JCHR

Journal of Community Health Research 2025; 14(1): 21-24.

Conceptual Gap between Education and Literacy in Health Sciences Studies

Ehsan Allah Kalteh [1,2], Mohammad Hassan Lotfi [1], Hossein Akhondi [1], Shahin Izadi [1]*

1. Center for Healthcare Data Modeling, Department of Biostatistics and Epidemiology, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
2. Management and Social Development Research Center, Golestan University of Medical Sciences, Golestan, Iran

ARTICLE INFO

Editorial

Received: 01 Dec 2024
Accepted: 27 Jan 2025

Corresponding Author:
Shahin Izadi
shahin.izadi.65@gmail.com

ABSTRACT

This article explores the distinction between education and literacy, emphasizing their close yet separate meanings. Education typically refers to formal schooling and academic qualifications, while literacy now includes a wider range of skills beyond basic reading and writing, such as digital, financial, and health literacy. Education is achieved through structured learning environments and results in certifications, whereas literacy involves the application of knowledge to effect significant changes in one's life. Effective learning brings about stable changes in behavior, unlike temporary shifts due to external factors. The article argues that true literacy depends on various societal factors, including supportive families, well-equipped schools, and community resources. Despite this, many individuals receive degrees without attaining comprehensive literacy. In epidemiological research, addressing bias and confounding variables is crucial. Bias, such as misclassification bias, can skew results by misrepresenting data. Confounding occurs when an external variable influences both exposure and outcome, potentially distorting the observed relationships. Residual confounding may persist despite adjustments, highlighting the need for accurate indicators. The article questions the validity of using educational level as a proxy for literacy, suggesting it may not fully capture literacy's complexity and introduce residual confounding.

Keywords: Education, literacy, health literacy, bias, confounding factors, educational status

How to cite this paper:
Kalteh EA, Lotfi MH, Akhondi H, Izadi Sh. Conceptual Gap between Education and Literacy in Health Sciences Studies. J Community Health Research 2025; 14(1): 21-24.

[DOI: 10.18502/jchr.v14i3.17894]

Expecting a well-educated person to have higher literacy level and not engaging in an unhealthy behavior is just one example of statements we encounter daily based on the concept of literacy and education. Education and literacy are closely related concepts. These two concepts are sometimes used interchangeably. Education is a certificate or diploma issued after completing defined educational courses in each school and university. Students and learners, based on formal education provided by professional teachers and professors in structured and formal environments such as schools and universities, are usually categorized based on the level of education, including primary, secondary, high school, and then university in associate, bachelor's, master's, and doctoral levels.

Literacy, which was previously limited to reading and writing in the mother tongue by UNESCO, now takes on a much broader meaning (1). In the second definition, the ability to use a computer and remember a foreign language has also been added to the previous definition (2). In the third definition, having 12 skills including emotional literacy, communication literacy, financial literacy, media literacy, educational literacy, computer literacy, health literacy, ethnic and national literacy, ecological literacy, analytical literacy, energy literacy, and scientific literacy, is considered as part of being literate (3). Recently, UNESCO defined literacy as creating significant changes in life through the skills and knowledge of an individual (4). Interestingly, learning in psychological texts is defined as creating sustainable behavior change. Therefore, education and literacy can be understood respectively as instruction and learning. Instruction refers to activities designed to facilitate learning by the teacher or educator to simplify learning which occurs through interactive actions between the teacher and one or more learners. Education has an external aspect to it. However, learning is an internal process and refers to creating relatively stable changes in behavior or behavioral capacity resulting from experience. After gaining learning experience, a living being, including humans, changes compared to their previous state with regard to how they interact with events. This change should be relatively stable. Changes resulting from motivational, emotional, fatigue or emotional adaptation factors quickly fade away and are not considered part of our learning experiences. Relatively stable change should be created in our behavioral capacity, not just in our visible behavior. By observing the changes in an individual's actions and behaviors, we deduce the changes in their abilities. A change in the learner's behavioral capacity is considered learning only if it occurs as a result of the learning experience, not other factors such as growth, adulthood, and aging, which lead to changes; but they are not considered learning because they do not stem from experience (5).

Literacy is a reality, not just an academic degree. The infrastructures for expanding literacy include:

1- A cohesive and respectful family, 2- A school with standard facilities and environment, with knowledgeable teachers and mentors, 3- Universities and scientific centers with prominent professors, talented students, and top-ranked experts, modern educational and research facilities, 4- Academies and science academies with experienced scientific professors, 5- Informal and private centers in the community for supporting and advancing knowledge and creativity can be provided for society. Nowadays, students and learners do not receive education and training in the above-mentioned path, and most of them obtain academic degrees (6).

In epidemiological research, avoiding bias and controlling for confounding variables is essential. Bias and confounding are non-causal reasons for the relationship between exposure and outcome. They are major threats to the internal validity of a study and should always be considered as alternative explanations when interpreting study results (7). Any systematic error that occurs in the design, implementation, or analysis of research results, leading to an incorrect estimation of the effect of an exposure on the risk of disease, is called bias. Information bias is an example of bias

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that occurs when some of the information collected regarding exposure is not correct or is incomplete. If the information-gathering method is not correct, we may not properly classify the individuals under study, creating a type of bias called misclassification bias. For example, some individuals who do not have the exposure of interest may be classified in the exposed group (8).

Given the differences in education and literacy levels, if in studies the concept of education refers to the literacy level of individuals, the possibility of collecting information on this concept from individuals covered by the research program may not exist. Accordingly, as the extent of misclassification encountered in different groups under study is the same and there will be a problem hidden in the data collection method, we will encounter a form of misclassification bias known as nondifferential misclassification bias. Nondifferential misclassification bias typically affects the underestimation of the relative risk or odds ratio more, pushing the absolute measure towards one. In other words, it reduces the probability of finding a relationship, if any (9). This error is due to the low sensitivity or specificity of the level of education as an indicator for the level of literacy, which can increase this error due to degree-oriented attitude, the low-quality level of schools and universities, and the ease with which people graduate.

The term confounding refers to a situation where a non-causal relationship occurs between the exposure and the desired outcome due to a third variable or a group of variables. The confounding variable must be associated with both the exposure and the outcome. If the confounding variable is not properly addressed, incorrect conclusions may be drawn. Confounding variables can create an apparent causal relationship between independent and dependent variables when none exists or distort a real causal relationship. For example, in a study investigating the relationship between coffee consumption (independent variable) and the risk of heart disease (outcome), exercise habits could be a confounding variable. Individuals who regularly exercise may also consume more coffee and be less likely to develop heart disease, creating a false link between coffee consumption and the risk of heart disease. To control for confounding, researchers often use adjustment techniques such as stratification and multiple regression to explain the effect of the confounding variable (9-12).

A flaw that after unsuccessful attempts to make it ineffective still influences the study, is called residual confounding. The main sources of residual confounding are insufficient information, improper grouping, and incorrect categorization of one or more confounding variables (12). Residual confounding occurs when the adjustment variable does not fully account for the confounding effect of the variable it is intended to control (9). Using education level as the variable for adjustment and indicator to match the literacy level may lead to residual confounding. Therefore, the appropriateness of the education level as a substitute for the literacy level is also questionable.

Key Message

Although higher educational attainment is often equated with greater literacy and healthier behaviors, this study underscores the risks of conflating education with literacy in epidemiological research. Specifically, using education level as a proxy for literacy may introduce nondifferential misclassification bias and residual confounding, leading to underestimation of true associations between exposure and outcomes. Our findings highlight the importance of distinguishing between education and literacy to improve the accuracy and validity of public health research.

Acknowledgement

We sincerely appreciate all the participants of this study for their valuable cooperation and contribution.

Conflict of interest

The authors have no conflicts of interest associated with the material presented in this paper.

Funding

[DOI: 10.18502/jchr.v14i3.17894]

No funding was received for conducting this study.

Ethical considerations

None.

Code of ethics

None.

Author contributions

Conceptualization: E. K, MH. L; Project administration: S. I; Writing - original draft: E. K, MH. L, H. Ak; Writing - review & editing: E. I, H. Ak.

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