

## Associations Between Employment Status and Health Literacy in the Danish Adult Population

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### Abstract

This study aimed to assess differences in health literacy across groups defined by labor market participation, comparing individuals in employment with those outside the workforce. The analysis used data from a nationwide Danish cross-sectional survey carried out in 2016–2017, employing the HLS-EU-Q16 instrument to measure health literacy. Individual-level socio-demographic data were obtained from administrative registers. Associations between employment status and limited health literacy were examined using weighted logistic regression models adjusted for relevant background characteristics. Compared with people in paid employment, individuals receiving various forms of public income support—including unemployment benefits, social assistance, employment and support allowance, retirement pensions, and sickness benefits—were more likely to demonstrate inadequate health literacy. The strongest association was found among unemployment benefit recipients, who showed a 78% higher likelihood of inadequate health literacy (OR = 1.78; 95% CI: 1.23–2.56). Being outside the labor market and dependent on public financial support is associated with a greater risk of limited health literacy, even after accounting for age and socioeconomic position. These findings provide further insight into how employment-related social conditions contribute to health inequalities.

**Keywords:** Health literacy, Labor market attachment, Public transfers, Health inequality, Cross-sectional design, Register-based data

### Introduction

In recent years, health literacy has emerged as a key concept in public health research and policy worldwide [1]. It refers to a multifaceted set of skills that enable individuals to locate, comprehend, evaluate, and use health-related information in ways that support health maintenance and improvement. As the volume and complexity of available health information continue to grow, individuals are increasingly expected to take an active role in managing their own health and preventing disease. This development places greater demands on

people's ability to navigate both reliable information and misinformation and to make informed decisions about prevention, treatment, and care [2].

Limited health literacy has been consistently linked to unfavorable health outcomes. According to the World Health Organization (WHO), individuals with lower health literacy are more likely to engage in unhealthy behaviors, experience poorer overall health, have weaker self-management abilities, and require more frequent hospital care compared with those who have higher health literacy skills [3]. Evidence from a multinational European survey indicates that nearly half of respondents demonstrate limited levels of health literacy [4]. In Denmark, national estimates suggest that approximately 10–20% of the population struggles with core health literacy skills, such as understanding health-related information sufficiently to act upon it or communicating effectively with healthcare professionals [5]. Furthermore, a Danish population-based study reported

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that close to 40% of participants experienced challenges across key health literacy domains, with 8.18% categorized as having inadequate health literacy and 30.94% as having problematic health literacy [6]. Given its strong associations with adverse individual and societal outcomes, limited health literacy is widely recognized as a significant public health concern [7, 8]. Health literacy does not develop in isolation but is shaped through life experiences, including education, work, and broader social conditions [9]. The WHO emphasizes that health literacy should be understood as emerging from the interaction between individuals, organizations, and the settings in which people live and act [3]. Scholarly reviews examining the relationship between health literacy and social context highlight substantial variation in how the concept is theoretically framed and empirically measured across disciplines [10, 11]. Although constructs such as social networks, social support, inclusion, and everyday practices are frequently referenced in theoretical discussions, they are often inconsistently or loosely operationalized in empirical health literacy research [12]. This underscores the importance of accounting for contextual and environmental influences when designing and evaluating health promotion strategies.

In contemporary industrialized societies, employment constitutes a central arena of daily life. Within the European Union, full-time employees work an average of 37 hours per week, making the workplace a key setting for social interaction and health-related initiatives [13]. Employment status plays an important role in shaping both physical and mental well-being, while unemployment has been associated with elevated mortality, poorer self-rated health, and unhealthy lifestyle patterns [14]. In Denmark, differences in employment status are partly mitigated through a universal welfare model that provides financial compensation and social protection, supporting labor market flexibility and social equity [15]. Individuals who are unable to work may receive various forms of public income support through this publicly funded system. However, those outside the workforce may lack access to workplace-based health promotion activities and everyday social interactions with colleagues—factors that could contribute to the development and maintenance of health literacy. Moreover, variation in social and economic resources within employment groups may further influence individual health literacy levels.

Against the backdrop of demographic change and increasing pressure on healthcare systems, strengthening the population's capacity to maintain good health has become increasingly important. Understanding determinants that shape health literacy is therefore essential for effective prevention and health promotion efforts. Employment conditions may represent one such determinant, as occupational circumstances can influence access to information, social resources, and opportunities for learning health-related competencies [16]. Although research examining the relationship between employment status and health literacy remains limited, existing studies suggest that health literacy varies across different labor market positions [17–22]. Accordingly, the present study seeks to examine whether health literacy differs according to employment status by comparing individuals who are not employed with those who are employed. We hypothesize that individuals receiving public financial support are more likely to have inadequate health literacy than those participating in paid employment.

## Materials and Methods

### *Study design*

A nationally representative cross-sectional survey was conducted in Denmark between December 2016 and February 2017. A random sample of 15,682 individuals aged 25 years or older was selected from the Danish Civil Registration System. Of those invited, 8,997 completed a self-administered electronic questionnaire. Invitations were distributed primarily through *e-Boks*, the secure digital mailbox used by Danish public authorities to communicate with citizens.

To enhance representativeness, a subsample of participants ( $n = 1,082$ ) was additionally contacted by telephone. Sampling was stratified by sex, age group, and geographical region. All study materials were provided in Danish. After excluding cases with missing or insufficient information, the final analytical sample consisted of 8,767 respondents, corresponding to a response rate of 57.4%.

### *Measures*

The questionnaire included the European Health Literacy Survey instrument (HLS-EU-Q), which covers four thematic domains: (1) health literacy, (2) health-related behaviors, (3) health risk factors, and (4) self-rated health. Survey responses were linked to individual-level

data from national administrative registers maintained by Statistics Denmark, providing information on demographic characteristics, socioeconomic conditions, employment status, and health-related indicators.

#### Health literacy assessment

Health literacy was assessed using the 16-item short form of the European Health Literacy Survey Questionnaire (HLS-EU-Q16). Each item was rated on a four-point Likert scale ranging from “very difficult” to “very easy” [23]. For analytical purposes, response categories were dichotomized into “easy” (combining “fairly easy” and “very easy”) and “difficult” (combining “fairly difficult” and “very difficult”).

A composite health literacy score was calculated by summing item responses, resulting in a possible range from 0 to 16, while allowing for a limited number of missing responses. Participants who provided valid answers to at least 14 of the 16 items were included in the analyses [24]. To distinguish individuals with sufficient versus limited competencies, the total score was further dichotomized into two categories: *adequate health literacy* (scores 13–16) and *inadequate health literacy* (scores 0–12), where the latter encompasses both problematic and insufficient levels of health literacy [23, 24].

#### Employment status variable

Information on participants’ employment status was retrieved from the Danish DREAM register [25]. This administrative database provides weekly records of individuals’ primary income sources, including both employment-related earnings and various forms of public income support received by individuals outside the labor market. The register is compiled using data from the Ministry of Employment and integrates information from education and taxation authorities [25].

For the present study, register data covering the period from week 27 of 2015 to week 26 of 2016 were extracted. For each participant, the number of weeks spent in a given employment category or receiving a specific type of public transfer during this period was identified. Employment status was categorized based on either the dominant industrial sector for those in work or the primary type of publicly funded financial support for those not employed.

The public income support categories included in the analyses were: unemployment benefits, social assistance, employment and support allowance, sickness benefits, retirement pension, voluntary early retirement pension, and a residual category labeled “other” [26, 27]. A detailed description of these categories is provided in

#### Table 1.

**Table 1.** Description of relevant public support for people not in work.

Category	Description
<b>Unemployment Benefits</b>	A optional personal insurance program for unemployment that provides benefits for up to two years. Eligibility includes membership in an unemployment fund, registration as a job seeker at a government employment center, meeting specific work history criteria, being ready for employment, and ensuring the unemployment is not due to one's own actions.
<b>Social Assistance</b>	A government program that offers financial aid to individuals unable to sustain themselves or their dependents. It requires exhausting all possible job options first.
<b>Employment and Support Allowance</b>	Financial aid from the public sector designed to provide a stable income base for those with long-term, substantially impaired ability to work who cannot maintain themselves financially.
<b>Sickness Benefit</b>	Monetary reimbursement for earnings lost because of illness-related absence from work. Qualification demands an active link to the labor market.
<b>Retirement Pension</b>	A state-funded pension that guarantees income for all Danish residents exiting the workforce at the legal retirement age, which varies by year of birth.
<b>Voluntary Early Retirement Pension</b>	An elective program allowing full or partial exit from the workforce prior to standard retirement age, provided certain criteria are met, such as at least 30 years of uninterrupted membership payments.

#### Confounding variables

Several variables were treated as potential confounders, including age, sex, cohabitation status, educational

attainment, immigration background, and household income. These data were obtained from a combination of survey responses and national administrative registers.

Information on sex, age, and immigration status was drawn from the Danish Civil Registration System, which contains demographic records for all residents with a personal identification number [28]. Educational data were retrieved from the Danish Education Registers [29] and referred to the highest completed level of education one year prior to survey participation. Household income data were obtained from the Danish Income Register [30] and were based on earnings reported for the years 2013–2015. Income values were included in the analyses only when data were available for at least two of the three years; if information was missing for one year, the mean of the remaining two years was used. Information on cohabitation was collected directly through the questionnaire.

For analytical purposes, confounding variables were operationalized as follows. Sex was coded as a binary variable (“female” or “male”). Age was grouped into five categories: 25–34, 35–44, 45–54, 55–64, and 65 years or older. Immigration background was dichotomized into “Danish” and “non-Danish,” the latter including both immigrants and their descendants. Educational attainment, defined as the highest completed level, was categorized into five groups: “basic,” “upper secondary/vocational,” “medium,” “high,” and “unknown.” Medium-level education comprised short- and medium-cycle higher education as well as bachelor’s degrees, whereas high-level education included master’s and doctoral degrees. Household income was classified as a binary variable indicating whether the individual’s average income was below or above the sample mean.

Cohabitation status was initially measured using six indicator variables: living with a partner or spouse; living with one or more children under 16 years of age; living with parents; living alone; living with other adults aged over 20 years; and living with young people aged 16–20 years. These indicators were subsequently combined into a single categorical variable with five mutually exclusive groups: “partner only,” “partner and child under 16,” “child under 16 only,” “living alone,” and “other living arrangements.”

### *Ethics*

Approval for data processing was granted by the Danish Data Protection Agency (journal number 2008-58-0028), and all procedures complied with the principles of the Declaration of Helsinki. Under Danish legislation, studies based on questionnaire data and register linkages

do not require approval from a medical research ethics committee [31]. Participants were informed about data usage and voluntary participation, and completion of the questionnaire was regarded as implied consent.

### *Statistical Analyses*

Chi-square tests were used to examine whether participant characteristics were associated with survey participation. Logistic regression models were applied to estimate the relationship between receipt of public financial support and health literacy, while adjusting for sex, age, immigration background, educational level, cohabitation status, and household income.

To account for differential non-response, survey weights were constructed using predicted response probabilities derived from a logistic regression model including sex, age, and education for both respondents and non-respondents. These probability weights were applied in all subsequent analyses using survey-design commands. Potential interaction effects by sex were evaluated by comparing changes in model fit (pseudo  $R^2$ ) and assessing the statistical significance of interaction terms. Statistical significance was defined as a two-sided  $p$ -value below 0.05. Results are reported as odds ratios (ORs) with corresponding 95% confidence intervals (CIs). All analyses were conducted using STATA/MP version 15.1.

## **Results and Discussion**

**Table 2** presents the characteristics of participants included in the analyses, stratified by mode of data collection: respondents who completed the web-based questionnaire ( $N = 7,862$ ) and those interviewed by telephone ( $N = 905$ ). Among individuals invited to complete the online survey, response likelihood differed significantly by age group, immigration background, educational level, and mean annual household income (all  $p < 0.001$ ), indicating that these factors were associated with participation in the web-based mode.

For respondents interviewed by telephone, no statistically significant associations were observed between participation and sex, age group, or average annual household income. However, immigration status was significantly related to response probability in this group ( $p = 0.004$ ). Due to small cell sizes ( $N < 5$ ), educational level is not shown for the telephone interview subgroup in **Table 2**.

**Table 2.** Responder analysis stratified for online and telephone survey.

Category	Online Survey				p-value	Telephone Survey				
	Participants (N=7,862)		Non-Participants (N=6,636)			Participants (N=905)		Non-Participants (N=46)		
	N	%	N	%		N	%	N	%	
<b>Sex</b>					<0.001					0.348
<b>Female</b>	4,331	55.09	2,915	43.93		467	51.60	27	58.70	
<b>Male</b>	3,531	44.91	3,721	56.07		438	48.40	19	41.30	
<b>Age Groups</b>					<0.001					0.189
<b>25–34</b>	950	12.08	1,668	25.14		150	16.57	7	15.22	
<b>35–44</b>	1,341	17.06	1,789	26.96		213	23.54	6	13.04	
<b>45–54</b>	1,951	24.82	1,493	22.50		189	20.88	11	23.91	
<b>55–64</b>	1,850	23.53	1,010	15.22		180	19.89	15	32.61	
<b>65+</b>	1,770	22.51	676	10.19		173	19.12	7	15.22	
<b>Immigration Status</b>					<0.001					0.004
<b>Danish</b>	7,347	93.45	5,455	82.46		848	93.70	38	82.61	
<b>Foreigner</b>	515	6.55	1,160	17.54		57	6.30	8	17.39	
<b>Average Household Income per Year (DKK)</b>					<0.001					0.649
<b>Below group average</b>	4,259	54.17	4,138	63.39		540	59.67	29	63.04	
<b>Above group average</b>	3,603	45.83	2,390	36.61		365	40.33	17	36.96	

Notes: Row percentages are presented

<sup>a</sup>Cleaned data sample, participant characteristics (N = 230)

<sup>b</sup>Missing values for non-participants (N = 3)

<sup>c</sup>Chi<sup>2</sup> analysis presented

The prevalence of inadequate health literacy was 39% (Table 3). The highest prevalence of inadequate health literacy was found for the group receiving unemployment

benefit, around 54% and the lowest distribution was found for the group being on voluntary early retirement pension, around 32%

**Table 3.** Prevalence of inadequate and adequate health literacy by relevant covariates (crude and weighted prevalence).

Category	Adequate		Inadequate		Total	
	N (%) <sup>a</sup>	Weighted % <sup>a</sup>	N (%) <sup>a</sup>	Weighted % <sup>a</sup>	N (% of total) <sup>b</sup>	Weighted % <sup>b</sup>
<b>Overall</b>	5,461 (62.29)	61.02	3,306 (37.71)	38.98	8,767 (100)	100.00
<b>Employment Status</b>						
Employed	3,589 (63.31)	62.16	2,080 (36.69)	37.84	5,669 (64.66)	67.27
Unemployment Benefits	67 (49.26)	46.46	69 (50.74)	53.54	136 (1.55)	1.70
Social Assistance	61 (45.19)	46.94	74 (54.81)	53.06	135 (1.54)	2.11

Employment and Support Allowance	163 (52.75)	51.19	146 (47.25)	48.81	309 (3.52)	3.48
Sickness Benefit	129 (52.65)	51.64	116 (47.35)	48.36	245 (2.79)	2.97
Retirement Pension	966 (64.36)	63.88	535 (35.64)	36.12	1,501 (17.12)	13.19
Voluntary Early Retirement Pension	172 (68.25)	67.94	80 (31.75)	32.06	252 (2.87)	2.36
Others	314 (60.38)	59.08	206 (39.62)	0.92	520 (5.93)	6.92
<b>Sex</b>						
Female	3,197 (66.63)	65.40	1,601 (33.37)	34.60	4,798 (54.73)	50.22
Male	2,264 (57.04)	56.61	1,705 (42.96)	53.39	3,969 (45.27)	49.78
<b>Age Groups</b>						
25–34	610 (55.45)	55.29	490 (44.55)	44.71	1,100 (12.55)	17.95
35–44	927 (59.65)	58.89	627 (40.35)	41.11	1,554 (17.73)	21.58
45–54	1,355 (63.32)	62.62	785 (36.68)	37.38	2,140 (24.41)	23.59
55–64	1,295 (63.79)	63.03	735 (36.21)	36.97	2,030 (23.16)	19.81
65+	1,274 (65.57)	65.23	669 (34.43)	34.77	1,943 (22.16)	17.07
<b>Immigration Status</b>						
Danish	5,139 (62.71)	61.41	3,056 (37.29)	38.59	8,195 (93.48)	91.40
Foreigner	322 (56.29)	56.95	250 (43.71)	43.05	572 (6.52)	8.60
<b>Education</b>						
Basic School	842 (59.38)	58.17	576 (40.62)	41.83	1,418 (16.17)	17.90
High School/Vocational	2,238 (60.26)	59.09	1,476 (39.74)	40.91	3,714 (42.36)	41.80
Medium	1,629 (67.01)	66.12	802 (32.99)	33.88	2,431 (27.73)	24.47
High	632 (62.76)	61.63	375 (37.24)	38.37	1,007 (11.49)	10.68
Unknown	120 (60.91)	61.23	77 (39.09)	38.77	197 (2.25)	5.15
<b>Average Household Income per Year (DKK)</b>						
Below Group Average	2,901 (60.45)	59.05	1,898 (39.55)	40.95	4,799 (54.74)	56.25
Above Group Average	2,560 (64.52)	63.57	1,408 (35.48)	36.43	3,968 (45.26)	43.75
<b>Cohabitation</b>						
Spouse/Partner	2,852 (63.93)	62.98	1,609 (36.07)	37.02	4,461 (50.88)	48.56
Partner and Children	884 (60.10)	59.22	587 (39.90)	40.78	1,471 (16.78)	18.72
Only Child	324 (55.67)	54.67	258 (44.33)	45.33	582 (6.64)	7.40
Alone	912 (60.24)	58.31	602 (39.76)	41.69	1,514 (17.27)	16.79

Others	489 (66.17)	64.69	250 (33.83)	35.31	739 (8.43)	8.54
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<sup>a</sup>Row percentages are presented

<sup>b</sup>Column percentages are presented

Logistic regression (**Table 4**) showed that receiving unemployment benefits, social assistance, employment and support allowance, sickness benefit and retirement pension were significantly associated with having inadequate health literacy compared to being employed. For those receiving unemployment benefits, the association with having inadequate health literacy was significant with OR = 1.78 (95% CI:1.23–2.56) when adjusted for sociodemographic variables age group, sex, cohabitation, education group, immigration status and household and income. Furthermore, for the group receiving employment and support allowance, the association with having inadequate health literacy was also significant with an OR = 1.61 (95% CI:1.25–2.07).

**Table 4.** Odds ratio for employment status and inadequate health literacy (weighted data).

Category	Crude OR (95% CI)	Adjusted for Socio-Demographic Variables <sup>a</sup> OR (95% CI)
Unemployment Benefits	1.89 (1.33–2.70)	1.78 (1.23–2.56)
Social Assistance	1.85 (1.28–2.68)	1.49 (1.01–2.17)
Employment and Support Allowance	1.57 (1.24–1.98)	1.61 (1.25–2.07)
Sickness Benefit	1.54 (1.18–2.00)	1.53 (1.17–2.01)
Retirement Pension	0.93 (0.82–1.05)	1.34 (1.06–1.71)
Voluntary Early Retirement Pension	0.77 (0.59–1.02)	0.97 (0.72–1.29)
Others	1.14 (0.93–1.39)	1.04 (0.85–1.27)

<sup>a</sup>Adjusted for age group, sex, cohabitation, education group, immigrant status and household income.

This study identified clear differences in the prevalence of inadequate health literacy across groups receiving different forms of public financial support. Among individuals outside the labor market, between 32% and 54% were classified as having inadequate health literacy, with the highest prevalence observed among recipients of unemployment benefits. Overall, 39% of the study

population exhibited inadequate health literacy. With the exception of individuals receiving voluntary early retirement pensions, all categories of public support were significantly associated with a higher likelihood of inadequate health literacy. These findings align with the study hypothesis and support existing evidence indicating that individuals who are unemployed or otherwise detached from the labor market are more likely to have limited health literacy [17–22, 32]. Nevertheless, differences in study design, populations, and measurement approaches should be considered when comparing results across studies.

Previous research conducted in diverse national contexts supports the observed association between employment status and health literacy. For example, Wu et al. [17] reported in a community-based Chinese study of 1,360 participants aged 15–69 years that unemployed individuals were more likely to exhibit low health literacy than those employed in technical or professional occupations. Similarly, a nationwide study from Japan by Furuya et al. [18], including 1,237 participants, found that levels of communicative and critical health literacy differed significantly by employment status, with the lowest scores observed among unemployed respondents. In addition, Van der Heide and colleagues [20] demonstrated that employment status was an important predictor of both self-assessed and performance-based health literacy, with individuals outside the workforce showing lower average scores than those in employment. Their findings further indicated that not being employed was independently associated with poorer performance-based health literacy outcomes.

Health literacy builds upon foundational literacy skills but also requires the capacity to obtain, interpret, and apply health-related information, as well as the ability to translate knowledge into action—an essential component of effective health promotion [33, 34]. Based on existing literature, employment status appears to be closely linked to these competencies. One possible explanation is that participation in paid work provides opportunities for ongoing learning, cognitive engagement, and exposure to information-rich environments, all of which may strengthen general literacy and related skills necessary for navigating health information [20]. However, the

direction of causality between employment and health literacy remains uncertain, as lower health literacy may also limit access to stable employment.

In addition to employment status itself, educational attainment plays a central role in shaping health literacy levels [35]. Given the strong relationship between education and labor market position, individuals with higher occupational status or more advanced educational backgrounds tend to demonstrate higher health literacy [19]. Supporting this notion, Wu et al. [17] found particularly high levels of inadequate health literacy among individuals engaged primarily in manual labor. These findings underscore the presence of a social gradient in health literacy [36], suggesting that both the nature of one's occupation and the broader working environment contribute to the development and maintenance of health literacy skills.

### *Implications*

The findings of this study have several important implications for public health practice and policy. The observed association between employment status and health literacy suggests that the workplace may represent a key setting for fostering health literacy competencies. Employment appears to be linked to health literacy independently of age, sex, cohabitation, educational attainment, immigration background, and household income. This highlights the relevance of considering occupational attachment when addressing differences in health literacy across population groups.

Over recent decades, health promotion strategies have increasingly shifted from an individual behavior-oriented focus toward a settings-based approach, emphasizing how environments such as workplaces can support healthier choices and behaviors [37]. Workplaces can provide structures, social interactions, and resources that encourage engagement in health-promoting activities and facilitate access to relevant information [38]. Individuals who are outside the labor market may therefore lack exposure to such supportive environments, potentially limiting opportunities to develop or maintain health literacy skills.

Public health initiatives should also recognize that individuals receiving public financial support represent a heterogeneous group with diverse needs and circumstances. Tailored strategies are therefore required when designing interventions aimed at improving health literacy among populations outside paid employment. Given that nearly 40% of individuals receiving economic

support in this study exhibited inadequate health literacy, targeted and context-sensitive approaches are especially warranted. Strengthening health literacy may serve as one pathway to reducing social inequalities in health [3]. Reducing disparities in health literacy may also have broader societal benefits. Improved health literacy could support greater participation in the labor market and, over time, contribute to lowering public expenditure related to social and economic support. In light of demographic changes and increasing pressure on healthcare systems, promoting both population health and employability becomes increasingly important. Although causal relationships cannot be established from the present findings, the results suggest that labor market participation may play a role in supporting health literacy and, by extension, overall health outcomes.

### *Strengths and Limitations*

Several limitations should be taken into account when interpreting the results. First, the cross-sectional design precludes causal inference, as exposure and outcome were measured at the same point in time [39]. It therefore remains unclear whether employment status influences health literacy or whether health literacy affects individuals' ability to obtain or maintain employment. Longitudinal studies are needed to clarify the direction of this relationship.

Second, health literacy was assessed using the HLS-EU-Q16, which captures self-perceived abilities rather than objectively measured competencies. Self-report measures may be subject to systematic overestimation or underestimation of skills, potentially influencing the observed associations [40, 41]. In addition, survey participation tends to attract individuals with greater resources, which may introduce selection bias. Although telephone interviews were included to reach participants with potentially lower literacy levels, this subgroup was relatively small, which may limit robustness.

Despite these limitations, the study has several notable strengths. It draws on a large, nationally representative sample stratified by sex, age, and geographical region, enhancing generalizability. The linkage of survey data with high-quality national register information allowed for precise measurement of socioeconomic and employment-related variables. Furthermore, the use of probability weighting helped adjust for differential response patterns and improve representativeness. The inclusion of telephone interviews also supported

participation among individuals who may otherwise be underrepresented in survey research.

### Conclusion

This study demonstrates a clear association between receipt of public financial support and inadequate health literacy, even after accounting for key sociodemographic and socioeconomic factors. The findings contribute to a broader understanding of health inequalities related to employment status and highlight the interconnected roles of labor market participation, health literacy, and health outcomes. Although causal conclusions cannot be drawn, the results underscore the need for targeted preventive strategies aimed at improving health literacy among populations outside the workforce. In the context of demographic change and increasing demands on healthcare and labor systems, such efforts may support both individual well-being and broader societal sustainability.

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