

# Construction of Nutrition Literacy Indicators for College Students in Taiwan: A Delphi Consensus Study

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## ABSTRACT

**Objective:** To use the Delphi process to select nutrition literacy (NL) indicators for Taiwan college students.

**Design:** Initial formulation of 8 principal indicators and 77 subindicators, followed by a 2-round Delphi survey and final selection of indicators.

**Participants:** A total of 28 nutrition experts selected through snowball sampling; 100% response rate.

**Main Outcome Measures:** An expert panel scored and ranked NL themes and indicators for relevance, representativeness, and importance.

**Analysis:** Quantitative analysis. For principal indicators, the defined cutoff was mean (relevance and representativeness) > 4 and SD < 1. For subindicators, screening criteria were: (1) >20 experts ranked the nutrition theme's importance in the top 50% of the 12 themes; (2) mean (relevance and representativeness) > 4 and SD < 1 and >20 experts ranked the indicator's importance in the top 50% of all indicators within a domain.

**Results:** Consensus was reached on 8 principal indicators and 28 subindicators in 8 themes, including 10 in understand, 8 in analyze, 5 in appraise, and 5 in apply.

**Conclusions and Implications:** An initial set of NL indicators was developed for Taiwan college students, serving as a basis to develop Taiwan College's Nutrition Literacy Scale and providing information on nutrition education.

**Key Words:** nutrition literacy, college students, Delphi, Taiwan (*J Nutr Educ Behav.* 2017; ■:1-9.)

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## INTRODUCTION

Emerging adulthood refers to the population aged 18–25 years who have not yet formally entered adulthood.<sup>1,2</sup> Physiologically this is a time of peak body function and lowest disease acquisition, but this age group also has a relatively higher risk of becoming overweight or obese, with poor eating habits and physical inactivity compared with other age groups.<sup>3</sup> These unhealthy behaviors may contribute to weight gain in early adulthood and

cause a risk for hyperlipidemia, hyperglycemia, and hypertension.<sup>4</sup> It was also noted that if young adults maintain a stable body mass index before entering middle age, they might have minimal progression of the risk factors for metabolic syndrome and a lower incidence of it,<sup>5</sup> which in turn is favorable for preventing cardiovascular diseases and diabetes.

In Taiwan, most emerging adults attend college, which is both crucial to independence and a major turning point in life.<sup>6,7</sup> College life is free from

parental supervision, allowing students greater autonomy and broader support networks.<sup>3</sup> Students' eating behaviors are most affected by their families and schools before starting college, but afterward their dietary choices are mostly made independently.<sup>8</sup> Therefore, the college stage is important to the development of individuals' eating behavior, and the food choices made at this stage influence whether they will gain weight or maintain a healthy lifestyle during adulthood.<sup>9,10</sup> Noteworthy findings regarding college students from a 2011 national survey of Taiwan indicated unhealthy eating behaviors of frequent fast foods and sugar-sweetened beverage consumption and inadequate fruit and vegetable intake.<sup>11</sup> Thus, unhealthy eating behaviors have become a health risk for today's college students.<sup>12,13</sup>

Because health literacy (HL) substantially affects health status, health inequality, health expenditure, access to health care, understanding of health information, and decision-making behavior in medical settings,<sup>14</sup> enhancing HL is considered a core public health issue

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internationally.<sup>15</sup> The concept of nutrition literacy (NL) was derived from and elaborated on HL, and its definition was based on the US National Institute of Medicine's definition of HL<sup>16</sup>: The word *nutrition* replaces *health*, and the meaning thus becomes "the capacity to obtain, process, and understand nutrition information and skills needed in order to make appropriate nutrition decisions."<sup>17-20</sup> Nutrition literacy can also be regarded as a process of skills development, allowing individuals to understand and convert nutrition messages into knowledge.<sup>17,21</sup> Several NL measurement tools were established in the literature. The Nutrition Literacy Scale, developed by Diamond,<sup>22</sup> adopts a Cloze test (leak word quiz) to measure patients' reading comprehension capacity in terms of nutrition-related texts. Aihara and Minai<sup>17</sup> developed an NL assessment tool for Japanese seniors by asking respondents to self-assess their understanding of nutrition-related knowledge within the context of Japanese dietary guidelines. Gibb and Chapman-Novakofski<sup>23</sup> also developed the Nutrition Literacy Assessment Instrument (NLAI) to allow dietitians to assess the NL of cases in practice, to provide a more appropriate service. In line with professionals' expectations of NL, the NLAI was designed based on interviews with dietitians. Through that study, dietitians considered the NLAI to be a content valid NL measurement tool conducive to practical applications. Because dietitians were first-line personnel who were familiar with public dietary patterns, the current study also developed indicators taking into account the views of Taiwanese nutrition professionals, to establish a good foundation for the future development of NL measurement tools.

The discrepant definitions and connotations of NL that pertain globally<sup>24</sup> resulted in differences in NL measurement tools. Employing a widely used HL measurement tool, the Newest Vital Sign Scale (NVS),<sup>25</sup> as an example, the concept of NL was represented, because the questions adopted related to the food labeling of ice cream.<sup>20</sup> Cha et al<sup>26</sup> also adopted the NVS to measure the HL of overweight or obese college students and explored the association between HL and body mass index, and food label use behavior. They

found that individuals' food label use behavior and sufficient HL could predict diet quality effectively (namely, a higher degree of compliance with dietary guidelines). Despite this, because the NVS was not designed on the basis of the concept of NL, it is worth further discussion about whether the results can be used to represent NL.

Because NL emphasizes nutrition-related skills in which an individual should have to make wise decisions regarding dietary situations in daily life, it can be regarded as an imperative component of food education programs and important to promoting healthy eating behaviors. Nutrition literacy is an emerging concept coupled to differences in dietary patterns among countries and assessed subjects; thus it is necessary to develop guidelines or NL indicators that are localized and valued by specific audiences. Therefore, this study aimed to aggregate the recommendations of nutrition-related professionals regarding NL for Taiwan college students, using the Delphi process to reach a consensus on an initial set of NL indicators. The researchers hoped to construct NL indicators for Taiwan college students that would provide a crucial reference for developing NL assessment tools and nutrition intervention programs.

## METHODS

### Research Design

This study adopted a 2-round Delphi survey to agglomerate a consensus gradually from dietitians and nutritionists on NL indicators for Taiwan college students. The research process was divided into 3 stages: (1) development of potential NL indicators, (2) administration of a 2-round Delphi survey, and (3) final selection of NL indicators. Unlike traditional one-off surveys, in round 2, panelists could modify their previous responses based on information provided by the researcher regarding the difference between their own responses and the group average. Responses from each panelist were then integrated, and it was determined whether consensus had been reached.<sup>27</sup> Delphi provides multiple feedbacks and an effective mode of communication that resembles hosting in-person meetings; experts' responses are not influenced

by any authority. For this reason, it has become widely used in recent years when selecting or developing indicators, such as those for clinical care<sup>28,29</sup> or for healthy behavior interventions in the field of health.<sup>30,31</sup>

### Sampling Methods and Recruitment

The researchers used snowball sampling to recruit participants. Recruitment criteria were: (1) holding a current position as dietitian, including in schools, hospitals, or quantity foodservice companies, with a dietitian's license, and working as a dietitian for >3 years; (2) having a background in nutrition or relevant fields; or (3) being public sector administrative staff member responsible for nutrition-related business. Thirty potential expert panel participants who met 1 of these criteria were invited to participate; 2 people declined. Finally, a panel of 28 experts was formed, 85.7% of whom were accredited dietitians. The experts had a mean of years 20.96 years' work experience (median, 21; mode, 25). Regarding their work setting, nearly half of the experts worked as dietitians in either schools or hospitals, whereas 43% were professors of nutrition. Response rates for the 2 rounds of Delphi were each 100%.

### Development of Potential Indicators

This study used 5 domains (obtain, understand, analyze, appraise, and apply) to develop NL indicators based on the definitions of health and nutrition literacy in the literature.<sup>17-20,32</sup> Explanations for the 5 domains are as follows: (1) obtain nutrition information means having the capacity to search for, find, and acquire nutrition information; (2) understand nutrition information means having basic nutrition knowledge and the capacity to understand general nutrition information; (3) analyze nutrition information means having the capacity to discriminate and analyze nutrition information in a given situation; (4) appraise nutrition information means having the capacity to judge and assess nutrition information in terms of personal needs; and (5) apply nutrition information means having the capacity to apply nutrition information to daily life to achieve a healthy diet.

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