



Study Title: Low Health Literacy (LHL): A Devious Enemy of Patient Treatment Adherence

Abdul Kader Mohiuddin^{1*}

¹Alumnus, Faculty of Pharmacy, Dhaka University

<p>Abstract: People must have particular personality traits and social resources, also known as health literacy, in order to access, comprehend, and use information to make decisions about their health. Patients' ability to engage in complex disease management and self-care is strongly related to their level of health literacy. It can help us stay healthy by preventing illness and effectively managing existing illnesses. People with low health literacy (LHL) may find it difficult to manage their condition and prevent illness, which may lead to increased use of healthcare services. Furthermore, LHL is associated with increased hospitalizations, increased use of emergency care, decreased use of preventative services, and a worsened ability to understand labels and health messages, a worsened state of health, higher mortality, and more expensive medical care.</p>	<p>Research Paper</p>
	<p>*Corresponding Author: Abdul Kader Mohiuddin Alumnus, Faculty of Pharmacy, Dhaka University</p>
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<p>Keywords: Parental health literacy; necessary health education; understanding treatment guidelines; medication non-adherence; healthcare, avoidable medical costs, global health burden, COVID-19 vaccine negligence.</p>	<p>Article History: Submit: 20.11.2022 Accepted: 21.12.2022 Published: 24.12.2022 </p>
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INTRODUCTION

Understanding common health care communications, such as prescription instructions, test results, and insurance forms, is referred to as health literacy. Health literacy improves a population's ability to care for themselves and aids in the reduction of health disparities. It has an impact on the use of health services, as well as on patient satisfaction and the physician-patient relationship. It is one of the major impediments to healthcare professionals adequately transmitting information to those under their care. Personal health literacy refers to a person's ability to locate, comprehend, and apply information and services to support health-related decisions and actions for themselves and others. Health literacy is recommended by the World Health Organization as a tool for achieving several important objectives outlined in the Sustainable Development Goals. Many factors can influence a person's health literacy, including knowledge of medical terminology; understanding of how the health care system operates; ability to communicate with health care providers; ability to locate health information, which may be associated with age, income, education, language skills, and culture; and physical or psychological limitations. Health literacy affects treatment adherence, which may have an

impact on treatment outcomes. Despite the negative implications of LHL, physicians are typically unaware of their patients' health literacy levels and their subsequent effects on their patients' outcomes.

MATERIAL AND METHODS

Prioritized databases for public health topics included PubMed, ALTAVISTA, Embase, Scopus, Web of Science, and the Cochrane Central Registers. Along with other online sources, journals from Elsevier, Springer, Willey Online Library, and Wolters Kluwer were thoroughly searched. The infographic was prepared by Canva Illustrator, and the citation work was done by citationmachine.net.

LITERATURE REVIEW

Many studies reveal that patients from high-income countries are not adequately adhering to medications as they are prescribed. Forgetfulness, confusion about the duration required for medication use, and mistrust about the overall efficacy of medication are among the reasons for non-adherence to diabetes management protocols in Middle Eastern countries [1]. Conversely, after World War II, Taiwan faced severe poverty, but it is now the 8th largest economy in Asia and also the home of type 2 diabetes

However, in this submission, a few more sensational facts in the form of an infographic model about LHL is shared (Figure 1):

- A. LHL is associated with people who cherish superstitions and stigma within their preset narrow mind, which prevents them from gathering relevant health information from their surroundings [5].
- B. LHL has a significant impact on patients' treatment guideline compliance, or, more directly, medication adherence, which leads to poorer health outcomes, higher healthcare costs, increased hospitalizations, and even higher mortality rates [6].
- C. Only 12% of Americans have adequate health literacy, and improving health literacy could prevent nearly 1 million hospital visits and save more than \$25 billion per year, according to the US Centers for Disease Control and Prevention (CDC) [7].
- D. The global economic cost of illiteracy is estimated to be \$1.19 trillion, but LHL alone costs the US economy \$238 billion per year [8].
- E. Both are found in both developed and developing countries around the world, and socioeconomic factors are not the only cause of LHL [9].
- F. Surprisingly, nearly 40% of US and UK adults have LHL, compared to around 50% of Europeans, 60% of adults in Canada, Australia, and the UAE, and nearly 70% of Chinese [10].
- G. In China, health literacy increased from 6.48% of the population in 2008 to 23.15% in 2020 [11]. However, only 1 in 5 military health providers of the Chinese People's liberation Army had adequate health literacy, found in a recent survey published in BMC Public Health [12].
- H. Evidence suggests that LHL has significant economic consequences at the individual, employer, and healthcare system levels [13].
- I. The authors of the Hamburg Diabetes Prevention Survey, a population-based cross-sectional study in Germany, concluded that LHL is a significant risk factor for the metabolic syndrome's three conditions: obesity, diabetes, and hypertension [14].
- J. Age, place of residence, education, and family status all have an impact on health literacy [15].
- K. More than half of Dutch health providers use health literacy-specific materials only infrequently [16].
- L. Mistrust and LHL perceptions were linked to high levels of vaccine hesitancy, providing evidential support for portraying these factors as perceived barriers to COVID-19 vaccine uptake [17].
- M. LHL is not uncommon among patients with a high level of education or with well-off patients. Moreover, patients with LHL, but with high education, had a higher probability of emergency department (ED) re-visits. Empirical research based on a conceptual model estimated that low health literacy costs between 7 and 17% of total healthcare expenditures [8].
- N. According to patient-centered interventions, improving health literacy can reduce the risk of polypharmacy, medication non-adherence, and healthcare costs [18].
- O. According to the 1996-2017 Medical Expenditure Panel Survey (Cheng & Tanna, 2022), LHL was more prevalent in glaucoma patients, and patients with LHL were prescribed more medications and had higher medication costs [19].
- P. Nearly 35% of diabetic patients worldwide have limited health-related education [20].
- Q. LHL is linked to gestational diabetes, maternal stress and depression, low birth weight, stillbirth, and congenital malformations during pregnancy and birth, all of which have negative consequences for the woman and her child [21].
- R. Health literacy among the population is expected to rise over time in this era of modernization. According to a national survey conducted in the Czech Republic in 2015-16, nearly 60% of Czechs have LHL. Surprisingly, a 2018 survey revealed that health literacy in the Czech Republic was still declining [22].
- S. The prevalence of LHL in the ED varies greatly, with estimates as high as 88% depending on the patient mix and screening instruments used [23].
- T. In both low and high-income countries, low parental health literacy was linked to poorer child health outcomes [24].
- U. Patients who are older, have less education, a lower income, and have chronic conditions are more vulnerable [25].
- V. LHL was discovered in more than 70% of formal paid caregivers of non-self-supporting older adults in Tuscany, Italy, and in more than 50% of caregivers of heart failure patients in the United States [26].
- W. People with low health literacy may have 1.5-3 times the number of serious health outcomes, such as higher mortality, hospitalization rates, and disease management ability, as those with adequate health literacy [27].
- X. In cardiac patients, it has been linked to increased mortality, hospital readmission, and lower quality of life [28].
- Y. LHL represents nearly 50% of Germans [29]. In Germany, every fourth to fifth person is not immunized against COVID-19 [30].

- Z. According to a Waystar (Health Care Billing Software) report from 2019, nearly 40% of healthcare consumers were unaware that the cost of their healthcare varied across facilities [31].

Factors or Consequences Associated with LHL

1. Superstitions: an elephant in the room

Superstition is the non-scientific belief in magical connection. Aspects of certain religions and supernatural ideologies, such as astrology, omens, witchcraft, and prophecies, are examples of such beliefs. Even after all of the modernization and enlightenment, superstitious beliefs still exist in our societies. Most people are thought to have irrational, superstitious beliefs to some extent. Epilepsy and schizophrenia are still viewed in the majority of the world as an evil spirit. Although two-thirds of patients could become seizure-free with proper care, poor adherence to proper guidelines is a major problem for effective recovery [32, 33]. In an Indian study, 60% of the participants thought that illnesses were the result of luck or superstition [34]. In Northern Germany, superstitions were also reported in nearly 40% of men and 70% of women [35]. 70% of people in Africa use folk remedies like charms and witchcraft to treat their illnesses [36]. Surprisingly, researchers found that 73% of addiction treatment programs in the USA include a spirituality-based element and that more than 40% of Americans believe in spiritual therapies [37, 38]. According to a South Iranian study, 60% of diabetic patients refused insulin despite doctor recommendations due to phobia [39]. Menstruation is fraught with taboos, restrictions, and misconceptions in low- and middle-income countries, especially in India and sub-Saharan Africa [40]. In India, nearly 80% of menstruating girls and women use an old cloth that is frequently reused. Further, around 90% of women in India sometimes resort to using ashes, rags, sand, newspapers, dried leaves, wood shavings, hay, plastic and husk sand to aid absorption [41-43]. Additionally, these two areas are home to more than 90% of the world's open defecation practitioners [44, 45]. Many superstitious Indians hold the view that defecation is an impure act that should only be performed outside the home and that toilets should only be used in inclement weather [46]. It is not surprising that at least 90% of Indian adults have poor health literacy [47].

2. Medication or Treatment Guideline Non-compliance

Medication noncompliance accounts for more than half of the \$500 billion in total avoidable costs associated with suboptimal medicine use worldwide each year [48]. LHL was linked to increased unintentional non-adherence and poor medication self-management in a variety of domains, including forgetting or having difficulty remembering to take medications. However, no relationship was found between health literacy and intentional non-adherence,

which includes stopping medications when feeling better or worse [49]. Studies show that LHL is connected with poorer disease knowledge and symptom recognition, poor glycemic or dyslipidemia control, greater difficulty interpreting food labels and estimating portion sizes, lower self-efficacy, higher level of body mass index, information gap in the use of medical devices for self-monitoring of blood glucose (SMBG), poorer communication with their providers, higher doses of insulin, more medical expenses and hospitalization among diabetes patients [50-57]. LHL is more common in people with hypertension and is associated with hypertension prevalence in selected ethnic groups [58]. Among hypertensive patients, LHL was associated with higher dietary salt intake, poor knowledge of blood pressure control, lower systolic blood pressure control, current smoking or higher nicotine dependence, as well as established predictors of smoking relapse [59-62]. Apart from these, LHL was associated with higher addiction severity [63], medication errors, misinterpreting physician's instructions and disease symptoms [64], a greater number of unreconciled medications [65], reason behind the medication discrepancy [66], preventable adverse drug reactions [67], inequity of access to the benefits of prescription medication [68].

3. Substance Use Disorder

Drug addiction kills approximately 8 million people each year, and the UN Office on Drugs and Crime (UNODC)'s World Drug Report 2022 estimates that approximately 284 million people aged 15-64 used drugs worldwide in 2020 [69, 70]. According to University of Pennsylvania research, America has spent over a trillion dollars enforcing its drug policy since 1971 [71]. People who use alcohol (AUD) or have a substance use disorder (SUD) are at risk of having lower health literacy due to a variety of negative health, psychosocial, and economic factors associated with substance use [72]. Another study confirms that both LHL and low academic performance have their role in tackling the disparities in substance use [73]. An Australian study with a mixed sample of people with AUD and SUD found that 90% of participants had LHL [74]. In people with alcohol and drug dependence, LHL is associated with worse depressive symptoms [63]. Patients with LHL poorly handle pain medications [75]. Around 300 metric tons of morphine-type painkillers are used (and/or abused) worldwide each year, more than 99% of which consumed by high income countries [76]. A study based on a mixed population of US citizens confirmed that LHL was strongly linked to opioid misuse among adult patients with chronic pain [77]. Use of cannabis for pain management has always been a controversial issue. Also, cannabis in the form of medical cannabis (MC) or recreational marijuana legalized or less restricted in Thailand, Canada, Uruguay, South Korea, Japan, India, Pakistan, Israel, Belgium, USA, UK, Germany, Italy, Singapore and Malaysia, probably among many others. However,

Health literacy, social support, attitudes about MC, age, and duration of disease were significantly associated with demand for MC use among cancer patients in Thailand [78].

4. Poor COVID-19 or Contagious Disease Management and Vaccine Negligence

A cross-sectional study of 259 school leaders in Hong Kong carried out during the COVID-19 pandemic between April 2021 and February 2022 shows that more than 50% of participants had LHL, and their LHL was strongly associated with a negative attitude about vaccination, low information, and confusion about COVID-19-related information [79]. Although, an Oxford Academic study concluded that not health literacy directly but poor knowledge of selected diseases was associated with vaccine confidence index [80]. Thankfully, another study from Oxford University Press established health literacy as the “social vaccine” to combat against SARS-CoV-2 [81]. Even before Covid-19, WHO has listed vaccine hesitancy as one of the top ten global health threats in 2019 [82, 83]. Also, a Swiss journal says that a percentage increase in vaccine hesitancy can lead to a decline in vaccination coverage by 30% [84]. Therefore, LHL was the major obstacle to create vaccine hesitancy in China, Africa [85], India [86], Europe [87] and USA [88, 89]. As expected, in three different studies, close to 40% of Chinese participants (LHL persists among more than 70% of the population) [10], [85], more than 60% of Bulgarians (the lowest health literacy among EU countries) [3], [86] showed hesitancy, and above all, more than one-third of European adults are not fully vaccinated (LHL persists among half of the total population), says another Oxford University Press study [10], [89]. Vaccinated people or people wearing masks, on the other hand, were careless about social distancing, believing that being vaccinated or wearing masks was sufficient and that other preventive measures, such as social distancing, were unnecessary. Even the CDC redeemed fully vaccinated people who wore a face mask or engaged in social distancing in most settings, whether outdoors or indoors, in updated public health guidance released on May 13, 2021. Also, conspiracy theories, rallies against masks/vaccines are vividly reported [90-97].

5. Barriers to Autism Recovery and Progression

The social burden of autism can exceed \$6 trillion in the US alone by 2060, and the WHO estimated that worldwide, about one in 100 children has autism [98, 99]. The failure to recognize the first signs of autism can significantly postpone the age of diagnosis, the provision of informed supervision to families, and the execution of adapted initiatives during the critical period of early development. Parent health literacy may further contribute to autism services use for young children [100]. A misunderstanding of early signs as manifestations of a developmental condition

may lead to increased stigma and non-conventional explanations [101-103]. Parents with LHL whose child has recently been diagnosed with autism spectrum disorder (ASD) report an information gap and a lack of resource adaptation during diagnosis [104]. Above all, health literacy is linked to help-seeking behaviors among parents of children with special health care needs (CSHCN), autism, and attention deficit hyperactivity disorder (ADHD); or people with Schizophrenia and Bipolar disorders [105-107].

RESULTS AND DISCUSSION

LHL contributes significantly to the healthcare system's incompetent socioeconomic culture. Health issues are not only overlooked but also neglected. It reflects how much health and wellbeing are overlooked in a community or country. Economic conditions should not be condemned because they persist in developed countries as well. LHL has grown to unbearable proportions all over the world. Reading, listening, analytical, and decision-making skills, as well as the ability to apply them to health situations, are all components of health literacy. Literacy can only be improved through health education, which necessitates multifaceted approaches. Many members of the health care team lack health literacy training, are unaware of ways to improve communication, and forget to use effective communication practices on a regular basis when providing care. Health care professionals require assistance and training to better understand health literacy and how to address it through clear communication strategies. Customized patient education, on the other hand, engages, motivates, and strengthens patients to participate in their own health care and treatment decisions, resulting in better outcomes, fewer diagnostic tests, and significantly greater patient satisfaction.

CONCLUSION

Nonetheless, health literacy is clearly beneficial in addressing the healthcare needs of even the most marginalized and disadvantaged communities. Patients must clearly and appropriately recognize healthcare information related to their specific illness or disease in order to improve adherence. This understanding could be crucial in assisting patients in developing the motivation, beliefs, and appropriate health behaviors needed to improve overall adherence. LHL is a curse to be avoided. This effort should be supported by all healthcare providers, stakeholders, and even government and community leaders.

ABBREVIATIONS

ADSD: Attention Deficit Hyperactivity Disorder
 ASD: Autism Spectrum Disorder
 AUD: Alcohol Use Disorder
 CDC: US Centers for Disease Control and Prevention

COVID-19: Coronavirus Disease 2019
 ED: Emergency Department
 MC: Medical Cannabis
 SMBG: Self-Monitoring of Blood Glucose
 SUD: Substance Use Disorder
 UNODC: UN Office on Drugs and Crime

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The current research was carried out exclusively to look into problems associated with low health literacy. With time and the availability of newer investigation in the same field, the statistical evidence or variables presented here may transform.

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The corresponding author is the sole contributor and the only author.

Conflicts of Interest

The author declares that he has no competing interests.

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