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## Original research article

# Health literacy levels of the workers in a steel factory: A cross sectional study in Turkey

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## ABSTRACT

Health literacy is important as it shows the degree to which a person understands and interprets medical information and makes the appropriate health decision. The workers of steel factories are often faced with health information and issues in their work place related to personal protection, occupational hazards and occupational injuries. Therefore, it is important to demonstrate the health literacy of the workers to ensure health literacy responsive work places. This paper aims to show the health literacy level of the steel factory male workers in Turkey.

In this study, in order to measure the health literacy level of men, REALM and NVS scales were used. Additionally, questions related to socio-demographics and the health information sources and General Health Questionnaire were applied. For the analysis, chi-square and ANOVA tests were used.

Of the participants, the mean age was  $34.9 \pm 8.8$  (min.–max. = 18–53), the mean scores were  $64.0 \pm 2.1$ ,  $3.2 \pm 1.2$ , and  $1.5 \pm 0.8$ , respectively for REALM, NVS and GHQ scales. According to REALM scale, 8.1% ( $n = 20$ ) of the workers had limited health literacy. Whereas, in the NVS scale, 5.7% ( $n = 14$ ) had inadequate health literacy, and 55.1 % ( $n = 136$ ) had limited health literacy.

At least one of every ten workers had limited or inadequate health literacy level. The results should be taken into consideration by the healthcare providers and policymakers while implementing health promotion interventions to increase the health literacy level of the workers.

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## Introduction

In recent years, studies on health literacy (HL) have been increasing in number. It was first mentioned as “an

important component of health education” by Simonds in 1974. Nowadays, the World Health Organization (WHO) uses a much broader definition for the concept [1]. In 2017, WHO made a call to all national and international organizations to develop and improve the policies on HL

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and used the definition of the concept: “the cognitive and social skills which determine the motivation and ability of the individuals to gain access to understand and use information in ways which promote and maintain good health” [2–4].

It has a significant role in an individual's health and wellbeing as a low level of HL is found to be associated with less participation in health prevention and health promotion activities, such as mammography and cervical cancer screenings and immunization rates [5–10], risky health behaviours such as smoking and unhealthy diet leading to obesity [11–12], more work accidents [4], poor management of chronic diseases and insufficient self-care [11, 13], increased hospitalization and readmission rates [14, 15], increased mortality and premature death [4] and also, increasing social gradient and reinforcing existing inequalities [4, 16, 17].

In the USA national Adult Literacy Survey, it was shown that one in three adults have inadequate HL level [18]. In the study of the European Consortium on HL, it was also shown that more than 30% of adults have inadequate HL level in Europe [19]. In addition to this, in the nationwide study of Turkey, it was shown that 64.6% of the Turkish population has inadequate or problematic HL level [20].

In this concept, there are some specific groups that are at risk of having low HL. These are people with low education level, people with low income, patients with chronic diseases, elderly people, people who are part of ethnic minority groups and vulnerable populations [4, 14, 15].

The concept of HL applies to occupational health since the workers are very often faced with health information from health providers and occupational health providers on prevention, occupational hazards and occupational injuries [21]. In 1993, Dryson [21] found that 38% of the workers seek information and, in a study of Rhebergen et al. [22], the percentage of the workers who looked for health advice was 70%. In another study in France, Rollin et al. found that 58% of the workers seek medical advice [23]. Although a high percentage of the workers need health information and advice, it has been shown that many of them are unable to find it [21–23]. It was found that there are barriers to accessing information and HL is an important barrier in obtaining health information and processing it for the workers [21].

In this study, the aim is to address the HL level of the male workers in a factory in Turkey.

## Materials and methods

The data was collected in a steel factory in Turkey between September and December 2014. Before the application of questionnaires and scales, all the workers were informed about the study and verbal consents were obtained. Participation in the study was based on willingness, and a convenience sample of 248 male volunteer workers participated. Only the workers who were able to read and write were included in the study as the scales require literacy. The ethical approval of the study was obtained from Dokuz Eylul University Ethical Committee.

In the study, a sociodemographic questionnaire, HL scales; Rapid Estimate of Adult HL (REALM) and Newest Vital Sign (NVS) and General Health Questionnaire (GHQ-12) were used. As different scales of HL measure different aspects, such as reading, comprehension and numerical literacy, two HL scales were chosen for this study. The choice of the scales among all HL scales was made according to their availability in the Turkish language at the time of the study. Besides the sociodemographic features such as age, economic status and education level; the number of hospitalisations, diagnosis of chronic disease and number of admissions to hospital were also questioned. Furthermore, the attitudes of the participants towards the written health related information papers were also questioned.

REALM scale was developed by Davis et al. [24] and consists of 66 medical terms that are aligned from the easiest to the more difficult. In this scale, the total score is calculated according to the number of words familiar to the participant. The participant is asked to read the words one by one with a loud voice and skip the unfamiliar ones. While the person is reading the terms, the one who conducts the survey gives points to the words that are read properly. The evaluation with this scale takes around 3–5 min. The evaluation of its scores is as follows:

- 0–18 points: third class level or less (it is not possible to read basic education material; it is necessary to repeat a few times. It could be beneficial to use visual and auditory files).
- 19–44 points: 4th–6th class level (it could be beneficial to use basic education material; it could be difficult to read drug inscriptions).
- 45–60 points: 7th–8th class level (it is possible to handle many education materials. Basic education materials shouldn't be used).
- 61–66 points: high-school level (it is possible to handle all kinds of education materials).

NVS was developed by Weiss et al. [25] and the scale consists of a table that shows the nutritional values on the label of ice cream. The participants are asked to answer related questions with a calculation for some of them. The scores of the scale are evaluated as: 0–1 points, limited HL level; 2–3 points, risk of limited HL; 4–6 points, adequate HL. The required time to apply this scale is around 8–10 min. The reliability and validity of REALM and NVS scales in Turkish was done by Ozdemir et al. [26] in 2010.

GHQ was developed by Goldberg and Hillier [27] in 1979, and the reliability and validity in Turkish were done by Kiliç [28] in 1996. It is a self-questionnaire to determine the risk of having a psychological disorder of the population in primary care settings. For the ranking, 0 point is given for the “a” and “b” choices and 1 point is given for the “c” and “d” choices. The total score varies between 0 and 12.

In the evaluation of the questionnaire:

- <2 points: low risk;
- 2–3 points: medium risk;
- ≥4 points: high risk.

For the statistical analysis, SPSS 22.0 for Windows package programme was used. For the continuous

variables, mean and standard deviation and for the categorical variables, frequency and percentages were used as descriptive statistics. In order to analyze associations between variables, chi-square and ANOVA tests were used. A  $p$ -value < 0.05 was accepted as statistically significant.

## Results

The mean age of the participants was  $34.9 \pm 8.8$  (min.–max. = 18–53). Of the participants, 20.2% ( $n = 50$ ) had primary school degree, and 19.8% ( $n = 49$ ) had higher degree.

The mean duration of hospitalization was  $52.0 \pm 50.8$  (min.–max. = 6–120) days. The mean scores of the participants were  $64.0 \pm 2.1$ ,  $3.2 \pm 1.2$ , and  $1.5 \pm 0.8$ , respectively for REALM, NVS and GHQ scales.

According to Table 1, 10.1% ( $n = 25$ ) of the participants had chronic disease diagnosis. When the hospitalization history was questioned, 16.2% ( $n = 40$ ) were hospitalised once and 22.3% ( $n = 55$ ) were hospitalised twice or more. When the average admission to the hospital in a month was questioned, it was found that everyone admitted at least once totals 71.7% ( $n = 177$ ), and 28.3% ( $n = 70$ ) were admitted twice or more.

**Table 1 – Distribution of the workers according to some medical history information**

	<i>n</i>	%
Chronic disease diagnosis		
No	222	89.9
Yes	25	10.1
Hospitalisation history		
Never	147	59.5
Once	40	16.2
Twice and more	55	22.3
Admission to the hospital/month		
Once	177	71.7
Twice and more	70	28.3

According to Table 2, 65.6% ( $n = 162$ ) of the workers scored less than two in GHQ, meaning that they had low risk for psychological problems. 16.2% ( $n = 40$ ) scored four or more, meaning they were at high risk for psychological problems.

Of the workers, 8.1% ( $n = 20$ ) had limited HL according to REALM scale. Whereas, in NVS scale, 5.7% ( $n = 14$ ) had inadequate HL, and 55.1% ( $n = 136$ ) had limited HL.

When the workers were questioned about their attitude towards the written medical information given at the medical centres, they reported that 96% ( $n = 237$ ) of them always read it by themselves. The number of the participants who didn't answer were 4% ( $n = 10$ ). Furthermore, when the clarity of the written information was questioned, 71.7% ( $n = 177$ ) of the workers defined them as "mostly understandable", 26.3% ( $n = 65$ ) defined them as "sometimes understandable" and 2% ( $n = 5$ ) defined them as "never understandable". Of the workers, 96% ( $n = 237$ ) always read the information papers and 4% ( $n = 10$ ) throw them directly into the trash.

**Table 2 – Scores of the workers for GSA, REALM, NVS and some answers to medical information questions**

	<i>n</i>	%
GSA		
<2 (low risk)	162	65.6
2–3 (moderate risk)	45	18.2
≥4 (high risk)	40	16.2
REALM		
45–60 (limited health literacy level)	20	8.1
61–66 (adequate health literacy level)	227	91.9
NVS		
0–1 (inadequate health literacy level)	14	5.7
2–3 (limited health literacy level)	136	55.1
4–6 (adequate health literacy level)	97	39.3
The information papers that are provided at the medical centre		
Always read by the patient	237	96.0
Ask to read by the hospital attendant	0	0.0
Ask to read by healthcare givers	0	0.0
Unanswered	10	4.0
The written information papers that are provided at the medical centre		
Mostly understandable	177	71.7
Sometimes understandable	65	26.3
Never understandable	5	2.0
The information papers that are given at the medical centre		
Patient read	237	96.0
Someone else read	0	0.0
Throw in the trash	10	4.0

According to Table 3, the workers with chronic disease diagnosis had  $3 \pm 2.1$ ,  $64.4 \pm 1.0$  and  $3.0 \pm 1.1$  from GHQ, REALM and NVS scales respectively. On the other hand, the workers who did not have the diagnosis had  $1.4 \pm 2.1$ ,  $64.0 \pm 2.1$  and  $3.2 \pm 1.2$  from GHQ, REALM and NVS scales respectively. Although it was statistically significant for GHQ ( $p$ -value < 0.001), it was not significant for REALM and NVS ( $p$ -value = 0.318 and  $p$ -value = 0.436, respectively).

The workers who had a hospitalization history of twice or more had  $2.1 \pm 0.3$  in GHQ, once had  $2.0 \pm 0.3$  and never had  $2.0 \pm 0.2$ , which was statistically significant ( $p$ -value = 0.008). Surprisingly, the workers who had no history of hospitalization had  $64.2 \pm 2.2$  in REALM score, the workers who were hospitalised once had  $63.9 \pm 1.8$ , and twice or more had  $63.7 \pm 2.1$  ( $p$ -value = 0.401). In NVS scale, similar to REALM, there was no significant difference between groups ( $p$ -value = 0.180).

Finally, when the relationship between the hospital admission numbers and scales were analyzed, it was found that the workers who were only once admitted to the hospital had  $1.0 \pm 1.6$ , while twice or more had  $2.9 \pm 2.7$  in GHQ ( $p$ -value < 0.001). The workers who were only admitted once to the hospital had  $64.3 \pm 2.0$ , while twice or more had  $63.4 \pm 2.1$  ( $p$ -value = 0.002). Conversely, there was no significant relationship between admission numbers and NVS scores of the participants.

**Table 3 – Scores of the workers for GSA, REALM, NVS according to their health status and behaviours**

	% (n)	GSA scores	p-Value	REALM scores	p-Value	NVS scores	p-Value
Chronic disease diagnosis							
No	89.9 (220)	1.4 ± 2.1	<0.001	64.0 ± 2.1	0.318	3.2 ± 1.2	0.436
Yes	10.1 (25)	3.0 ± 2.1		64.4 ± 1.0		3.0 ± 1.1	
Hospitalisation history							
Never	59.5% (147)	2.0 ± 0.2	0.008	64.2 ± 2.2	0.401	3.3 ± 1.2	0.180
Once	16.2% (40)	2.0 ± 0.3		63.9 ± 1.8		3.0 ± 1.0	
Twice or more	22.3% (55)	2.1 ± 0.3		63.7 ± 2.1		3.1 ± 1.1	
Admission to the hospital/month							
Once	71.7% (177)	1.0 ± 1.5	<0.001	64.3 ± 2.0	0.002	3.3 ± 1.2	0.231
Twice or more	28.3% (70)	2.9 ± 2.7		63.4 ± 2.1		3.1 ± 1.2	

## Discussion

### Main findings

As far as is known, this is the first study that addresses the HL level of the workers in Turkey. Our study showed that around 60% of the workers had limited or inadequate HL level in the NVS scale, and one of every ten of them in REALM. In addition to these findings, one third of the workers had at least a moderate risk for psychological problems.

### Comparison with existing literature

The difference between REALM and NVS might be the result of the requirement of complex math skills for NVS and being unfamiliar with reading ingredients and calculations. NVS seems to differentiate advanced skills better than REALM – as reading skills might be easily affected by other things. According to HL Survey-Europe (HLS-EU), performed in eight countries in 2012 with the HLS-EU scale, the number of people who have inadequate or limited HL varies, for example half of the participants in Austria, more than 60% in Bulgaria, around 40% in Poland, and a quarter in the Netherlands [19]. In Turkey, in the HL Survey performed by Tanrıöver et al. [20] in 2015, 4924 participants' data were included. Around half of the participants were men, one third of the participants had education higher than high school. In that study, two thirds of the population had inadequate or limited HL level with HLS-EU and NVS, and the women scored lower points than men.

In the study of Ozdemir et al. [26], performed with REALM, 456 patients were included and the mean age was similar to our population. Our study only consisted of male participants, whereas in their study, only 40% of the study population were male. In our study, 10% of the population had inadequate or problematic HL level, whereas in their study it was around 40%. As we already know, HL level differs in gender and females have a lower HL level compared to men. This difference might be affected by the number of women participants in their study.

In the same study, around 72% of the participants had inadequate or problematic HL level with NVS. In our study

it was around 60%. In the study of Yilmazel and Cetinkaya [29], performed with NVS, 500 school teachers (66.4% male) were included and the mean age was higher than our population. Similar to the results of the study of Ozdemir et al. [26], a quarter of the participants had adequate HL level in our study as well. In the study of Yilmazel and Cetinkaya [29], all the participants had at least higher education, unlike our study, in which only one fifth of the participants had higher education. However, the mean HL score of the participants was higher in our study. This shows that HL is a variable that can be affected by many factors.

A quarter of the participants of our study found the written information to be “sometimes understandable” and “never understandable”. This means that one of every four patients is a candidate for misunderstanding or non-understanding the written medical information provided. These materials could be either prescriptions or consent forms, or sometimes informational flyers/brochures.

In our study, participants who had a chronic disease diagnosis or who had increased number of hospitalization history or who had been admitted to hospital more than once had an increased risk of psychological problems. In the study of Matsuzaki et al. [30], they measured the psychological problems with GHQ and, similar to our results, they found that almost one third of the male workers were at a high risk of psychological problems. This can lead to an increased need and use of health care services. At this point, the HL levels of these workers will be important in various ways, such as following directions in the healthcare system, avoiding unnecessary use, or taking medications properly.

On the other hand, their HL level only had an effect on the admission numbers to hospital. As the score decreased in REALM scale, their admission numbers to hospital increased. This finding was similar in the outcome measures study by Berkman et al. [14, 15] in 2004 and 2011.

One of the major findings of the HLS-EU was that the health status of a country's population has a close relationship with the HL level of the people [19]. Additionally, people who have inadequate HL use health services more than six times per year. We cannot directly compare this data with our study, as data in our study was collected as categorical. However, we still found a similar result with REALM scale.



### Strengths of the study

There are various opinions about the efficiency of different HL scales. In our study, we used two of them, which allowed us the opportunity to see the similarities/differences in measuring HL levels of the participants, or the relationship of HL levels with other variables in both scales.

### Limitations of the study

As the current study was designed as cross-sectional study, it fails to prove the causal relationships. Moreover, due to the sample size and sampling method, the results cannot be generalized to the whole population. One of the other limitations of our study was the limited sample size and we cannot compare different working areas/factories. It is important in such a way that in different factories, due to the differences in the area of work, health promotion activities might differ and this might affect the HL of the workers. Moreover, additional detailed information could bring more insights about the attitudes of workers towards health promotion and prevention services.

### Conclusions

The results show that at least one of every ten workers have limited or inadequate HL level. HL level is important for the workers to understand health information, as well as the hazards and possible injuries that they face in their working area. Before a health-related activity or an intervention, HL levels of the workers should be addressed. Following this, the interventions should be implemented according to the level of HL of the workers in order to increase the success of the activity. This will help the healthcare providers and policymakers to increase the health and wellbeing of the workers. In future studies, appropriate health promotion interventions for workers who work in different sectors and in different HL levels can be addressed.

### Conflict of interests

The authors have no conflict of interests to declare.

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