-efficacy than the assessment of personal health status. In particular, a strong positive correlation between the HL score and the GSE score was found (0.53), while a weak positive correlation between the HL score and the assessment of personal health status using EQ-VAS was found (0.27). A weak positive correlation was also found between the assessment of personal health status and general self-efficacy (0.28).

Discussion

The study investigated HL level among 503 patients attending medical facilities in general medicine located in Naples and Caserta, in Southern Italy. We achieved a high response rate (92.3%) and a high level of completion of the questionnaire because the medical researcher was available to provide information to patients. Although not representative of the reference population, our analysis revealed that 38.4% of the participants had a high level of HL.

Findings from two other studies conducted in Italy using a representative sample, reported a higher level of HL using the HLS-EQ-Q47 in one [12], whereas the other study [11] showed a lower level using the HLS-EQ-Q16.

The scarcity of national studies on this topic did not allow us to make a valid comparison between North and South Italy. We considered comparing these two areas important because the imbalances between the north and the south are very high. Northern Italy is more industrialised, healthier and wealthier than Southern Italy and the National Health Service in Northern

Table 1. Socio-demographic characteristics of the participants.

| Socio-demographic characteristics | n   | %  |
|----------------------------------|-----|----|
| **Gender**                       |     |    |
| Male                             | 196 | 39.0|
| Female                           | 303 | 60.2|
| Missing                          | 4   | 0.8 |
| **Age**                          |     |    |
| Mean (Standard deviation)        | 52.5 (16.7) |
| Range                            | 18–88 |
| 18–45                            | 150 | 29.8|
| 46–65                            | 208 | 41.4|
| ≥ 65                             | 133 | 26.4|
| Missing                          | 12  | 2.4 |
| **Education Level**              |     |    |
| ISCED§ 0–2                       | 184 | 36.6|
| ISCED 3–8                        | 316 | 62.8|
| Missing                          | 3   | 0.6 |
| **Chronic Diseases**             |     |    |
| Yes                              | 255 | 50.7|
| No                               | 229 | 45.5|
| Don’t know                       | 16  | 3.2 |
| Missing                          | 3   | 0.6 |
| Total                            | 503 | 100|

§International Standard Classification of Education.

https://doi.org/10.1371/journal.pone.0236963.t001

Pearson correlation

We correlated the HLS-EU-Q16 score with GSE and EQ-VAS scores. The coefficient of correlation between the scores is shown in Table 4. HL was stronger correlated to general self-efficacy than the assessment of personal health status. In particular, a strong positive correlation between the HL score and the GSE score was found (0.53), while a weak positive correlation between the HL score and the assessment of personal health status using EQ-VAS was found (0.27). A weak positive correlation was also found between the assessment of personal health status and general self-efficacy (0.28).

Discussion

The study investigated HL level among 503 patients attending medical facilities in general medicine located in Naples and Caserta, in Southern Italy. We achieved a high response rate (92.3%) and a high level of completion of the questionnaire because the medical researcher was available to provide information to patients. Although not representative of the reference population, our analysis revealed that 38.4% of the participants had a high level of HL.

Findings from two other studies conducted in Italy using a representative sample, reported a higher level of HL using the HLS-EQ-Q47 in one [12], whereas the other study [11] showed a lower level using the HLS-EQ-Q16.

The scarcity of national studies on this topic did not allow us to make a valid comparison between North and South Italy. We considered comparing these two areas important because the imbalances between the north and the south are very high. Northern Italy is more industrialised, healthier and wealthier than Southern Italy and the National Health Service in Northern
Table 2. Sociodemographic characteristics and health behaviours disaggregated for Health Literacy.

|                  | Low Health Literacy | High Health Literacy | crude \( p \)-value | Adjusted \( p \)-value* | Adjusted Odds Ratio* |
|------------------|---------------------|----------------------|----------------------|-------------------------|----------------------|
| **Age**          |                     |                      |                      |                         |                      |
| \( \geq 65 \)    | 102 (76.7%)         | 31 (23.3%)           | <0.001               | 0.508                   | 1.3 (C.I. 0.7–2.4)   |
| 46–65            | 126 (60.6%)         | 82 (39.4%)           | <0.001               | 0.691                   | 1.5 (C.I. 0.7–2.9)   |
| 18–45            | 77 (51.3%)          | 73 (48.7%)           |                      |                         |                      |
| **Total**        | 305 (62.1%)         | 186 (37.9%)          |                      |                         |                      |
| **Sex**          |                     |                      |                      |                         |                      |
| Female           | 188 (62.0%)         | 115 (38.0%)          |                      |                         |                      |
| Male             | 120 (61.2%)         | 76 (38.8%)           | 0.854                | -                       | -                    |
| **Total**        | 308 (61.7%)         | 191 (38.3%)          |                      |                         |                      |
| **Education Level** |                     |                      |                      |                         |                      |
| ISCED§ 0–2       | 148 (80.4%)         | 36 (19.6%)           | <0.001               | <0.001                  | 1.2 (C.I. 1.1–1.3)   |
| ISCED 3–8        | 160 (50.6%)         | 156 (49.4%)          | 1.2 (C.I. 1.1–2.0)   |                         |                      |
| **Total**        | 308 (61.6%)         | 192 (38.4%)          |                      |                         |                      |
| **Chronic Diseases** |                   |                      |                      |                         |                      |
| Yes              | 177 (69.4%)         | 78 (30.6%)           | <0.001               | 0.714                   | 0.9 (C.I. 0.7–1.2)   |
| No               | 119 (52.0%)         | 110 (48.0%)          |                      |                         |                      |
| **Total**        | 296 (61.2%)         | 188 (38.8%)          |                      |                         |                      |
| **GSE score**    |                     |                      |                      |                         |                      |
| \( \leq 29 \)    | 244 (74.6%)         | 83 (25.4%)           |                      |                         | 1                    |
| \( \geq 30 \)    | 64 (36.8%)          | 110 (63.2%)          | <0.001               | <0.001                  | 3.8 (C.I. 2.5–5.8)   |
| **Total**        | 308 (61.5%)         | 193 (38.5%)          |                      |                         |                      |

* Multivariate logistic regression (in the model, the following variables with a \( p \)-value <0.25 have been included: age, education level, chronic diseases and self-efficacy score).

§ International Standard Classification of Education.

https://doi.org/10.1371/journal.pone.0236963.t002

Table 3. Stratified analysis between Health Literacy and age by education level.

| Education Level | Age          | Total          | RR*            | \( p \)-value |
|-----------------|--------------|----------------|----------------|--------------|
|                 | 18–45        | >45            |                |              |
| ISCED§ 0–2      | Low HL       | 22 (73.3)      | 125 (82.8)     | 147 (81.2)   | 1.11 (C.I. 0.91–1.36) | 0.30                |
|                 | High HL      | 8 (26.7)       | 26 (17.2)      | 34 (18.8)    | 1.14 (C.I. 0.96–1.37) | 0.16                |
| ISCED 3–8       | Low HL       | 55 (45.8)      | 103 (54.5)     | 158 (51.1)   | 1.23 (C.I. 1.08–1.41) | <0.00               |
|                 | High HL      | 65 (54.2)      | 86 (45.5)      | 151 (48.9)   |                      |                    |
| **Total**       | Low HL       | 77 (51.3)      | 228 (67.1)     | 305 (62.2)   | 1.23 (C.I. 1.08–1.41) | <0.00               |
|                 | High HL      | 73 (48.7)      | 112 (32.9)     | 185 (37.8)   |                      |                    |

§ International Standard Classification of Education.

* Relative risk.

https://doi.org/10.1371/journal.pone.0236963.t003

Table 4. Pearson’s correlation among HL score, GSE score and EQ-VAS scale.

|                  | EQ-VAS Scale | GSE score | HL score | \( p \)-value |
|------------------|--------------|-----------|----------|--------------|
| **EQ-VAS**       | 1            | 0.28      | 0.27     | <0.001       |
| **GSE**          | 0.28         | 1         | 0.53     | <0.001       |
| **HL score**     | 0.27         | 0.53      | 1        | <0.001       |

https://doi.org/10.1371/journal.pone.0236963.t004
Italy is faster, richer and has better quality [41–43]. Consequently, patients in Northern Italy may have a higher HL than those in the South. If this was true, interventions to improve HL should be differentiated between these two geographical areas.

In Europe, Sorensen et al. [4] analysed HL level in eight countries (Austria, Bulgaria, Germany, Greece, Ireland, Netherlands, Poland and Spain). The highest level of HL was found in the Netherlands and the lowest level of HL in Bulgaria (respectively 71.4% and 37.9% of sufficient/excellent HL).

Many studies have shown that low level of HL is associated with poorer health outcomes, older people, lower education level, poorer self-rated health, limited use of preventive health services, increased hospital visits and higher mortality rates as well as inferior physical and mental health [19, 23, 24, 44–48].

Three sociodemographic characteristics (education level, age and chronic diseases) and two scales (GSE and EQ-VAS) were included in our analysis. Multivariate analysis showed that only the education level was associated with HL among the three sociodemographic characteristics. This is consistent with other studies [2, 4, 5, 10, 20, 49–53] and the World Health Organisation’s statement that consider people with low level of education as a vulnerable group with a scarce HL [2].

Health behaviour measured by GSE and health status measured by EQ-VAS were positively correlated with HL as expected [2, 53, 54].

Health Literacy and self-efficacy are important factors contributing to health promotion behaviour. Therefore, it would be desirable for each person to have both high HL and high GSE. In our sample, these two factors were correlated, but this correlation was stronger when both factors were consistent (48.5% both low vs 21.9% both high). Therefore, only 21.9% of the respondents in our sample seem to have had means for health promotion behaviour.

In our healthcare system, general practitioners might actively promote HL of their target group by providing information, advice, education and guidance. Their role should be important for the creation of an appropriate database to develop health literacy promotion strategies and to plan evidence-based interventions. However, the general practitioners included in our study would appear to have had little influence in promoting the HL of their patients.

Limitation. The main limitation of the study is related to its external and internal validity. Firstly, the respondents were a selected group of patients waiting in outpatient medical facilities in general medicine, and not a sample of the general population. Therefore, their HL level may be different from the general population. Secondly, they completed the questionnaire after the secretary of the general practitioner gave them the opportunity to participate in the study. They voluntarily took part in the study but the presence of the medical researcher during the completion of the questionnaire might have caused them not to answer the items truthfully, rather in a certain desired direction or under the psychological pressure of consulting with their general practitioner. It is also possible that patients might have completed the questionnaires hastily without paying particular attention because they were probably focused on seeing their general practitioner and did not want to miss their turn.

Conclusion

This study reports the first results on HL for Southern Italy in outpatient medical facilities in general medicine. It showed a low level of HL. As the sample was not representative of the reference population, we cannot derive a corresponding conclusion for the general population of Southern Italy. Despite the important role of the general practitioners, they would appear to have had little influence in promoting the HL of their patients. Therefore, more data about HL in this area and in Italy are needed for a better understanding of the situation in the country and to plan actions to improve HL in our population.
Supporting information

S1 Data.
(SAV)

Acknowledgments

The data presented here originate from a collaborative project led by Monika A. Rieger, Achim Siegel (University Hospital Tübingen, Institute of Occupational and Social Medicine and Health Services Research), the corresponding author Francesco Attena and the first author Sara Schiavone. In this project, amongst others, an Italian version of the measurement tool ‘Patient Enablement Scale–13 Items’ (PEN-13) was developed and validated. The authors gratefully acknowledge the general practitioners who agreed to participate. A special thanks to Anna Ehmann, Dr. Achim Siegel and Prof. Monika A. Rieger for their professional advice and for their methodology suggestions.

Author Contributions

Conceptualization: Sara Schiavone.
Data curation: Sara Schiavone.
Formal analysis: Sara Schiavone.
Investigation: Sara Schiavone.
Methodology: Francesco Attena.
Project administration: Francesco Attena.
Software: Sara Schiavone, Francesco Attena.
Supervision: Francesco Attena.
Validation: Francesco Attena.
Writing – original draft: Sara Schiavone.
Writing – review & editing: Francesco Attena.

References

1. Sørensen K, van den Broucke S, Fullam J, et al. Health literacy and public health: a systematic review and integration of definitions and models. BMC Public Health 2012; 12: 80 https://doi.org/10.1186/1471-2458-12-80 PMID: 22276600
2. Kickbusch I, Pelikan JM, Apfel F, Agis D. Tsouros. Health Literacy: The Solid Facts. World Health Organization, 2013 2013.
3. Workshop: Health literacy: an asset to public health policy. Eur J Public Health 2019; 29(Supplement_4) [https://doi.org/10.1093/eurpub/ckz185.551]
4. Sørensen K, Pelikan JM, Röthlin F, et al. Health literacy in Europe: comparative results of the European health literacy survey (HLS-EU). Eur J Public Health 2015; 25(6): 1053–8 https://doi.org/10.1093/eurpub/ckv043 PMID: 25843827
5. Bonaccorsi G, Lastrucci V, Vettori V, Lorini C. Functional health literacy in a population-based sample in Florence: a cross-sectional study using the Newest Vital Sign. BMJ Open 2019; 9(6): e026356 https://doi.org/10.1136/bmjopen-2018-026356 PMID: 31221877
6. Schulz PJ, Nakamoto K. Health literacy and patient empowerment in health communication: the importance of separating conjoined twins. Patient Educ Couns 2013; 90(1): 4–11 https://doi.org/10.1016/j.pec.2012.09.006 PMID: 23063359
Measuring Health Literacy in Southern Italy: A cross-sectional study

7. Aimaleh R, Helmy Y, Farhat E, Hasan H, Abdelhafiz A. Assessment of health literacy among outpatient clinics attendees at Ain Shams University Hospitals, Egypt: a cross-sectional study. Public Health 2017; 151: 137–45 https://doi.org/10.1016/j.puhe.2017.06.024 PMID: 28800559

8. Berens E-M, Vogt D, Messer M, Hurrelmann K, Schaeffer D. Health literacy among different age groups in Germany: results of a cross-sectional survey. BMC Public Health 2016; 16(1): 1151 https://doi.org/10.1186/s12889-016-3810-6 PMID: 27829401

9. Campbell P, Lewis M, Chen Y, Lacey RJ, Rowlands G, Protheroe J. Can patients with low health literacy be identified from routine primary care health records? A cross-sectional and prospective analysis. BMC Fam Pract 2019; 20(1): 101 https://doi.org/10.1186/s12875-019-0994-8 PMID: 31319792

10. Jordan S, Hoebel J. Gesundheitskompetenz von Erwachsenen in Deutschland: Ergebnisse der Studie “Gesundheit in Deutschland aktuell” (GEDA). Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 2015; 58(9): 942–50 https://doi.org/10.1007/s00103-015-2200-z PMID: 26227894

11. Lorini C, Lastrucci V, Mantwill S, Vettori V, Bonaccorsi G. Measuring health literacy in Italy: a validation study of the HLS-EU-Q16 and of the HLS-EU-Q6 in Italian language, conducted in Florence and its surroundings. Ann Ist Super Sanita 2019; 55(1): 10–8 https://doi.org/10.4415/ANN_19_01_04 PMID: 30968831

12. Palumbo R, Annarumma C, Adinolfi P, Musella M, Piscopo G. The Italian Health Literacy Project: Insights from the assessment of health literacy skills in Italy. Health Policy 2016; 120(9): 1087–94 https://doi.org/10.1016/j.healthpol.2016.08.007 PMID: 27593949

13. Roediger A, Immonen-Charambas K, Kujawa M, Sørensen K. Nothing about me without me: why an EU health literacy strategy embracing the role of citizens and patients is needed. Arch Public Health 2019; 77: 17 https://doi.org/10.1186/s13690-019-0342-4 PMID: 30984392

14. Nutbeam D. The evolving concept of health literacy. Soc Sci Med 2008; 67(12): 2072–8 https://doi.org/10.1016/j.socscimed.2008.09.050 PMID: 18952344

15. Quaglio G, Sørensen K, Rübig P, et al. Accelerating the health literacy agenda in Europe. Health Promot Int 2017; 32(6): 1074–80 https://doi.org/10.1093/heapro/daw028 PMID: 27099240

16. Schaeffer D, Berens E-M, Vogt D. Health literacy in the German population- results of a representative survey. Dtsch Arztebl Int 2017; 114(4): 53–60 https://doi.org/10.3238/arztebl.2017.0053 PMID: 28211318

17. Lastrucci Vieri, Lorini Chiara, Caini Saverio, Florence Health Literacy Research Group, Guglielmo Bonaccorsi. Health literacy as a mediator of the relationship between socioeconomic status and health: A cross-sectional study in a population-based sample in Florence. PLOS ONE 2019; 14(12): e0227007 https://doi.org/10.1371/journal.pone.0227007 PMID: 31869381

18. ACDC Project. Health literacy in Europe in 2017.

19. Berens E-M, Vogt D, Ganahl K, Weishaar H, Pelikan J, Schaeffer D. Health Literacy and Health Service Use in Germany. Health Lit Res Pract 2018; 3(2): e115–e122 https://doi.org/10.3928/24748307-20180503-01 PMID: 31294284

20. García-Codina O, Juvinıyä-Canal D, Amil-Bujan P, et al. Determinants of health literacy in the general population: results of the Catalan health survey. BMC Public Health 2019; 19(1): 1122 https://doi.org/10.1186/s12889-019-04344-0 PMID: 31294284

21. Palumbo R, Annarumma C, Adinolfi P, Musella M. The missing link to patient engagement in Italy. J Health Organ Manag 2016; 30(8): 1183–203 https://doi.org/10.1108/JHOM-01-2016-0011 PMID: 27834606

22. Kwan B, Frankish J, Rootman I. The Development and validation of measures of "Health Literacy" in different population 2006.

23. Griffey RT, Kennedy SK, D’Agostino McGowan L, McGowan L, Goodman M, Kaphingst KA. Is low health literacy associated with increased emergency department utilization and recidivism? Academic Emergency Medicine 2014; 21(10): 1109–15 https://doi.org/10.1111/aceM.12476 PMID: 25308133

24. Niedorys B, Chrzan-Rodak A, Słusarska B. Health literacy–a review of research using the European Health Literacy Questionnaire (HLS-EU-Q16) in 2010–2018. Pielegnjarstwo XXI wieku / Nursing in the 21st Century 2020; 0(0) [https://doi.org/10.2478/pielxxiv-2020-0001]

25. Biasio LR, Carducci A, Fara GM, Giannanco G, Lopalco PL. Health literacy, emotionality, scientific evidence: Elements of an effective communication in public health. Hum Vacc Immunother 2018; 14(6): 1515–6 https://doi.org/10.1080/21645515.2018.1434382 PMID: 29381399

26. Istat. Indicatori demografici. Available from: URL: http://dati.istat.it/Index.aspx?DataSetCode=DCIS_INDDEMOG1.

27. Love P. Ageing: Debate the Issues. Paris: OECD Insights, OECD Publishing. 2015.

28. OECD. Health reform: Meeting the challenge of ageing and multiple morbidities: Meeting the challenge of ageing and multiple morbidities. Paris: OECD Publishing 2011.
29. Visscher BB, Steunenberg B, Heijmans M, et al. Evidence on the effectiveness of health literacy interventions in the EU: a systematic review. BMC Public Health 2018; 18(1): 1414 https://doi.org/10.1186/s12889-018-6331-7 PMID: 30594180

30. Pelikan JM, Ganahl K, Roethlin F. Health literacy as a determinant, mediator and/or moderator of health: empirical models using the European Health Literacy Survey dataset. Glob Health Promot 2018; 17579759188788300 https://doi.org/10.1177/17579759188788300 PMID: 30427258

31. Lorini C, Santomuto F, Grazzini M, et al. Health literacy in Italy: a cross-sectional study protocol to assess the health literacy level in a population-based sample, and to validate health literacy measures in the Italian language. BMJ Open 2017; 7(11): e017812 https://doi.org/10.1136/bmjopen-2017-017812 PMID: 29138204

32. Sibilia L, Schwarzer R, Jerusalem M. Italian Adaptation of the General Self-Efficacy Scale.; 1997.

33. EuroQol. EuroQol—a new facility for the measurement of health-related quality of life. Health Policy 1990; 16(3): 199–208 [https://doi.org/10.1016/0168-8510(90)90421-9]

34. Siegel A, Ehmann AT, Meyer I, et al. PEN-13: A New Generic 13-Item Questionnaire for Measuring Patient Enablement (German Version). International Journal of Environmental Research and Public Health 2019; 16(23) https://doi.org/10.3390/ijerph16234867 PMID: 31816911

35. UNESCO Institute for Statistics. International standard classification of education: ISCED 2011. Montreal, Quebec: UNESCO Institute for Statistics 2012.

36. Cohen J. Statistical power analysis for the behavioral sciences. Revised ed. New York: Academic press 1977.

37. Luszczynska A, Scholz U, Schwarzer R. The general self-efficacy scale: multicultural validation studies. J Psychol 2005; 139(5): 439–57 https://doi.org/10.3200/JRLP.139.5.439-457 PMID: 16285214

38. The General Self-Efficacy Scale: Multicultural Validation Studies: The Journal of Psychology: Vol 139, No 5; 2020 [cited 2020 February 20]

39. Schwarzer R, Fuchs R. Self-Efficacy and Health Behaviours; 1999. Available from: URL: http://userpage.fu-berlin.de/gesund/publicat/conner9.htm.

40. Ture DA, Demirci H, Sengoren Dikis O. The relationship between health literacy and disease specific costs in subjects with chronic obstructive pulmonary disease (COPD). Aging Male 2018: 1–7 https://doi.org/10.1080/13688553.2018.1501016 PMID: 30269823

41. Petrelli A, Di Napoli A, Sebastiani G, et al. Atlante italiano delle disuguaglianze di mortalità per livello di istruzione. Epidemiol Prev 2019; 43(1S1): 1–120 https://doi.org/10.19191/EP19.1.S1.002 PMID: 30808126

42. Simeoni S, Frova L, Curtis M de. Inequalities in infant mortality in Italy. Ital J Pediatr 2019; 45(1): 11 https://doi.org/10.1186/s13052-018-0594-6 PMID: 30635011

43. Mateus C, Joaquim I, Nunes C, Boto P, Campos L. Geographic Variations in Health Care. OECD 2014.

44. Vogt D, Schaeffer D, Messer M, Berens E-M, Hurrelmann K. Health literacy in old age: results of a German cross-sectional study. Health Promot Int 2018; 33(5): 739–47 https://doi.org/10.1093/heapro/dax012 PMID: 28369348

45. Baker DW, Wolf MS, Feinglass J, Thompson JA, Gazmararian J. A., Huang J. Health Literacy and Mortality Among Elderly Persons. Arch Intern Med 2007; 167(14): 1503–9 https://doi.org/10.1001/archinte.167.14.1503 PMID: 17646604

46. Adams Robert J, Appleton Sarah L, Hill Catherine L, Mark Dodd, Christopher Findlay, Wilson David H. Risks associated with low functional health literacy in an Australian population. Medical Journal of Australia 2009; 191(10): 530–4 [https://doi.org/10.5694/j.1326-5377.2009.tb03304.x] PMID: 19912083

47. Jansen T, Rademakers J, Waverijn G, Verheij R, Osborn E, Heijmans B. The role of health literacy in explaining the association between educational attainment and the use of out-of-hours primary care services in chronically ill people: a survey study. BMC Health Serv Res 2018; 18(1): 394 https://doi.org/10.1186/s12913-018-3197-4 PMID: 29855365

48. Liu Y-B, Hou P, Xue H-P, Mao X-E, Li Y-N. Social Support, Health Literacy, and Health Care Utilization Among Older Adults. Asia Pac J Public Health 2019; 31(4): 359–66 https://doi.org/10.1177/101059519851674 PMID: 31307218

49. Tiller D, Herzog B, Kluttig A, Haerting J. Health literacy in an urban elderly East-German population—results from the population-based CARLA study. BMC Public Health 2015; 15: 883 https://doi.org/10.1186/s12889-015-2210-7 PMID: 26357978

50. Levin-Zamir D, Baron-Epel OB, Cohen V, Elhayany A. The Association of Health Literacy with Health Behavior, Socioeconomic Indicators, and Self-Assessed Health From a National Adult Survey in Israel. J Health Commun 2016; 21(sup2): 61–8 https://doi.org/10.1080/10810730.2016.1207115 PMID: 27869369
51. Nolasco A, Barona C, Tamayo-Fonseca N, et al. Alfabetización en salud: propiedades psicométricas del cuestionario HLS-EU-Q16. Gac Sanit 2018 https://doi.org/10.1016/j.gaceta.2018.08.006 PMID: 30473252

52. van der Heide I, Uiters E, Sørensen K, et al. Health literacy in Europe: the development and validation of health literacy prediction models. Eur J Public Health 2016; 26(6): 906–11 https://doi.org/10.1093/eurpub/ckw078 PMID: 27312257

53. Ehmann AT, Groene O, Rieger MA, Siegel A. The Relationship between Health Literacy, Quality of Life, and Subjective Health: Results of a Cross-Sectional Study in a Rural Region in Germany. International Journal of Environmental Research and Public Health 2020; 17(5) https://doi.org/10.3390/ijerph17051683 PMID: 32150820

54. Palumbo R, Annarumma C, Manna R, Musella M, Adinolfi P. Improving quality by involving patient. The role of health literacy in influencing patients' behaviors. International Journal of Healthcare Management 2019: 1–9 [https://doi.org/10.1080/20479700.2019.1620458]