

Association between health literacy and colorectal cancer screening behaviors in adults in Northwestern Turkey

Nuket Pancar^{1,2}, Yeliz Mercan^{1,3}

1 Department of Public Health, Kırklareli University Health Sciences Institute, Kırklareli, Turkey

2 Kırklareli Provincial Health Directorate, Pınarhisar Community Health Center, Kırklareli, Turkey

3 Department of Health Management, Kırklareli University School of Health, Kırklareli, Turkey

Correspondence: Yeliz Mercan, Public Health & Health Management, Kırklareli University School of Health, 39000 Kırklareli, Turkey, Tel: +90 (0) 507 239 29 95, e-mail: mercan.yeliz@gmail.com

Background: In this study, aimed to determine the frequency of participation in colorectal cancer (CRC) screenings, the factors affecting participation and the association between CRC screening behaviors and health literacy (HL). **Methods:** This community-based cross-sectional study was carried out with 408 people residing in Kırklareli, a province in Northwestern Turkey, between August and November 2019. **Results:** CRC screenings participation prevalence was 21.1%. Of them, 17.2% participated in fecal occult blood tests (FOBT) screenings, 7.6% participated in colonoscopy screenings, and 86.5% had inadequate or limited-problematic HL. According to the multivariate logistic regression analysis, the likelihood of not participating in CRC screenings was high in the participants who worked at a paid job (OR: 3.001, 95% CI: 1.018–8.850), who did not do any physical activity regularly (OR: 2.516, 95% CI: 1.251–5.060), who were not aware of the presence of an early diagnosis test for CRC (OR: 32.613, 95% CI: 13.338–79.742), who did not have a person having had CRC screening in their immediate environment (OR: 3.562, 95% CI: 1.752–7.240) and who had sufficient or excellent HL (OR: 3.324, 95% CI: 1.128–9.796). According to adjusted for some characteristics, there was no significant association between participation in CRC screenings and THLS-sub-dimensions and THLS-processes ($P > 0.05$). **Conclusions:** Participation in CRC screenings was low, and those with a high HL level were more likely not to participate in CRC screenings. Working status, knowledge and awareness levels affected the participation to CRC screenings. To encourage people to participate in screenings and to improve their HL, awareness-raising attempts for target groups should be increased.

Introduction

Colorectal cancers (CRC), which rank third among the most common types of cancer after lung and breast cancer are the second most common cause of cancer deaths with 862 000 deaths.¹ The incidence of CRC increases after age 40–50. Of CRC cases, 90% are diagnosed in individuals above the age of 50, and this rate rises up to 10% in men and 15% in women over 80 years of age. The incidence of CRC throughout life ranges between 2.4% and 5%, and certain risk factors a person has increase the incidence of CRC.²

If diagnosed at an early stage, CRC is a highly treatable disease.² The main purpose of CRC screenings is to detect colorectal pathologies in the premalignant period, to reduce the frequency of invasive cancer, and thus morbidity and mortality rates, to prevent complex treatments and to reduce health expenditures.³ Participation rates for CRC screenings differ greatly from one program to another. The prevalence of CRC screening participation reported to vary from 1.5% to 84.9% in international studies,^{4–6} ranges between 20% and 30% at the national level in Turkey.² It has been reported that due to insufficient knowledge of CRC symptoms and risk factors of CRC, and inadequate awareness of screening tests, participation in CRC screenings is low, and that this situation has become more important due to insufficient information and guidance provided by healthcare professionals, and insufficient health literacy (HL) levels.^{6–9}

HL refers to personal, cognitive and social skills that determine an individual's ability to access, understand and use information to improve and protect his or her health.¹⁰ Capacity and competence

related to HL differ from culture to culture and from environment to environment.¹¹ Inadequate education, learning disabilities and cognitive decline increasing with age are among the causes of limited HL¹² and affect individuals' ability to join disease prevention activities.¹³ The role of HL in understanding potential benefits, harms, alternatives and uncertainties associated with cancer screening is an undeniable fact.¹⁴ In several studies, a positive correlation has been shown between the low HL level and limited information about cancer, and low cancer screening rates.^{14–16}

In this study, it was aimed to determine the frequency of participation of adults in CRC screenings, and to determine the factors affecting participation in CRC screenings and the association between CRC screening behaviors and HL within the scope of the national screening program. This issue, which remains to be an important public health problem, contains important findings in terms of guiding local health service providers and maintains its importance.

Methods

Study design and sample

This community-based cross-sectional study was conducted between August 2019 and November 2019. In the National Cancer Control Program in Turkey, people aged 50–70 years are recommended to have fecal occult blood tests (FOBT) every 2 years and to undergo colonoscopy every 10 years for the CRC screening.³ In Pınarhisar, the number of people over 50 years of age registered in

Turkey Statistical Institute Address Based Population Registration System was 7867 in 2018.¹⁷ Given the age groups specified in the national screening program, the population of the study comprised 2642 adults aged 50–70 (women: 1342, men: 1300) residing in Pınarhisar Central district. Minimum sample size was calculated in the Epi Info 7.2.3.1 StatCalc program as 288 ($P=0.30^2$, $\alpha=0.05$, $d=0.05$). Considering the possibility of losses during the study, it was decided to include 30% more people in the sample and it was aimed to reach 375 people. At the end of the visits, we reached 408 people who were able to read and write in Turkish, had cognitive competence enough to answer the questions and volunteered to participate in the study.

Procedure

The proportional cluster sampling method was used in the study. The number of people to be included in the sample from each neighborhood/cluster was determined in proportion to the population density in the neighborhoods/clusters. The streets to be visited in clusters were determined by drawing lots, the households to be visited in the streets were determined taking into account the number of the houses/apartments not of the buildings. One in every seven houses/apartments in a row was visited. Of the houses/apartments, the one with the smallest odd door number was visited. When there was no adult aged 50–70 years in the household, then the next house/apartment with an odd door number was visited. If there were two or more adults aged 50–70 years in the household, all of them were included in the study.

The purpose and scope of the study were explained to the participants who met the inclusion criteria. Of the participants, those who agreed to participate in the study and signed the written informed consent statement were included in the study. Visits were conducted on weekdays and weekends during the daytime hours. The data were collected by face-to-face interview method. It took 35–40 min to fill in the questionnaire.

Data collection

The tools used to collect the data were the Personal Information Form and Turkey Health Literacy Scale (THL-32).

Personal information form

The researchers developed the form based on the pertinent literature. The items in the form question the participants' sociodemographic characteristics, some aspects of their lifestyle, health/disease status, CRC screening behaviors and CRC knowledge level.

Turkey Health Literacy Scale (THL-32)

The THL scale was developed based on the Health Literacy Survey in Europe. The scale is a self-report scale and is aimed at to assess the HL levels of literate individuals over the age of 15. Based on a 2×4 matrix, the THL scale consists of eight components, two dimensions and four processes. The sub-dimensions of the THL scale are 'Treatment and Service' and 'Disease Prevention/Health Promotion'. The processes of the scale are 'Access to Health Related Information (HRI), Understanding the HRI, Appraisal of the HRI, Using/Applying the HRI'. The scale was standardized between 0 and 50, as in the HLS-EU study. The higher the score obtained from the scale is the higher the HL level is. Given the cutoff point, the scores between 0 and 25 indicate inadequate HL, between 26 and 33 indicate problematic—limited HL, between 34 and 42 indicate adequate HL, between 43 and 50 indicate excellent HL.¹⁸ The Cronbach's alpha coefficient, which was 0.927 for the overall scale¹⁸ was calculated as 0.955 in this study.

Study variables

The dependent variable of the study was participation in CRC screening. The 'yes' answer given to the question 'Have you ever had a colorectal (bowel/intestinal) cancer screening?' was considered as participation in CRC screening. Then, to confirm this finding, 'Which of the colorectal (bowel/intestinal) cancer screening tests did you have?' was asked. The options were FOBT, colonoscopy, rectosigmoidoscopy and others. According to the selected options, the prevalence of participation in FOBT screening, participation in colonoscopy screening etc. was determined. Sociodemographic characteristics, some of the lifestyle-related characteristics, disease/health status-related characteristics, questions asked to determine the knowledge level related to CRC screening behavior and HL levels were used as independent variables. Light- or moderate-intensity physical activities, such as walking, jogging, cycling or swimming, for at least 5 days a week for 30 min a day were considered as regular physical activity.

Data analysis

In the analysis of the data, numbers (n), percentages (%), mean and standard deviation (\pm SD) were used for the descriptive statistics. Pearson's chi-square test was used to compare the rates in the independent groups. The multivariate logistic regression analysis was used to determine the factors that affect participation in CRC screenings (Enter strategy). Variables with $P < 0.10$ in the univariate analysis were included in the model. Participation in CRC screenings and variables, such as age, sex, education, chronic disease, knowing the presence of a screening test for early diagnosis of CRC in the models made for THL subscales and THL processes, were used as confounding variables. The explanatory power of the model was evaluated according to Nagelkerke R square (Nagelkerke R^2). A two-tailed $P < 0.05$ was considered statistically significance level. The analysis was performed using the Statistical Package for the Social Sciences, version 22.0 (SPSS Inc., Chicago, IL, USA).

Ethic approval

The study approved by the Ethics Committee of Kirklareli University, Institute of Health Sciences Ethics Committee in 2018 was conducted in accordance with ethical principles (Reference number: 26 April 2019/P0123R01).

Results

The distribution of descriptive characteristics participants and the prevalence of these distributions according to their participation in CRC scans were given in [table 1](#). The mean age of the participants was 59.30 ± 5.05 (min.: 50, max.: 70) years and 67.9% were women. CRC screenings participation prevalence was 21.1% ($n=86$). Of them, 17.2% ($n=70$) participated in FOBT screenings, and 7.6% ($n=31$) participated in colonoscopy screenings. While 13.5% of the participants had adequate or excellent HL, 86.5% of them had inadequate/problematic-limited HL.

Multivariate logistic regression analysis of the participants' participation in CRC screenings was shown in [table 2](#). Variables included in the model using the enter strategy accounted for 59.5% of the variance in the participation of CRC screenings according to Nagelkerke ($P < 0.001$). Likelihood of not participating in CRC screenings was high in the employed participants (OR: 3.001, 95% CI: 1.018–8.850), those who did not always do regular physical activity (OR: 2.516, 95% CI: 1.251–5.060), those who did not know that there was a screening test for the early diagnosis of CRC (OR: 32.613, 95% CI: 13.338–79.742), those who had relatives or people in their environment who did not have a CRC screening (OR: 3.562, 95% CI: 1.752–7.240) and those whose HL was adequate and excellent according to the overall score of THL (OR: 3.324, 95% CI: 1.128–9.796).

Table 1 The distribution of sociodemographic characteristics and HL levels of the participants and the prevalence of these distributions according to their participation in CRC screening

Variables	All groups n = 408 n (%)	Participation in CRC screening		Participation in the CRC screening (yes)		P-value* (between no and yes)
		No n = 322 (78.9%) n (%)	Yes n = 86 (21.1%) n (%)	FOBT screening n = 70 (17.2%) n (%)	Colonoscopy screening n = 31 (7.6%) n (%)	
Sex						
Women	277 (67.9)	215 (66.8)	62 (72.1)	51 (72.9)	17 (54.8)	0.348
Men	131 (32.1)	107 (33.2)	24 (27.9)	19 (27.1)	14 (45.2)	
Age (year)						
50–61	259 (63.5)	207 (64.3)	52 (60.5)	43 (61.4)	19 (61.3)	0.513
61–70	149 (36.5)	115 (35.7)	34 (39.5)	27 (38.6)	12 (38.7)	
Education level (year)						
<5	244 (59.8)	193 (59.9)	51 (59.3)	40 (57.1)	16 (51.6)	0.915
≥5	164 (40.2)	129 (40.1)	35 (40.7)	30 (42.9)	15 (48.4)	
Work status						
Working	60 (14.7)	53 (16.5)	7 (8.1)	5 (7.1)	4 (12.9)	0.053
Not working	348 (85.3)	269 (83.5)	79 (91.9)	65 (92.9)	27 (87.1)	
Regular physical activity						
Always	157 (38.5)	111 (34.5)	46 (53.5)	36 (51.4)	23 (74.2)	0.001
Sometimes—never	251 (61.5)	211 (65.5)	40 (46.5)	34 (48.6)	8 (25.8)	
Chronic diseases						
No	271 (66.4)	230 (71.4)	41 (47.7)	33 (47.1)	16 (51.6)	<0.001
Yes	137 (33.6)	92 (28.6)	45 (52.3)	37 (52.9)	15 (48.4)	
Is there a screening test for the early diagnosis of CRC?						
Yes	137 (33.6)	59 (18.3)	78 (90.7)	63 (90.0)	30 (96.8)	<0.001
No/I do not know	271 (66.4)	263 (81.7)	8 (9.3)	7 (10.0)	1 (3.2)	
Can CRC be treated if it is diagnosed early?						
Yes	201 (49.3)	141 (43.8)	60 (69.8)	54 (77.1)	18 (58.1)	<0.001
No/I do not know	207 (50.7)	181 (56.2)	26 (30.2)	16 (22.9)	13 (41.9)	
Relative in his/her environment participating in CRC screenings						
Yes	90 (22.1)	41 (12.7)	49 (57.0)	42 (60.0)	18 (58.1)	<0.001
No	318 (77.9)	281 (87.3)	37 (43.0)	28 (40.0)	13 (41.9)	
Willingness in the future						
Yes, within 1 year	112 (27.5)	70 (21.7)	42 (48.8)	35 (50.0)	14 (45.2)	<0.001
Undecided or no	296 (72.5)	252 (78.3)	44 (51.2)	35 (50.0)	17 (54.8)	
THL general						
Inadequate/problematic-limited	353 (86.5)	273 (84.8)	80 (93.0)	65 (92.9)	30 (96.8)	0.047
Adequate/excellent	55 (13.5)	49 (15.2)	6 (7.0)	5 (7.1)	1 (3.2)	

FOBT, fecal occult blood tests.

*: Pearson's chi-square test.

Tables 3 and 4 show the multivariate logistic regression analysis of the participants' participation in CRC screenings in terms of the THL components and processes, respectively. In the models created for the THL sub-dimensions and THL processes using the enter strategy, the dependent variable accounted for 54.5% and 55.3% of the variance, respectively, according to Nagelkerke ($P < 0.001$). In the models adjusted for age, sex, educational status, chronic disease and being aware of the presence of screening test for the early diagnosis of CRC, there was no statistically significant association between participants' participation in CRC screenings, and THL sub-dimensions and THL processes ($P > 0.05$).

Discussion

It was found that more than one out of every five participants participated in CRC screenings. In a multicenter study conducted in the Asia-Pacific region, the mean rate of participation in CRC screenings was reported as 27%, with the highest participation rate in the Philippines, and the lowest participation rate in India.⁶ In the Turkey CRC National Control Program, the coverage rate of the CRC screenings was reported to be 20–30%.² In addition, similar to a study conducted in Saudi Arabia with people aged 18–75,¹⁹ the frequency of participation in FOBT screenings in this study was twice as high as participation in colonoscopy screenings. That our results, compatible with those of national studies conducted in Turkey,^{9,20,21} were different from those obtained in other countries

was thought to stem from the differences between the incidence of cancer cases, national cancer control programs and delivery of healthcare in those countries.

In our study, about one out of three participants did not want to participate in cancer screenings in the future. In a previous study, it was determined that after a training on cancer screening, the participation rate in cancer screenings increased.^{9,22} This low rate of participation in cancer screenings was thought to result from the fear of colonoscopy. It is thought that participation can be increased not by increasing the quantity of the trainings but by focusing on the quality of the trainings or by giving individual consultancy. In this study, those who did not know that there is a screening test for early diagnosis of CRC were not likely to participate in CRC screenings. Similarly, in their study, Pirinççi et al.²³ found that those who were aware of the presence of CRC screening tests participated in the CRC screenings to a greater extent. In a study conducted in Saudi Arabia, those who knew that colonoscopy is a screening method were more likely to participate in CRC screenings, and this rate was higher in those who had family members with CRC.¹⁹ Madlensky et al.²⁴ reported that family history of CRC was positively correlated with participation in screening. In our study, those whose relatives or people in their environment did not have a CRC screening test were not likely to participate in CRC screenings. This result, which is in line with the literature, may be related to low awareness levels or might have resulted from cross-sectional research design. In other words, the fact that the participants think that they do not

Table 2 Multivariate logistic regression analysis of the participants' participation in CRC screenings

Predictors	Univariate			Multivariate		
	OR	(95% CI)	P-value	OR	(95% CI)	P-value
Work status						
Not working ^a	1			1		
Working	2.224	(0.972–5.085)	0.058	3.001	(1.018–8.850)	0.046
Regular physical activity						
Always ^a	1			1		
Sometimes—never	2.186	(1.350–3.540)	0.001	2.516	(1.251–5.060)	0.010
Chronic disease						
No ^a	1			1		
Yes	0.364	(0.224–0.593)	<0.001	0.657	(0.324–1.335)	0.245
Is there a screening test for the early diagnosis of CRC?						
Yes ^a	1			1		
No/I do not know	43.462	(19.914–94.856)	<0.001	32.613	(13.338–79.742)	<0.001
Can CRC be treated if it is diagnosed early?						
Yes ^a	1			1		
No/I do not know	2.962	(1.779–4.934)	<0.001	0.682	(0.304–1.528)	0.352
Relative in his/her environment participating in CRC screenings						
Yes ^a	1			1		
No	9.076	(5.299–15.546)	<0.001	3.562	(1.752–7.240)	<0.001
Willingness in the future						
Yes, within 1 year ^a	1			1		
Undecided or no	3.436	(2.087–5.659)	<0.001	1.959	(0.962–3.988)	0.064
THL ggeneral						
Inadequate/problematic-limited ^a	1			1		
Adequate/excellent	2.393	(0.989–5.790)	0.053	3.324	(1.128–9.796)	0.029

a: Reference group.

Table 3 Multivariate logistic regression analysis of the participants' participation in CRC screenings in terms of the THL components

Sub-dimensions	All groups n (%)	Unadjusted OR (95% CI)	P-value	Adjusted OR ^b (95% CI)	P-value	
Treatment and service						
Inadequate/problematic-limited ^a	339 (83.1)	1		1		
Adequate/excellent	69 (16.9)	1.586	(0.569–4.417)	2.887	(0.975–8.549)	0.056
Disease prevention/health promotion						
Inadequate/problematic-limited ^a	357 (87.5)	1		1		
Adequate/excellent	51 (12.5)	1.865	(0.533–6.524)	2.215	(0.602–8.156)	0.232

a: Reference group.

b: Adjusted for age, sex, education, chronic disease, being aware of the presence of screening test for the early diagnosis of CRC.

Table 4 Multivariate logistic regression analysis of the participants' participation in CRC screenings in terms of the THL processes

Processes	All groups n (%)	Unadjusted OR (95% CI)	P-value	Adjusted OR ^b (95% CI)	P-value	
Access to HRI						
Inadequate/problematic-limited ^a	351 (86.0)	1		1		
Adequate/excellent	57 (14.0)	3.584	(0.951–13.505)	2.501	(0.582–10.755)	0.218
Understanding the HRI						
Inadequate/problematic-limited ^a	332 (81.4)	1		1		
Adequate/excellent	76 (18.6)	1.038	(0.391–2.760)	1.888	(0.540–6.603)	0.320
Appraisal of the HRI						
Inadequate/problematic-limited ^a	361 (88.5)	1		1		
Adequate/excellent	47 (11.5)	3.536	(0.754, 16.584)	3.160	(0.557, 17.928)	0.194
Using/applying the HRI						
Inadequate/problematic-limited ^a	337 (82.6)	1		1		
Adequate/excellent	71 (17.4)	0.408	(0.161, 1.036)	0.714	(0.220, 2.320)	0.575

HRI, health-related information.

a: Reference group.

b: Adjusted for age, sex, education, chronic disease, being aware of the presence of screening test for the early diagnosis of CRC.

have genetic disposition because they do not have any complaints/symptoms related to intestines or they do not have CRC cancer history in their families might have been related to the low participation of these people to CRC screenings.

Approximately 9 out of every 10 participants had inadequate/problematic-limited HL. In studies conducted in various countries, the rate of people with insufficient or limited-problematic HL ranged between 1.8% and 68%.^{25–27} In other studies carried out at the local level in Turkey, the rate of people with insufficient or

limited-problematic HL ranged between 41.3% and % 82.8%.^{28–31} In Okyay et al.'s¹⁸ study conducted with adults aged 15 and over, the mean THL scores were found lower in the participants who were in the advanced age groups or whose education level was low. That the rate of people with inadequate/problematic-limited HL was higher in our study than was that in the literature is thought to be due to the characteristics of the participants in our sample. In addition, in our study those whose HL level was adequate and excellent according to their score for the overall THL were not likely to participate in CRC screenings. In a community-based study conducted with British adults, limited HL level was found a barrier to participation in CRC screening.³² In several studies conducted on the issue, it has been reported that those who have inadequate HL are less likely to comply with CRC screenings and that the limited level of knowledge of experts about CRC screenings is another barrier to the public's participation in CRC screenings.^{7,33} On the other hand, in a study conducted in Japan, there was no significant relationship between HL, and preventive health behaviors, health-related behaviors and recommendations on compliance with cancer screening.³⁴ The fact that those with adequate or excellent general HL were less likely to participate in the screenings, which is different from the results in the literature, suggests that they may have had a difficulty in allocating time to screening participation. For instance, in our study, the likelihood of not participating in screenings among the participants working at a paid job was three-times higher than that among the non-working participants. In this study, approximately one-quarter of the participants worked at a paid job. Because their working hours coincided with the working hours of family health centers where the screenings were carried out and because they had heavy workload, they may not have allocated time to utilize preventive health services, which prevented them from participating in screenings.

In this study, those who did not always do regular physical activity were not likely to participate in CRC screenings. In Yilmaz et al.'s³⁵ study, those who exercised had FOBT more than those who did not exercise; however, there was no association between doing exercises and colonoscopy behavior. Although Carey and El-Zaemey³⁶ reported results that supported our findings, it was considered that our result stemmed from the inability in determining the cause-effect relation in the cross-sectional study design. As a matter of fact, it is expected that participants who exhibit healthy lifestyle behaviors are more sensitive about early diagnosis tests for disease control purposes.

Strength of study

The strongest aspect of this study is that it was a community-based study and thus it could be generalized to the whole community. In addition, both the prevalence of CRC screenings and HL levels of the participants were determined, and the association between them was revealed. From this point of view, another strength of this study is that the number of current studies in which these two variables are studied together is insufficient.

Limitation

The main limitation of this study is that the order of cause-effect relationship arising from the cross-sectional research design could not be determined exactly.

Conclusions

According to the national screening program, about one out of every five people participated in CRC screenings. The rate of those participating in FOBT screenings was two times higher than that of those participating in colonoscopy screenings. Approximately one out of every three participants did not want to participate in cancer

screenings in the future. Approximately one out of every three participants knew that there was a screening test for early diagnosis of CRC, and about half of them knew that this cancer could be treated if it is diagnosed early. Almost 9 out of 10 participants had inadequate/problematic-limited HL. Likelihood of not participating in CRC screenings was high in the participants who worked at a paid job, those who did not always do regular physical activity, those who did not know that there was a screening test for the early diagnosis of CRC, those who had relatives or people in their environment who did not have a CRC screening and those whose HL is adequate and excellent according to the overall score of THL.

Healthcare professionals should make more efforts to increase the knowledge and awareness levels of adults regarding CRC, and CRC screenings when they present to primary healthcare centers. Professional persuasion methods should be used to increase the awareness levels of those who are reluctant or undecided to participate in CRC screening in the future, by making the National Cancer Call Center Application more effective. It should be ensured that informative materials intended to persuade the public to participate in CRC screenings and to increase their HL levels should be made available to the public through written and visual media. Because those with adequate or excellent HL participate in CRC screenings at a lower rate, in-depth interviews or longitudinal studies including these groups should be performed. In addition, attempts to enable working people to participate in CRC screenings during working hours should be made. Disadvantaged groups in terms of social determinants should be encouraged to participate in free CRC screenings at primary healthcare centers. In order for health service providers to raise the HL levels of non-working or socially disadvantaged people, and to improve their sense of responsibility to protect both their health and public health, free courses should be organized and they should be encouraged to participate in such courses. No relations were detected between the participation in CRC screening and sub-dimensions and processes of TSOY. We recommend that further studies are conducted with wider samplings.

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Key points

- One out of every five people participated in CRC screenings.
- Almost 9 out of 10 participants had inadequate/problematic-limited HL.
- Those with a high HL level were more likely not to participate in CRC screenings.
- To investigate factors preventing people from participating in CRC screenings, in-depth interviews or longitudinal studies should be performed.
- To encourage people to participate in screenings and to improve their HL, awareness-raising attempts for target groups should be increased.

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