

Does Health Literacy Affect the Uptake of Annual Physical Check-Up?: The Varying Impact by Age Groups

Hee Yun Lee

University of Alabama

Sooyoung Kim (✉ kimsy@cup.ac.kr)

<https://orcid.org/0000-0002-0428-5723>

Jessica Neese

University of Alabama

Mi Hwa Lee

East Carolina University

Research article

Keywords: Health literacy, physical check-up, older adults, young adults, Andersen model

Posted Date: February 14th, 2020

DOI: <https://doi.org/10.21203/rs.2.23629/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Introduction Little is known about how health literacy is linked to physical check-ups. This study aimed to examine the levels of physical check-ups by age group and the role of health literacy regarding physical check-ups. **Methods** Data for the study were obtained from the 2017 Health Information National Trends Survey. The original sample included 3,285 respondents, but only 3,146 surveys were used for this study. Andersen's Behavioral Model of Health Services Use (Andersen, 1995) guided this study, and a binomial logistic regression model was conducted using Stata 12.0 software package. **Results** Annual check-ups were reported by 82.0% of the older group and 67.3% of the younger group. Both groups had similar ratios for health literacy-related item reporting. Study results show that annual check-up was positively associated with confidence in getting health information, having health insurance, and having a primary doctor for both age groups. However, getting a regular check-up was negatively associated with frustration while searching for information among the younger group while it was positively associated with difficulty understanding information for the older group. **Conclusions** To increase annual physical check-ups, health literacy-related interventions should be developed and address the barriers most associated with health check-ups. One way of addressing this barrier is to improve the line of communication from healthcare professionals to consumers through the use of easy-to-understand explanations appropriate for the consumer.

Introduction

Routine physical check-ups offer multiple health benefits that can lead to a longer, healthier life. Regular check-ups are used to assess the general health of individuals and prevent future illnesses [1]. Check-ups give health care providers an opportunity to get to know their patients better [2], allow for early detection of health problems at the beginning or early stages, and offer better treatment chances [3,4], and can be cost-saving [4]. Despite the positives associated with regular check-ups, some argue there is no clear evidence to support the need of physical check-ups [5] while others believe that annuals increase diagnoses and medications but does not affect ways to decrease morbidity and mortality from diseases such as cardiovascular issues and cancer [2]. Contrary to critics' arguments, physicals check-ups are still needed in order to continue to identify and detect diseases and other health issues that individuals experience early [6]. By being at the forefront of these diseases and issues, physicians can provide individuals with the appropriate services or refer them to specialists and reduce patients' concerns [1].

Previous studies have reported various barriers and facilitators associated with regular check-ups including socio-demographic characteristics (e.g., age, gender, income) [7,8,9], accessibility to health care services (e.g., health insurance, primary doctor, and living area) [10,11,12,13], personal history of cancer [14,15], and family cancer history [16]. For instance, young adults between the ages of 18-26 with a usual source of care were more likely to utilize physical check-ups [17] and having health insurance increased the likelihood of routine check-ups [13]. On the other hand, individuals in rural areas were less likely to have physical check-ups because obtaining a primary care doctor was difficult as physicians are typically in cities and more affluent suburbs, and having low income was associated with not seeing a doctor for

check-ups because of cost [18]. Individuals with a history of cancer were more likely to utilize check-ups than those without a history [14,15], but having a family history of cancer did not increase one's routine check-ups use [16]. Another facilitating factor includes having a history of physical check-ups. Labeit and colleagues (2013) concluded that individuals who visited a general physician in the past year were more likely to make an appointment for the coming year, suggesting that once the behavior of annual check-ups is initiated, the behavior will continue.

In addition to the literature supporting factors associated with physical check-ups, health literacy could be another critical factor to explain for an individual's physical check-up [19,20]. For example, people with limited health literacy tend to have cancer screenings and immunizations less frequently [21]. However, little is known about how health literacy is linked to physical check-ups. To our best knowledge, this is the first study to investigate the contribution of health literacy to the uptake of physical check-up. Hence, this study aimed to examine the levels of physical check-up uptake and factors associated with physical check-up with specific attention to the role of health literacy on physical check-up uptake in two age groups. In our study, health literacy was defined as an individuals' ability to obtain, process, and understand basic health information in order to make responsible decisions regarding their health [22, 23, 24].

Conceptual Framework

Andersen's Behavioral Model of Health Services Use [25] guided this study. The Andersen model is commonly used in studies on a variety of different health services divisions and diseases, such as HIV, dental, and long-term care [26,27,28]. In addition, the model has been used to predict variables associated with health literacy [29,30,31].

According to the Andersen model, individuals' access to and use of health services are explained by a function of three components of predisposing, enabling, and need factors [28]. Predisposing factors are an individual's social-cultural characteristics (e.g., age, gender, income, and living area). Enabling resources reflect condition making healthcare available to individuals (e.g., health literacy, education, health insurance, and primary doctor). Need factors are an individual's beliefs on their health and access to services such as self-reported health and the number of diseases (e.g., cancer, depression, etc.) and personal and family history of cancer. Figure 1 shows the conceptual model of this study.

Methods

Data and Sample

Data used for the current study is derived from the 2017 Health Information National Trends Survey (HINTS). A single-mode mail survey administered in English and Spanish was generated and dispersed in January to May 2017. The original sample included 3,285 respondents, but our study sample included 3,146. To achieve the objectives of the present study, we excluded those aged under 18 years (N=139). The sample was categorized into two age subgroups: those aged 18–59 years and those aged ≥ 60

years. Overall, the sample consisted of 1,681 respondents aged 18–59 years and 1,465 respondents aged ≥ 60 years.

Measures

Dependent Variables

The dependent variable measured respondents' self-reported check-up within the last year (1= Yes, 0 = No).

Independent Variables

Three sets of independent variables were included, which represented the predisposing, enabling, and need factors of the Andersen model.

- 1. Predisposing factors:** Four predisposing factors included age, gender (male=0; female=1), income, and living area (rural=0; urban=1). Income was measured with nine categories (1 = \$0–9,999; 2 = \$10,000–14,999; 3 = \$15,000–19,999; 4 = \$20,000–34,999; 5 = \$35,000–49,999; 6 = \$50,000–74,999; 7 = \$75,000–99,999; 8 = \$100,000–199,999; 9 \geq \$200,000), but collapsed into two groups (less than \$74,999=0; \$75,000 or more=1). Living area was measured as rural or urban and the areas were defined by the 2013 Rural-Urban Continuum
- 2. Enabling Factors.** Four enabling factors included health literacy, education, health insurance, and primary doctor. Health literacy was measured using five items: (1) it took great effort to get the information you need, (2) you felt frustrated during your search for information, (3) you were concerned about the quality of the information you found, (4) the information you found was hard to understand, and (5) confidence in getting health information. The first four items are based on a 4-point scale ranging from *strongly disagree* (1), to *strongly agree* (4). For analysis, all items were dichotomized (0=disagree; 1=agree). The last health literacy item (confidence in getting health information) was measured on a 5-point scale from *not confident at all* (1) to *completely confident* (5). For analysis, it was dichotomized as not very confident (0) or very confident (1). Education was measured by seven categories (1 = less than eight years; 2 = eight through 11 years; 3 = 12 years or completed high school; 4 = post-high school training other than college; 5 = some college; 6 = college graduate; 7 = postgraduate) and the level of education was dichotomized as high school diploma or less (0) or some college and above (1). The two variables of health insurance and primary doctor were measured using a *yes* (1) or *no* (0) question.
- 3. Need Factors.** Four need factors consisted of health status, depression, personal history of cancer, and family history of cancer. Health status was measured a single question on a five-scale from *poor* (1) to *excellent* (5). Depression was measured using four items (i.e., little interest or pleasure in doing things; feeling down, depressed, or hopeless; feeling nervous, anxious, or on edge; not being able to stop or control worrying). All the items were on a four scale from *not at all* (1) to *nearly every day* (4), with a higher score indicating a high level of depression. The total score of each item was computed

by summing all the individual items. Two questions of cancer history were measured if the respondent has cancer (*yes*=1; *no*=0) and if their family has cancer (*yes*=1; *no*=0).

Data Analysis

Our analytic process involved two steps. In step one, descriptive statistics were calculated to generate frequencies and proportions for sociodemographic characteristics of the sample and the health literacy and check-up variables. These statistics were calculated by younger and older age groups. Differences between younger and older respondents were examined using χ^2 tests with an α level of 0.05. In the second step, to examine the role of health literacy on a physical check-up uptake among study samples, we used a binomial logistic regression model with adjustments for predisposing factors, enabling factors, and need factors. All analyses applied jackknife weighting procedures provided by HINTS for analysis of the complex survey design and were conducted using survey procedures in Stata version 12.0 [32]. This allowed us to produce a valid variance estimation that eventually led us to produce unbiased estimates.

Results

Sociodemographic Characteristics

Table 1 presents the sociodemographic characteristics by age group. Of the 1,681 in the 18-59 age group, 67.3% had an annual check-up within the past year as well as 82.0% of the 1,465 respondents in the 60 years or older group. The average age was 44 years (SD = 10.737) in the younger group and 70 years (SD = 7.999) in the older group. There were relatively more females than males in both age groups. About 56.41% of the younger group and 72.42% of the older group members earned <\$75,000 per year. Most (88.58% and 84.37%, respectively) participants lived in an urban area. Two-fifths of the younger group completed some college or higher, and nearly half (41.18%) of the older group had a high school diploma or less. The majority in both groups had health insurance. More than a third in the younger group and most (81%) of the older group had a primary doctor and 86.1% of the younger and 77.79% of the older group reported their health as more than good. The average depression level was higher in the younger group (6.069, SD = 2.923) than the older group (5.747, SD = 2.617). Only 7.74% had ever had cancer in the younger group and 24.16% in the older group. Second, the younger and older groups had similar ratios for health literacy-related item reporting. More than a third put forth a lot of effort to get information and felt frustrated during searches for information. Nearly half reported that understanding the information they found was difficult, yet almost 60% of respondents in both groups reported that they felt confident getting health information. Lastly, as can be seen by the cross-tabulated frequencies in Table 1, there were significant relationships between health insurance ($\chi^2 = 35.753, p < 0.000, \chi^2 = 11.950, p < 0.000$), primary doctor ($\chi^2 = 129.341, p < 0.000, \chi^2 = 57.508, p < 0.000$), confidence in getting health information ($\chi^2 = 8.142, p < 0.01, \chi^2 = 5.343, p < 0.5$) and uptake of check-ups for both age groups. Among the younger group, there were significant relationships between gender ($\chi^2 = 8.383, p < 0.01$), income ($\chi^2 = 4.697, p < 0.05$), great effort required to get information ($\chi^2 = 8.841, p < 0.05$),

frustration while searching for information ($\chi^2 = 16.449, p < 0.000$), concerns about the quality of retrieved information ($\chi^2 = 4.962, p < 0.05$) and uptake of check-ups.

Factors Associated with Physical Check-Up

Estimates from the binominal logistic regression model presented in Table 2 show that annual check-up associated positively with confidence getting health information (OR = 1.184, 95% CI=1.029-1.362, OR = 1.209, 95% CI=1.011-1.446), health insurance (OR = 2.519, 95% CI=1.595-3.979, OR = 2.314, 95% CI=1.026-5.223), and primary doctor (OR = 2.833, 95% CI=2.231-3.596, OR = 2.721, 95% CI=1.927-3.840) for both age groups. However, the dependent variable was negatively associated with frustration while searching for information (OR = .773, 95% CI=0.631-0.946) and positively associated with age (OR = 1.025, 95% CI=1.014-1.037) and gender (OR = 1.305, 95% CI=1.031-1.653) among the younger group and positively associated with the term information you found was hard to understand (OR = 1.403, 95% CI=1.060-1.857) for the older group.

Discussion

Guided by Andersen's Behavioral Model, the current study examined the levels of physical check-ups and factors associated with physical check-ups with a specific focus on the role of health literacy in the uptake of physical check-up in two age groups. Of the participants in the older group, 82% reported an annual check-up within the last year, while only 67.3% of the younger group reported the same. Our findings are consistent with previous studies that older group received more physical check-ups than younger adults [7,33,34,35]. Among the Korean participants of a similar study, 29.5% of the older age group regularly visited the doctor, and only 8% of the younger group reported regular visits, further proving that older adults utilize regular visits to the doctor more than younger adults [35]. It might be a rational assumption that older adults take action as the onset of negative health issues arise rather than waiting like younger adults who are less likely to experience health issues and have a positive perception about their health.

The results from binominal logistic regression analysis indicated that two predisposing factors (age and gender) in the younger group and three enabling factors (health literacy, health insurance, and primary doctor) in both age groups were significant factors of an annual check-up. All of the need factors used in the study were not associated with annual health check-ups in both groups. In the younger age group, older and female participants tended to get an annual check-up more than their younger and male counterparts. Previous studies report that women visit their primary care clinic and use preventive care services more often than men [8,36]. Such behaviors might be rooted in traditional women's role and responsibility in managing the family's health [37] and men's lack of help-seeking behavior. Men tend to feel weak and vulnerable in help-seeking situations and viewing health symptoms as minor or insignificant [38, 39].

The current study indicated that health literacy is an important enabling factor of annual check-ups. This study found that three different items of health literacy predicted annual check-up in both age groups. For the younger group, feelings of frustration when searching for information negatively influenced partaking in annual check-ups; however, the majority of older adults indicated that difficulty in understanding information was positively associated with partaking in annual check-ups. It seems that when feeling frustrated in searching for information, the younger age group may pursue an annual check-up where they can directly ask health questions to health care professionals. In contrast, for the older age group, when having difficulty in understanding health information, they might tend to pursue physical check-up to ask meanings and accuracy of health information to their health care providers.

Although both groups expressed issues with health information, whether obtaining or understanding, study results indicated that annual health check-ups were positively associated with confidence in getting health information for both groups. Confidence in obtaining health information can stem from having reliable sources of information via the web, social media, friends, and a primary care doctor to provide more information, and knowledge allows the transition to improved regular check-up behavior. These reliable sources of information also impacted health literacy levels among participants of the 2003 National Assessment of Adult Literacy [40]. Participants with proficient levels of health literacy relied on the internet or personal contacts, such as health care professionals, to answer health-related questions, those with basic or intermediate health literacy levels relied on newspapers or magazines, and individuals with below basic health literacy, gathered their healthcare information mainly from either the radio or television [40].

Other enabling factors associated with annual check-ups were health insurance and a primary doctor for both groups. Study participants who had health insurance and a primary doctor were more likely to get annual check-ups than those who did not have either. This finding is not surprising given that health insurance and having a primary doctor are key factors in accessing health care and utilizing preventive health care.

Limitations

While the current study findings provide insight into the association between health literacy and physical check-up, there exist some limitations. First, this is a cross-sectional study, and only correlation could be identified. More future longitudinal studies are needed to further explore the causal relationship between health literacy and physical check-up. Second, the explanatory power of the identical model is low. This model could explain only 9.0% and 5.25% of the total variance among respondents aged between 18 and 59 years and over 60 years, respectively. There may exist some other important factors to better explain the variance of health check-up among specific age groups. Another limitation to add is that outcome measure (physical check-up) was self-reported rather than clinically or behaviorally measured, which might have caused response biases.

Implications for Health Practice and Policy

Several methods to increase annual health check-up are suggested. First, many participants in our study showed frustrations in searching for health information and difficulty to understand the meaning of the medical terminologies used by professionals. Health care professionals have the responsibility to share healthcare information to not only their patients but to the larger community as well by using the right communication strategies. Medical information should be translated into easy-to-understand language by healthcare professionals. Additionally, policies should recommend medical facilities or primary doctors to provide routine reminders via call/text/email regarding upcoming appointments as it may instill awareness and enhance health literacy to include health check-ups in the person's agenda [34,41]. Moreover, it is critical for health care professionals and policymakers to have different strategies for each age group to enhance health literacy. For younger age groups, providing easily accessible health information and cultivating the capacity to find health information would be crucial. The ability to obtain accurate medical information quickly and conveniently via online may provide an opportunity for better-informed decision making. At the same time, for older age groups, providing education to improve understanding of health materials should be provided [42,43]. Lastly, it is important to increase preventive medical service utilization such as annual check-ups, ultimately to aid in preventing health deterioration. The Institute of Medicine [44] states that the individual's efforts alone have limitations in improving health literacy. Therefore, it will be necessary to understand the mutual function between the individual and the medical environment, as well as environmental changes. Moreover, efforts to decrease the barriers in accessibility for regular health check-ups should be accompanied by bringing awareness and service to the community with special efforts from the health care settings.

Declarations

Ethics approval and consent to participate: Not applicable

Consent for publication: Not applicable. The present study used public dataset.

Competing interests: The authors declare that they have no competing interests

Funding: This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2018S1A3A2075402).

Authors' contributions: SYK and JN analyzed and interpreted the data regarding the health literacy and physical health check-up. HYL performed the background and discussion, and was a major contributor in writing the manuscript. MHL conducted the conclusion. All authors read and approved the final manuscript.

Acknowledgements: Not applicable

References

1. Virgini V, Meindl-Fridez C, Battegay E, Zimmerli LU. Check-up examination: recommendations in adults. *Swiss Med Wkly*. 2015 Jan 30;145:w14075. doi: 10.4414/smw.2015.14075.
2. Gorbenko, K, Metcalf, SA, MPhil, MM, Crump C. Annual physical examinations and wellness visits: Translating guidelines into practice. *Am J Prev Med*. 2017; 52(6): 813-816. doi:10.1016/j.amepre.2016.12.005
3. Centers for Disease Control and Prevention. Check-Ups are Important - Family Health - CDC. Retrieved 2019 from <https://www.cdc.gov/family/checkup/index.htm>
4. Labeit A, Peinemann F, Baker R. Utilisation of preventative health check-ups in the UK: findings from individual-level repeated cross-sectional data from 1992 to 2008. *BMJ open*. 2013;3(12), e003387. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3884617/pdf/bmjopen-2013-003387.pdf>
5. O'Malley PG, Greenland P. The annual physical: Are physicians and patients telling us something? *Arch. Intern. Med*. 2005;165(12):1333-1334. doi:10.1001/archinte.165.12.1333
6. Maciosek MV, Coffield AB, Flottemesch TJ, Edwards NM, Solberg LI. Greater use of preventive services in US health care could save lives at little or no cost. *Health Aff*. 2010; 29(9):1656-1660. doi: 10.1377/hlthaff.2008.0701.
7. Miller NA, Kirk A, Alston B, Glos L. Effects of gender, disability, and age in the receipt of preventive services. *Gerontologist*. 2014; 54(3): 473-487. doi:10.1093/geront/gnt012
8. Vaidya V, Partha G, Karmakar M. Gender differences in utilization of preventive care services in the united states. *J. Women's Health*. 2012; 21(2):14-145. doi:10.1089/jwh.2011.2876
9. Abdus S, Selden TM. Preventive services for adults: How have differences across subgroups changed over the past decade? *Med. Care*. 2013; 51(11): 999-1007. doi:10.1097/MLR.0b013e3182a97bc0
10. Jerant A, Fiscella K, Tancredi DJ, Franks P. Health insurance is associated with preventive care but not personal health behaviors. *J Am Board Fam Med. JABFM*, 2013; 26(6): 759-767. doi:10.3122/jabfm.2013.06.130054
11. Blewett LA, Johnson PJ, Lee B, Scal PB. When a usual source of care and usual provider matter: Adult prevention and screening services. *J. Gen. Intern. Med.*, 2008; 23(9): 1354-1360. doi:10.1007/s11606-008-0659-0
12. Caldwell JT, Ford CL, Wallace SP, Wang MC, Takahashi LM. Intersection of living in a rural versus urban area and Race/Ethnicity in explaining access to health care in the united states. *Am J Public Health*. 2016; 106(8): 1463-1469. doi:10.2105/AJPH.2016.303212
13. DeVoe SG, Roberts LL, Davis WS, Wallace-Brodeur RR. Identifying barriers to access and utilization of preventive health-care services by young adults in vermont. *J Adolesc Health*. 2018; 62(6): 674-680. doi:10.1016/j.jadohealth.2017.12.018
14. Yabroff, K. R., PhD, Short, P. F., PhD, Machlin, S., MS, Dowling, E., MHS, Rozjabek, H MPH, Li C, Virgo KS. Access to preventive health care for cancer survivors. *Am J Prev Med*. 2013; 45(3): 304-312. doi:10.1016/j.amepre.2013.04.021

15. Lafata JE, Salloum, RG, Fishman PA, Ritzwoller DP, O’Keeffe-Rosetti MC, Hornbrook MC. Preventive care receipt and office visit use among breast and colorectal cancer survivors relative to age- and gender-matched cancer-free controls. *J CANCER SURVIV*. 2015; 9(2): 201-207. doi:10.1007/s11764-014-0401-3
16. Bronner K, Mesters I, Weiss-Meilnik A, Geva R, Rozner G, Strul H, Kariv R. Do individuals with a family history of colorectal cancer adhere to medical recommendations for the prevention of colorectal cancer? *Fam. Cancer*. 2013; 12(4): 629-637. doi:10.1007/s10689-013-9627-x
17. Lau JS, Adams SH, Irwin CE, Ozer EM. Receipt of preventive health services in young adults. *J Adolesc Health*. 2013; 52(1): 42-49. doi:10.1016/j.jadohealth.2012.04.017
18. Dickman SL, Himmelstein DU, Woolhandler S. Inequality and the health-care system in the USA. *Lancet*. 2017; 389(10077): 1431-1441. doi:10.1016/S0140-6736(17)30398-7
19. Geboers B, Brainard JS, Loke YK, Jansen CJM, Salter, C, Reijneveld, SA, de Winter AF. The association of health literacy with adherence in older adults, and its role in interventions: A systematic meta-review. *BMC Public Health*. 2015; 15(1): 903. doi:10.1186/s12889-015-2251-y
20. Levy H, Janke A. Health literacy and access to care. *J. Health Commun*. 2016; 21(sup1): 43-50. doi:10.1080/10810730.2015.1131776
21. Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Crotty K. Low health literacy and health outcomes: An updated systematic review. *Annals of Internal Medicine*. 2011; 155(2): 97-107. doi:10.7326/0003-4819-155-2-201107190-00005
22. Yin Z, Fabbri D, Rosenbloom ST, Malin B. A Scalable Framework to Detect Personal Health Mentions on Twitter. *J Med Internet Res* 2015;17(6):e138. doi:2196/jmir.4305
23. Nutbeam D, Levin D, Rowlands G. Health literacy and health promotion in context. *Health Promot. Int*. 2018; 25(4): 3-5. doi:10.1177/1757975918814436.
24. Koh RE, Rudd RE. The arc of health literacy. *JAMA*. 2015; 314(12):1225-26. doi:10.1001/jama.2015.9978.
25. Andersen RM. Revisiting the behavioral model and access to medical care: Does it matter? *J Health Soc Behav*. 1995; 36(1), 1-10. doi:10.2307/2137284
26. Holtzman, CW, Shea, JA, Glanz, K, Jacobs LM, Gross R, Hines J, Yehia BR. Mapping patient-identified barriers and facilitators to retention in HIV care and antiretroviral therapy adherence to andersen’s behavioral model. *AIDS Care*. 2015; 27(7): 817-828. DOI:10.1080/09540121.2015.1009362
27. Chertok IRA, Chertok N, Haile ZT and Chavan B. Association of Youth Characteristics and Recent Utilization of Dental Services in the United States. *Front. Pediatr*. 2018; 6:104. doi: 10.3389/fped.2018.00104
28. Bradley EH, McGraw SA, Curry L, Buckser A, King KL, Kasl SV, Andersen R. Expanding the andersen model: The role of psychosocial factors in Long-Term care use. *Health Serv. Res*. 2002; 37(5): 1221-1242. doi:10.1111/1475-6773.01053
29. Lee HY, Choi JK, Lee MH. Health literacy in an underserved immigrant population: New implications toward achieving health equity. *Asian Am. J. Psychol*. 2015; 6(1): 97-105.

<https://doi.org/10.1037/a0037425>

30. Zhou AQ, Lee HY, Lee RM. Who has low health literacy and does it matter for depression? Findings from aggregated and disaggregated racial/ethnic groups. *Cultur Divers Ethnic Minor Psychol*. 2019; 25(1): 73-81. <https://doi.org/10.1037/cdp0000210>
31. Wister AW, Malloy-Weir L, Rootman, I, Desjardins R. Lifelong educational practices and resources in enabling health literacy among older adults. *J Aging Health*. 2010; 22(6): 827-854. <https://doi.org/10.1177/0898264310373502>
32. 2011. *Stata Statistical Software: Release 12*. College Station, TX: StataCorp LP.
33. Luquis R, Kensinger W. Perceptions of Health Care and Access to Preventive Services Among Young Adults. *J. Community Health*. 2017; 42(6): 1204–1212. <https://doi-org.libdata.lib.ua.edu/10.1007/s10900-017-0371-2>
34. Sheffet AM, Ridlen S, Louria, DB. Baseline Behavioral Assessment for the New Jersey Health Wellness Promotion Act. *Am J Health Promot*. 2006; 20(6): 401–410. Retrieved from <https://search-ebshost-com.libdata.lib.ua.edu/login.aspx?direct=true&db=s3h&AN=21673480&site=ehost-live>
35. Lee EJ, Lee HY, Chung S. Age Differences in Health Literacy: Do Younger Korean Adults Have a Higher Level of Health Literacy than Older Korean Adults? *Health Soc Work*. 2017; 42(3): 133-142. doi:10.1093/hsw/hlx026
36. Bertakis KD, Azari R, Callahan EJ, Robbins JA, Helms LJ. Comparison of primary care resident physicians' practice styles during initial and return patient visits. *J Gen Intern Med*. 1999; 14(8): 495-498. doi: [1046/j.1525-1497.1999.05068.x](https://doi.org/10.1525-1497.1999.05068.x)
37. Oksuzyan A, Juel K, Vaupel JW, Christensen K. Men: good health and high mortality. Sex differences in health and aging. *Aging Clin Exp Res*. 2008; 20(2): 91-102.
38. O'brien R, Hunt K, Hart G. 'It's caveman stuff, but that is to a certain extent how guys still operate': men's accounts of masculinity and help seeking. *Soc. Sci. Med*. 2005; 61(3): 503-516. doi:[1016/j.socscimed.2004.12.008](https://doi.org/10.1016/j.socscimed.2004.12.008)
39. Yousaf O, Grunfeld EA, Hunter MS. A systematic review of the factors associated with delays in medical and psychological help-seeking among men. *Health Psychol Rev*. 2015; 9(2):264-76. doi: [10.1080/17437199.2013.840954](https://doi.org/10.1080/17437199.2013.840954).
40. Kutner M, Greenburg E, Jin Y, Paulsen C. *The Health Literacy of America's Adults: Results from the 2003 National Assessment of Adult Literacy*. NCES 2006-483. National Center for Education Statistics; 2006.
41. Schmittiel J, McMenamin SB, Halpin HA, Gillies RR, Bodenheimer T, Shortell SM, Casalino LP. The use of patient and physician reminders for preventive services: results from a National Study of Physician Organizations. *Prev. Med*. 2004; 39(5): 1000–1006. <https://doi-org.libdata.lib.ua.edu/10.1016/j.ypped.2004.04.005>
42. Edejer TT. Disseminating health information in developing countries: the role of the Internet. *Br. Med. J*. 2000; 321(7564): 797–800. doi: [1136/bmj.321.7264.797](https://doi.org/10.1136/bmj.321.7264.797)

43. Gretchen KB, Marc NE, Leo SM, Jeffrey IA, Richard LK, Michael SB, David EK, Jorge AM, Juan-Antonio P, Marielena L, [Katherine EW](#), Hannah Y, Elizabeth AM. Health Information on the Internet: Accessibility, Quality, and Readability in English and Spanish. JAMA. 2001; 285(20): 2612-2621. doi:10.1001/jama.285.20.2612.
44. Institute of Medicine. Health literacy: a prescription to end confusion, National Academic Press, Washington. DC; 2004.

Tables

Table 1. Demographic Characteristics of the Sample by Check-Up

Variables	Frequency		Check-up		Frequency		Check-up		
	Mean (S.D.) /Total	No %	Age between 18 and 59		Mean (S.D.) /Total	Age 60 and Over			
			No %	Yes %		No %	Yes %		
Dependent Variable									
Check-up	.673(.469)				.820(384)				
Predisposing factor									
Age	44 (10.737)				70(7.999)				
Gender									
Male	665	36.84	63.16	8.3826**	598	19.40	80.60	1.4497	
Female	1,005	30.05	69.95		839	16.92	83.08		
Income									
\$0 to \$74,999	898	34.97	65.03	4.697*	927	18.12	81.88	0.904	
\$75,000 or more	694	29.83	70.17		353	15.86	84.14		
Living Area									
Urban	1,489	32.84	67.16	0.089	1,236	18.28	81.72	0.374	
Rural	192	31.77	68.23		229	16.59	83.41		
Enabling Factors									
A lot of effort to get the information									
Agree	436	37.84	62.16	8.841**	430	16.74	83.26	0.011	
Disagree	924	29.76	70.24		677	16.99	83.01		
Frustrated during search for the information									
Agree	422	40.05	59.95	16.449***	360	18.61	81.39	1.214	
Disagree	937	28.92	71.08		721	15.95	84.05		
Concerned about the quality of the information									
Agree	731	35.02	64.98	4.962*	485	16.49	83.51	0.066	
Disagree	627	29.35	70.65		603	17.08	82.92		
Information you found was hard to understand									
Agree	288	34.03	65.97	0.485	312	16.99	83.01	0.007	
Disagree	1,067	31.87	68.13		781	16.77	83.23		
Confident get Health information									
Very confident	1,046	30.21	69.79	8.142**	842	16.03	83.97	5.343*	
Not very confident	596	37.08	62.92		576	20.83	79.17		
Education									
Below high school graduate	433	36.26	63.74	3.370	598	17.56	82.44	0.211	
some college and above	1,240	31.45	68.55		854	18.50	81.50		
Health Insurance									
Yes	1,560	30.58	69.42	35.753***	1,411	16.80	83.20	11.950***	
No	110	58.18	41.82		36	38.89	61.11		
Primary doctor									
Yes	1,072	22.67	77.33	129.341***	1,173	13.55	86.45	57.508***	
No	598	49.83	50.17		275	32.73	67.27		
Need factors									

Health Status								
More than Good	1,437	33.54	66.46	2.767	1,131	17.95	82.05	0.017
Less than Fair	232	28.02	71.98		323	18.27	81.73	
Depression	6.069(2.923)				5.747(2.617)			
Personal History of Cancer								
Yes	1,550	33.23	66.77	2.164	353	16.71	83.29	0.578
No	130	26.92	73.08		1,108	18.50	81.50	
Family History of Cancer								
Yes	1,153	31.74	68.26	0.799	1,069	17.40	82.60	0.499
No	416	34.13	65.87		319	19.12	80.88	

Note: * $p < .05$; ** $p < .01$, *** $p < .001$

Table 2. Logistic Regression on Physical Check-Up by Age Group

Variables		Age between 18 and 59 (Model 1)		Age over 60 (Model 2)	
		OR	95% CI	OR	95% CI
Predisposing factor	Age	1.025***	1.014, 1.037	1.014	0.993, 1.034
	Gender(ref=male)	1.305*	1.031, 1.653	1.258	0.928, 1.705
	Income	0.959	0.904, 1.018	1.030	0.949, 1.118
	Urban(ref=rural)	1.085	0.756, 1.556	0.823	0.537, 1.263
Enabling factor	A lot of Effort to get the information (HL)	0.949	0.776, 1.162	1.007	0.773, 1.312
	Frustrated during search for the information (HL)	0.773*	0.631, 0.946	0.837	0.635, 1.103
	Concerned about the quality of the information(HL)	1.024	0.876, 1.197	1.019	0.814, 1.276
	Information you found was hard to understand(HL)	1.205	0.984, 1.477	1.403*	1.060, 1.857
	Confident Get Health Information (HL)	1.184*	1.029, 1.362	1.209*	1.011, 1.446
	Education	1.052	0.965, 1.147	0.983	0.886, 1.090
	Health Insurance	2.519***	1.595, 3.979	2.314*	1.026, 5.223
	Primary doctor	2.833***	2.231, 3.596	2.721***	1.927, 3.840
	Health Status	0.924	0.804, 1.062	0.879	0.738, 1.046
Depression	0.981	0.940, 1.024	0.982	0.924, 1.044	
Personal history of cancer	0.849	0.540, 1.335	1.033	0.719, 1.485	
Family history of cancer	0.959	0.740, 1.242	0.848	0.590, 1.219	
Number of observations		1465		1681	
Pseudo R ²		0.09		0.05	
Log Likelihood Rate Test		174.64		63.92	

Note: * $p < .05$; ** $p < .01$, *** $p < .001$

Figures

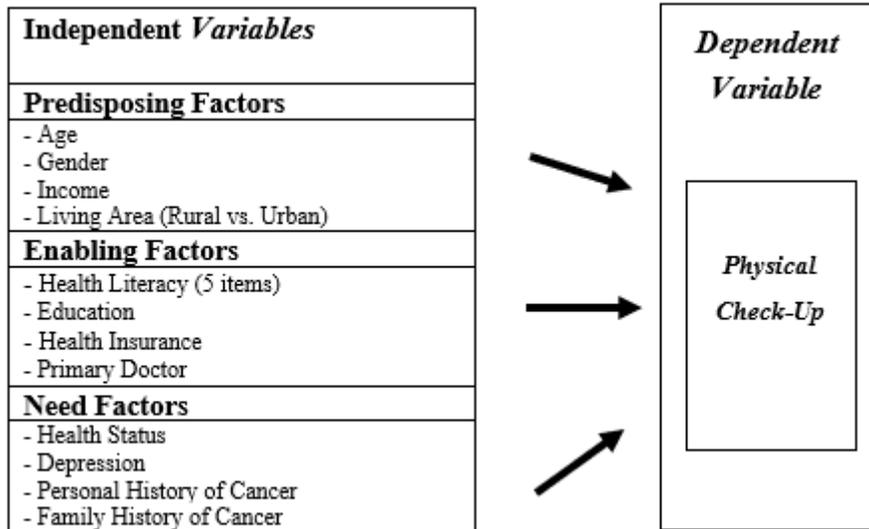


Figure 1

Conceptual Framework of the Study