

## PAPER DETAILS

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# Employment status, presence of chronic disease and daily screen time are determinants of healthy diet literacy

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## ABSTRACT

**Aims:** While it has become easier for consumers to reach information with the developments in technology, however, to be able to find the right resources for the information has become difficult. It is known that this situation is related to the health and nutrition literacy of individuals. In this study, it was aimed to determine health literacy, digital healthy diet literacy and healthy eating attitudes of adult individuals.

**Methods:** Study data were collected with the help of a questionnaire form from 150 individuals (106 females and 44 males, mean age  $32.1 \pm 10.62$  years) who live in Türkiye and voluntarily agreed to participate in the study between January and June 2023.

**Results:** More than half of the participants (56%) were found to have more than six hours of daily screen time. The most common sources of information on health and nutrition are reported as academic databases and Instagram (both 30.7%). In both genders, individuals' eating attitudes towards healthy eating were found to be high. When the factors affecting health literacy and digital healthy diet literacy were examined, it was seen that daily screen time, working status and having chronic diseases were statistically important factors ( $p < 0.05$ ).

**Conclusion:** These data have drawn a general framework about the individuals living in Turkey, but there is a need for more extensive research on other demographic groups of the society.

**Keywords:** Health literacy, nutrition literacy, screen time, body mass index

## INTRODUCTION

In recent years, the prevalence and mortality of non-communicable chronic diseases such as cardiovascular diseases, certain types of cancer, obesity, and type 2 diabetes have been observed to increase worldwide. According to the analysis conducted by the World Health Organization (WHO), unhealthy eating habits, defined as a diet high in refined carbohydrates, sodium, saturated fat, and calories, are associated with 71% (41 million people) of total deaths each year and the risk of non-communicable chronic diseases and premature death.<sup>1,2</sup> Being healthy is not merely the absence of illness or disability; it encompasses complete physical, social, and mental well-being. Among the determinants of "being healthy," individuals' access to health services and the recently emerged digital technology have also been recognized.<sup>3</sup> Health literacy, considered one of the most important factors influencing health, is defined as 'the degree to which individuals have the capacity to obtain, process, and understand basic health information and services required to make appropriate health decisions.'<sup>4</sup> Achieving higher literacy rates and levels in a population

is highly valued because it is associated with a range of health outcomes both directly and indirectly.<sup>5</sup> The WHO Commission on Social Determinants of Health has identified 'the critical importance of education for health equity' in both low-income and high-income countries.<sup>6</sup> Low levels of health literacy negatively affect health professional-patient communication.<sup>7</sup> From the perspective of the healthcare community, this situation also impacts preventable diseases and effective disease management because adults with poor health literacy skills face difficulties in interpreting and acting upon health information that could reduce their risk of diseases and related symptoms.<sup>8</sup>

In order to protect and prevent non-communicable chronic diseases, the WHO has set six fundamental targets in its global action plan for the period of 2013-2030 and nine targets aimed to be achieved globally by 2025. To achieve these goals, the WHO has developed global, regional, national, and social action plans to reduce the risk factors of diseases, explain the effects of nutrition and physical activity on health, and raise awareness on

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this matter. Education, communication, and increasing public awareness are among the significant objectives of these plans.<sup>9,10</sup> In order to attain these goals, health authorities emphasize the importance of nutritional literacy level, which is defined as 'nutrition literacy applied in the field of nutrition' or 'the capacity of an individual to access, understand, interpret, and apply basic nutritional information and services to improve their health' during the prevention and treatment of non-communicable chronic diseases, as a subset of health literacy.<sup>11</sup>

Nutrition is the process of taking in and utilizing essential nutrients from birth to sustain vital functions, promote growth and development, and enable individuals to live healthy and productive lives for an extended period.<sup>12</sup> Healthy eating, on the other hand, refers to consuming all necessary nutrients in sufficient quantities, in a balanced and diverse manner, and at appropriate times.<sup>13</sup> Achieving healthy eating behaviours requires accessing accurate information, evaluating it, and making informed decisions. It necessitates both knowledge and skills for individuals to implement specific dietary recommendations and guidelines. Having such knowledge and skills requires a good level of nutrition literacy.<sup>14</sup> Consequently, there has been an increasing global interest in topics such as "health, healthy living, and healthy eating" to enhance awareness of the importance of nutrition, understanding the relationship between nutrition and disease, and recognizing food and food groups.<sup>15</sup> This study aims to understand the health and nutrition literacy levels of adult individuals in Türkiye (formerly known as Turkey) and their attitudes toward healthy eating.

## METHODS

The study was carried out with the permission of Çukurova University Faculty of Medicine Non-interventional Clinical Researches Ethics Committee (Date: 06.01.2023, Decision No: 129-73-64). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

### Participants and Setting

This study aimed to evaluate the attitudes of adult individuals towards healthy eating and their digital healthy diet literacy. The study was conducted with 150 participants aged between 19 and 65 living in Turkey, including 106 women and 44 men. Data were collected through an online survey prepared by the researchers between January 2023 and June 2023. Before filling out the survey, participants were provided with information about the study, and their written consent was obtained. The following ethical considerations were taken into account when including participants

in the study: respecting the privacy of the participants, avoiding pressure on participants to complete the survey, providing an accurate and clear description of the study, and presenting the study in an unbiased manner by avoiding words that may invite specific responses.

### Scales

An online survey form was used as the data collection tool in the study. The survey form consisted of three sections: i) sociodemographic characteristics, ii) health literacy scale and digital healthy diet literacy scale, iii) attitude scale for healthy nutrition (ASHN). Validity and reliability studies specific to the use of the scales (health literacy scale, digital healthy diet literacy scale, and attitude scale related to healthy eating) in Turkish adult individuals were conducted and the evaluation was made using intersection values/classification methods specific to these scales. In addition, permission for the use of the scales was obtained from the authors via email. The digital healthy diet literacy scale with four items was an extended domain of a comprehensive health literacy framework.<sup>16,17</sup> This scale was found to be a valid and reliable tool for the quick assessment of participants' ability to access, understand, appraise, and apply healthy diet information found on the internet.<sup>18</sup> The health literacy scale consisted of 12 items, the digital healthy diet literacy scale consisted of four items 18 and the attitude scale related to healthy eating consisted of 21 items and had a structure with four factors. The index values calculated by the formula for the scales ranged from 0 to 50. The attitude scale related to healthy eating had a minimum score of 21 and a maximum score of 105.<sup>19</sup> The validity and reliability study of the Turkish version of both scales was conducted to evaluate the health literacy and digital healthy diet literacy of individuals aged 18-65.<sup>20</sup> Participants' reported body weight and height information were used to calculate body mass index (BMI) using the formula  $\text{body weight}/\text{height}^2$  ( $\text{kg}/\text{m}^2$ ). The classification of BMI was based on the WHO classification, where BMI categories were defined as follows: <18.5 underweight, 18.5-24.9 normal weight, 25.0-29.9 overweight, and  $\geq 30.0$   $\text{kg}/\text{m}^2$  obesity.<sup>21</sup>

## RESULTS

In the present study, 70.7% of the participants in the study were female, and 29.3% were male. **Table 1** presents the distribution of individuals' demographic characteristics and health information by gender. Regarding marital status, 51.3% of the individuals are married, with 54.5% of male participants and 50% of female participants being married. The majority of individuals (87.6%) have a high school education or above (although not shown in the **Table 1**), 61.3% are employed, and 54.6% have an income level above 10.000 Turkish Lira.

Characteristics	Males (n:44)		Females (n:106)		Total (n:150)		p**
	n	%	n	%	n	%	
Marital status							0.720
Married	24	54.5	53	50	77	51.3	
Single	20	45.5	53	50	73	48.7	
Employment status							0.139
Employed	31	70.5	61	57.5	92	61.3	
Unemployed	13	29.5	45	42.5	58	38.7	
Presence of chronic disease							0.650
Yes	7	15.9	22	20.8	29	19.3	
No	37	84.1	84	79.2	121	80.7	
Chronic disease							
Digestive system diseases	1	14.3	6	28.6	7	25.0	
Thyroid diseases	-	-	7	33.3	7	25.0	
Other (prostate, genetic factor deficiencies, kidney diseases, and glaucoma)	2	28.6	4	19.0	6	21.4	
Cardiovascular diseases	2	28.6	2	9.5	4	14.3	
Mental/psychological disorders	-	-	2	9.5	2	7.1	
Diabetes	1	14.3	-	-	1	3.6	
Eating disorders	1	14.3	-	-	1	3.6	
Income (per month, TL <sup>a</sup> )							0.192
0 - 5000	7	15.9	30	28.3	37	24.7	
5001 - 10.000	10	22.7	21	19.8	31	20.7	
Above 10.000	27	61.4	55	51.9	82	54.6	
Daily screen time (hour)							0.037
0-2	9	20.5	16	15.1	25	16.7	
2-4	10	22.7	31	29.2	41	27.3	
4-6	13	29.5	24	22.6	37	24.7	
Above 6	12	27.3	35	33.0	47	31.3	

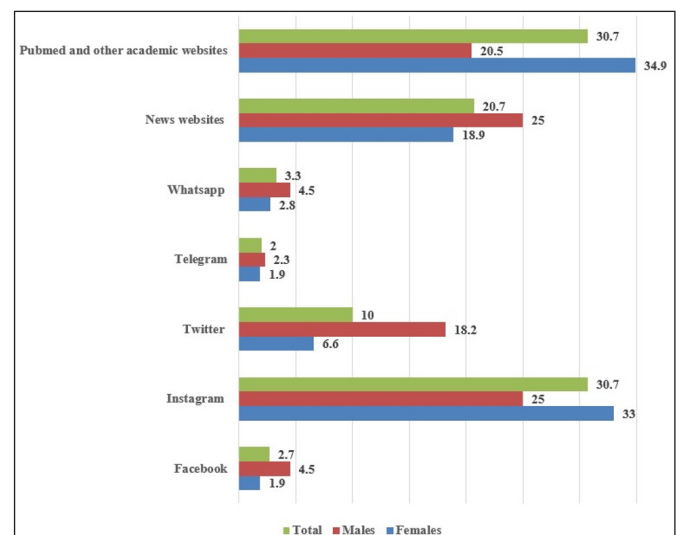
a TL: Turkish Lira, b p<0.05

In terms of health information, 19.3% of individuals, with 15.9% of males and 20.8% of females, have been diagnosed with a chronic illness. Among those with a diagnosis, 14.3% have cardiovascular disease (28.6% of males and 9.5% of females), 25% have digestive system disease (as shown in [Table 1](#)) (14.3% of males and 28.6% of females), 14.3% of males have diabetes and eating disorders, and 33.3% of females have thyroid disease. Additionally, 21.4% of individuals have various other diseases such as prostate issues, genetic factor deficiencies, kidney diseases, and glaucoma.

When examining the distribution of individuals' daily screen time, it is determined that 27.3% of male individuals and 33% of female individuals spend 6 hours or more in front of screens. Additionally, 29.5% of male individuals and 22.6% of female individuals spend 4-6 hours, 22.7% of male individuals and 29.2% of female individuals spend 2-4 hours, and 20.5% of male individuals and 15.1% of female individuals spend less than 2 hours per day in front of screen.

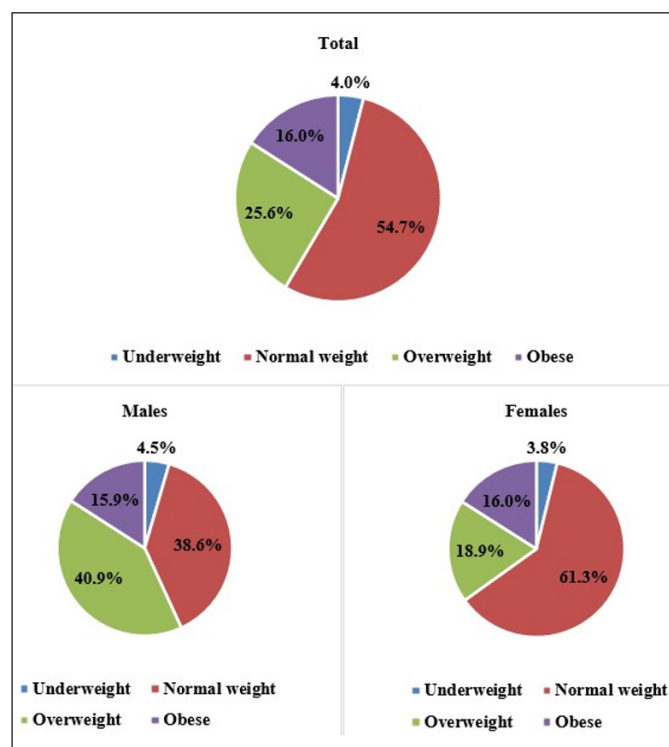
The distribution of sources for acquiring nutrition and health-related information by gender is presented in [Figure 1](#). It is found that 30.7% of individuals, including 20.5% of male individuals and 34.9% of female

individuals, obtain information from academic websites such as PubMed. Additionally, 20.7% of individuals, with 25% of males and 18.9% of females, acquire information from news websites. Furthermore, 48.6% of individuals, including 25% of male individuals and 33% of female individuals, obtain information on nutrition and health from various social media platforms such as Instagram, Twitter, WhatsApp, Telegram, and Facebook.



**Figure 1.** Sources of information on nutrition and health

**Figure 2** presents the distribution of individuals' BMI according to WHO criteria. Among male individuals, 40.9% are overweight, 38.6% have a normal BMI, 15.9% are obese, and 4.5% are underweight. Among female individuals, 61.3% have a normal BMI, 18.9% are overweight, 16% are obese, and 3.8% are underweight.



**Figure 2.** Distribution of individuals' body mass index according to WHO criteria

The evaluation of individuals' attitudes towards healthy eating using the ASHN by gender is presented in **Table 2**. According to the table, 69.3% of individuals, including 65.9% of males and 70.8% of females, have high scores indicating a positive attitude towards healthy eating. Furthermore, 21.3% of individuals, including 18.2% of males and 22.6% of females, have moderate scores. Additionally, 5.4% of individuals, including 7.3% of males and 3.8% of females, have very high scores, while 8.4% of individuals, including 12.6% of males and 5.1% of females, have low scores indicating a less healthy eating attitude. The difference in ASHN scores between genders was not found to be statistically significant ( $p>0.05$ ).

**Table 2.** Attitude scale for healthy nutrition scores according to the gender

ASHNa Score	Males (n:44)		Females (n:106)		Total (n:150)		pb
	n	%	n	%	n	%	
Very poor healthy eating (21-22 points)	-	-	-	-	-	-	
Low healthy eating (23-42 points)	2	4.5	2	1.9	4	2.7	
Moderate healthy eating (43-63 points)	8	18.2	24	22.6	32	21.3	0.583
High healthy eating (64-84 points)	29	65.9	75	70.8	104	69.3	
Very high healthy eating (84-105 points)	5	11.4	5	4.7	10	6.7	

a ASHN: Attitude scale for healthy nutrition, b  $p<0.05$

The evaluation of ASHN according to BMI is given in **Table 3**. According to this; 83.3% of underweight individuals, 67.1% of normal-weight individuals, 71.1% of overweight individuals and 70.8% of obese individuals had a healthy diet with high ASHN scores; It was determined that 7.3% of normal-weight individuals, 2.6% of overweight individuals and 12.5% of obese individuals had ASHN scores in the very high healthy diet range.

In **Table 4**, the analysis of determinants of the digital healthy diet literacy scale, which is considered the dependent variable, is shown using multivariate linear regression models. The regression model incorporates variables such as age, gender, marital status, education, employment status, monthly income level, presence of chronic illness, daily screen time, sources of health and nutrition information, BMI and ASHN. The variables that were found to be statistically significant ( $p<0.05$ ) in the regression model are employment status, presence of chronic illness and daily screen time.

## DISCUSSION

It is expected that individuals who have higher nutrition and health literacy might have better eating behaviors as well as attitudes towards healthy nutrition depending on the characteristics such as age, gender, BMI, profession and health status. In this study, using a multivariate linear regression model, we have shown that screen time, presence of chronic diseases and employment status were the main determinants of digital healthy diet literacy.

**Table 3.** Attitude scale for healthy nutrition scores according to the body mass index

ASHN Score	Underweight (n:6)		Normal weight (n:82)		Overweight (n:38)		Obese (n:24)		Total (n:150)	
	n	%	n	%	n	%	n	%	n	%
Very poor healthy eating (21-22 points)	-	-	-	-	-	-	-	-	-	-
Low healthy eating (23-42 points)	-	-	3	3.7	1	2.6	-	-	4	2.7
Moderate healthy eating (43-63 points)	1	16.7	18	22.0	9	23.7	4	16.7	32	21.3
High healthy eating (64-84 points)	5	83.3	55	67.1	27	71.1	17	70.8	104	69.3
Very high healthy eating (84-105 points)	-	-	6	7.3	1	2.6	3	12.5	10	6.7

ASHN: Attitude scale for healthy nutrition



**Table 4.** Determinants of digital healthy diet literacy scale via multivariate linear regression models

	$\beta_1$ (%95 CI)	SE	$\beta_2$	t	p	Zero	Partial	Part	VIF
(Constant)	-12.614	8.629	-	-1.462	0.168	-	-	-	-
Age (year)	0.043	0.046	0.240	0.949	0.369	0.100	0.255	0.129	3.478
Gender	-0.509	0.912	-0.094	-0.558	0.360	-0.083	-0.153	-0.076	1.544
Marital status	2.837	1.106	0.564	2.565	0.586	0.099	0.580	0.348	2.629
Employment status	1.284	1.141	0.247	1.125	0.023	-0.228	0.298	0.152	2.624
Education	1.771	0.580	0.575	3.056	0.281	0.426	0.647	0.414	1.925
Presence of chronic diseases	-4.205	2.339	-0.335	-1.798	0.009	-0.358	-0.446	-0.244	1.888
Monthly income status	0.636	0.235	0.642	2.708	0.953	0.373	0.600	0.367	3.066
Screen time (hour)	-0.295	0.154	-0.373	-1.910	0.018	-0.182	-0.468	-0.259	2.082
Sources of information on nutrition and health	0.039	0.092	0.035	0.431	0.079	0.035	0.035	0.035	1.000
BMI (kg/m <sup>2</sup> )	-1.448	1.695	-0.479	-0.854	0.409	0.099	-0.230	-0.116	17.161
ASHN score	0.099	0.623	0.028	0.159	0.876	0.322	0.044	0.022	1.649

\*SE: Standard error; CI: Confidence interval; VIF: Variance inflation factor; BMI: Body mass index; ASHN: Attitude scale for healthy nutrition, Dependent variable: Digital healthy diet literacy scale;  $\beta_1$  Non-standard coefficient;  $\beta_2$ : Standard coefficient; F 3.190; p<0.05; Adj. R<sup>2</sup>=0.761.

On the other hand, ASHN, a score for attitudes towards healthy nutrition, was not found to be a statistically significant determinant after the digital healthy diet literacy determinants were examined.

Dietary intake may change based on the presence of chronic diseases due to the fact that individuals with one or multiple chronic diseases are more tend to have healthier choices. A relationship between dietary patterns and chronic diseases has been shown in the literature.<sup>22</sup> However, it is also known that adults who have multiple chronic disease risk factors reported poorer diet quality.<sup>23</sup> Taylor et al.<sup>24</sup> have reported that nutrition literacy may predict adherence to a healthy or an unhealthy diet pattern in adults who have a nutrition-related chronic condition. Considering the long-term impacts of adherence to an unhealthy diet, it is highly possible to see a relationship between the presence of chronic diseases and diet patterns. Hence, having low healthy diet literacy scores might be the cause of the presence of chronic disease. In our study, we have found a reverse relationship between having chronic diseases and digital healthy diet literacy. Digital healthy diet literacy was found to be 4.205 units lower in those who had one/multiple chronic diseases (p=0.009). This result indicates that lower healthy diet literacy scores might have caused poor dietary intake, which could be the reason why those who have chronic diseases had lower digital healthy diet literacy scores.

The association between BMI/body weight status and nutrition/healthy diet literacy has been reported in many studies and different results have been shown.<sup>24-26</sup> It is possible to say that BMI might have either a positive or negative relationship with nutrition literacy. Some studies showed that individuals with higher BMI had lower nutrition literacy, while in some others positive association between BMI and nutrition literacy has been reported.<sup>24,25</sup> Even though BMI has been shown to be an important determinant of both healthy eating behavior and healthy diet literacy, in some studies authors did

not find any relationship.<sup>26,27</sup> Similarly, in the present study, BMI was not associated with healthy diet literacy in adults (p>0.05). This inconsistency in findings may be due to several factors related to the participants, including the age and gender as well as the methods used for measuring body weight. There are many scales which are used to measure nutrition literacy. The health literacy scale and digital healthy diet literacy scales, which are suggested to be used together, were used in the present study. The health literacy scale and digital healthy diet literacy scale are relatively recent scales and a validity and reliability study have been recently done in the Turkish population.<sup>20</sup> Hence, it is also important to indicate that although the main aim of the literacy scales is the same, however, different scales might be a reason why studies have reported different results from each other.

A large body of research has shown that there is a socioeconomic gradient in diet quality. In other words, people with higher socioeconomic status tend to have healthier diets than people with lower socioeconomic status. This is likely due to a number of factors, including access to healthy foods, knowledge about healthy nutrition, and time and resources.<sup>28</sup> It is known that energy-dense foods, such as processed snacks and sugary drinks, are relatively inexpensive, while nutrient-dense foods, such as fruits and vegetables, are more expensive.<sup>29</sup> The present study tried to explore the association between diet literacy and employment status of the participants. As expected, similar results have been found in the present study. Employment status was positively related to healthy diet literacy. Digital healthy diet literacy was 1.284 units higher in those who were employed (p=0.023). It can be concluded that people with limited financial resources are more likely to consume energy-dense foods and have poor diet quality which can lead to weight gain and other health problems such as insulin resistance and obesity.

It has been very well documented that screen time causes poor diet quality, greater adiposity/obesity and poorer life quality in different age groups. Studies on children, adolescents and adults reported that higher screen time is closely associated with psychosocial development, physical health and cognitive skills, depression and anxiety symptoms, insomnia, eye-related problems (myopia and dry eye syndrome) and higher energy and sweetened foods intake.<sup>30-32</sup> Adult individuals who spend 2.5 to 4 hours per day watching television have twice the likelihood of being overweight, while those who watch more than 4 hours per day are four times more likely to be overweight than those who watch less than 1 hour per day.<sup>33</sup> On the other hand, following the recommended amount of screen time was linked to a higher chance of having healthy eating habits. Girls who watched up to 2 hours of screen time were more likely to eat breakfast and have fresh produce and fish in their diet while boys who followed the screen time recommendation had a greater likelihood of eating breakfast, fresh fruit, and fish.<sup>31</sup> In the present study, the screen time of more than half of the participants was above 6 hours. Additionally, those who reported higher screen time had lower healthy diet literacy scores. Overall, high screen time is a problem across all age groups and it is significant to stick to the screen time guideline to be able to decrease the likelihood of consuming unhealthy foods and drinks, the risk of noncommunicable diseases.

## CONCLUSION

This study has shown that BMI and ASHN were not determinants of health literacy and digital healthy diet literacy while employment status, presence of chronic illness and screen time were significant determinants. It is clear that the use of electronics has increased drastically in recent years and it is expected to see even higher use of electronics in future. Availability of information has become effortless; however, it is still a challenge for individuals to reach reliable information sources. Hence, despite having easy access to information cannot be translated that individuals would have higher health and nutrition literacy. It is recommended to conduct larger studies on different groups in the population as well as to increase the awareness of the individuals via reliable sources.

## ETHICAL DECLARATIONS

**Ethics Committee Approval:** The study was carried out with the permission of Çukurova University Faculty of Medicine Non-interventional Clinical Researches Ethics Committee (Date: 06.01.2023, Decision No: 129-73-64).

**Informed consent:** All participants were informed consent form before they participated in the study.

**Referee Evaluation Process:** Externally peer reviewed.

**Conflict of Interest Statement:** The authors have no conflicts of interest to declare.

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**Author Contributions:** All the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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