Oxford Research Encyclopedia of Communication

Nutrition Labeling in Health and Risk Messaging in Asia

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Subject: Health and Risk Communication Online Publication Date: Apr 2017
DOI: 10.1093/acrefore/9780190228613.013.307

Summary and Keywords

Populated by a diverse spread of cultures, Southeast Asia is represented by the Association of Southeast Asian Nations (ASEAN), a regional organization comprising some 622 million people in ten countries. While food and beverage labeling policies differ across ASEAN member states, organizations such as the ASEAN Food and Beverage Alliance (AFBA) have pushed for standardization in the interest of facilitating interregional trade. Set against this backdrop of economic growth, nutrition labeling as a means of influencing consumer choices has become a significant area of focus for health authorities and researchers over the past two decades due to rising chronic disease levels within the region’s increasingly urbanized communities.

Food retail trends facing Southeast Asia challenge the state of existing regulations governing, as well as research on food labeling practices in the region. Two main points stand out. First, legislation has remained disparate among the ASEAN nations despite repeated calls for standardization by academics as well as other relevant bodies, with only Malaysia adopting mandatory regulations on food labeling and nutritional claims. Second, existing nutrition labeling research in ASEAN is sorely lacking. In addition, there is a lack of theoretical and methodological diversity in existing studies, leading to an incomplete understanding of nutritional label use in Asia and a crucial research gap that remains to be filled.

Keywords: nutrition labeling, food packaging, food claims, ASEAN, Southeast Asia, regulations, health and risk message design and processing

Nutrition and Food Labeling: A Brief Introduction

The landscape for food products is rapidly changing in Asia. From the proliferation of new and imported foods, to the changing ways in which food products are distributed and marketed, food consumption in Asia has inadvertently evolved as a result of greater urbanization, economic growth, and globalization (Rimpeekool et al., 2015; Vijaykumar, Lwin, Jiang, & Au, 2013). Traditionally, foods in Asia revolved around indigenous products and natural ingredients that were freshly prepared and cooked. Today, urbanization, economic growth, and globalization have led to an increasing demand for convenience and speed in food consumption. To cater to these demands, availability and accessibility of processed and packaged food products has been increasing in supermarkets and convenience stores across Asia. Asian consumers are more widely exposed to food products and packages on supermarket shelves.

Government agencies, in their efforts to combat the harms of poor nutrition that arise from the over- or underconsumption of various food products, have attempted to find ways to help consumers make healthier food consumption choices (Wills, Schmidt, Pillo-Blocka, & Cairns, 2009). These communication efforts have included front-of-package labels such as health seals and certifications, as well as back-of-package nutrition content labeling, to help consumers identify healthy options from unhealthy ones. These efforts are informed by empirical research, which have highlighted the fact that people use heuristic visual cues to form judgments about food products (e.g., Lwin et al., 2014). Nevertheless, the lack of regulation and enforcement in several Asian countries has meant that marketers can also create fictitious and unsubstantiated claims to persuade consumers to buy their products. As such, a combination of authentic government communication and unsubstantiated health claims pervade the food products that line the shelves in Asian supermarkets. Hence, Asian consumers today are exposed to a confusingly large number of nutritional cues when shopping for food products (Lwin, Vijaykumar, & Jiang, 2015). While nutrition labels are mandatory and visible in all packaged products, comprehending and forming informed judgments about food products from these labels requires a high level of motivation and cognitive capability (e.g., Cha et al., 2014). It is self-evident that understanding consumer nutritional label use is highly important. Research has shown that use of nutrition labels in an appropriate manner can lead to positive food consumption outcomes such as more nutritionally balanced meals within the family unit (Kreuter, Brennan, Scharff, & Lukwago, 1997; Mandal, 2010; Tee et al., 2002).

Notably, most existing research on nutrition labeling has been concentrated in the West. This entry attempts to consolidate and synthesize the existing research that have been conducted in Southeast Asia, to provide a comprehensive and critical assessment of the regional nutrition labeling research landscape. First, a comprehensive overview of the

date: 18 May 2017

existing regulatory structures surrounding nutrition labeling is provided. Second, existing research conducted in Southeast Asia is reviewed, then the key themes and focal areas of research that arise from the entire field of study are discussed. Finally, opportunities for future research that Asian scholars who are examining nutrition labeling are outlined.

The Southeast Asian Region

Based on the categorization by the United Nations, the considerably large continent of Asia can be divided into four sizable areas: namely (a) Southeast Asia (including Myanmar, Cambodia, Thailand, Laos, Brunei, Vietnam, Malaysia, Philippines, Indonesia and Singapore which are the Association of Southeast Asian Nations or ASEAN), (b) Northeast Asia (including China, Japan, South Korea and Taiwan), (c) South Asia (including countries like Afghanistan, Bangladesh, India, Pakistan, Sri Lanka), and (d) West/Middle Asia (mainly referring to the Middle East). This entry focuses mainly on Southeast Asia, a highly populated region of Asia characterised by rapid economic and population growth (Jones, 2013). As an area of rapidly changing retail landscapes where consumers face Western-style nutrition labeling and packaging, the numerous challenges and policies arise that characterize the food labeling and health claims landscape are reviewed. Some references to the Northeast Asian neighbors and suggest resources for further reading into this region are provided following the text.

In this entry, the terms Southeast Asia and the Association of Southeast Asian Nations (ASEAN) are used interchangeably; ASEAN represents almost all of Southeast Asia. ASEAN is a regional organization of ten countries that dominates the political and socio-economic landscape of Southeast Asia. The ten member nations are Laos, Malaysia, Vietnam, Singapore, Cambodia, Thailand, Brunei Darussalam, Myanmar, the Philippines, and Indonesia. Together, these countries account for a combined population of some 622 million people. If ASEAN was a single nation, it would be the third largest in the world after China and India, and would have nearly twice the population of the United States (USA; ASEAN, 2015; CIA, 2016). Economically, ASEAN accounted for nearly 7% of the world’s total trade value in 2014, placing it fourth, just behind such giants as China and the United States. ASEAN has enjoyed substantial economic growth and a general increase in affluence within its communities, with gross domestic product (GDP) per capita (purchasing power parity) in the region increasing rapidly from US$6,953 in 2007 to US$10,725 in 2014. Table 1 shows the population breakdown across the ASEAN nations and the rapid urbanization in the rural agriculture base of most countries has moved toward at least a third of the population living in urban areas (CIA, 2016).

Table 1 ASEAN Demographic Macro Data, FY2015.

	Population	**GDP (US$b)**	**GDP per capita (US$)**	**Urbanization (%)**	**Urbanization rate (2010 – 2015) (%)**
Singapore	5,674,472	462.6	84,600	100	2.0
Malaysia	30,513,848	777.2	25,400	74	2.7
Indonesia	255,993,674	2,712.0	10,800	54	2.7
Philippines	100,998,376	700.4	7,000	45	1.3
Thailand	67,976,405	1,078.0	15,700	49	3.0
Vietnam	94,348,835	517.7	5,700	33	2.9
Cambodia	15,708,756	50.7	3,300	21	2.6
Myanmar	56,320,206	264.9	5,200	34	2.5
Laos	6,911,544	34.88	5,100	38	4.9
Brunei	429,646	33.29	80,800	77	−1.8

Note: (*) *Measured in purchasing power parity (PPP)*.

Source: Adapted from The World Factbook (Central Intelligence Agency; CIA, 2016).

The rapid growth of ASEAN economies and the rise in per capita income has encouraged a shift toward consumption of processed and packaged foods as the region’s population undergoes urbanization (Vijaykumar et al., 2013; Rimpeekool et al., 2015). These new urbanites, used to traditional markets and shopping, often face a daunting landscape of supermarkets and convenience stores where a variety of food packaging and labeling are presented instead of fresh produce (Lwin, 2015).

Table 2 Concentration of Grocery Stalls in ASEAN 5 for FY2014.

	Supermarkets	**Hypermarkets**	**Convenience stalls**	**Total**	**Population size (million)**	**Grocery stalls per 1m population**
Singapore	303	16	621	940	5	188
Malaysia	1298	167	2547	4012	30	134
Indonesia	1323	269	22818	24449	254	96
Philippines	1631	178	2031	3840	108	36
Thailand	1079	281	10916	12276	68	183
Total	5673	911	38933	45517	465	98

Note: Adapted from DBS Group Research (2015).

Table 2 shows the rise of the modern supermarkets and grocery chains across Southeast Asia; they are fast replacing the local traditional markets in supplying foods to populations (DBS Group Research, 2015). These evolving shifts in dependence on packaged and processed foods, as well as the shifting consumption patterns have been accompanied by increasing concern from health authorities and governments regarding the prevalence of nutrition-related noncommunicable diseases (NCDs) such as obesity and diabetes (Mandle et al., 2015). In urban areas and the more developed Southeast Asian countries, NCDs have been conclusively associated with life-threatening comorbidities such as cardiovascular disease and stroke. With the consumption of processed foods that are rich in energy but poor in nutrition (a significant factor driving NCDs), it is therefore unsurprising that regional authorities have taken a keen interest in consumer protection and the promotion of healthier consumption practices (Tee et al., 2002; Mandle et al., 2015; Kasapila & Shaarani, 2016).

date: 18 May 2017

The Regulatory Landscape in ASEAN

Consumers form impressions about food products and the products' perceived qualities, such as healthfulness in a variety of ways. One most common way in which consumers create these impressions is through food product packaging (Just & Payne, 2009). Being an indispensable aspect of the communication process in the marketing strategy of a product, packaging plays a vital role in how consumers see a food product (Kotler & Armstrong, 2010). Common message features on food packaging include nutrition labeling and other front-of-package cues like nutrition claims (Lwin, 2015). These are instrumental in assisting consumers determine product benefits and have been found to influence consumer decision making greatly (Lwin, 2015).

In the past two decades, there has been greater focus on nutrition labeling as a way of facilitating trade via the standardization of labeling guidelines, as well as a means by which consumers can be better informed about nutrient content and therefore make better dietary choices (Tee et al., 2002; Kasapila & Shaarani, 2016). Nutrition labeling is a tool to implement the World Health Organization (WHO) strategy of promoting healthy diets and is included in the WHO Non-Communicable Diseases (NCD) Action Plan 2013–2020. The Codex Guidelines of Nutrition Labeling (FAO; Food and Agriculture Organization of the United Nations, 2015) recommends procedures for the nutrition labeling of foods and is intended to be used as a benchmark to guide national regulations. The Codex (FAO, 2015) recommends that nutrition labeling be enforced by national authorities when nutrient declarations are used to display energy value, key dietary indicators such as protein, available carbohydrate (i.e., dietary carbohydrate excluding dietary fibre), fat, saturated fat, sodium content and total sugars. In addition, the Codex (FAO, 2015) also recommends the enforcement of labeling for any other nutrient used in a nutrition and health claim by the product, and the amount of any other nutrient considered to be relevant for maintaining a good nutritional status as mandated by national legislation or dietary guidelines (e.g., the mandatory declaration of trans-fatty acids). While the guidelines are a good outcome of years of discussion and compromise amongst all global member states, the harmonizing influence of the Codex Alimentarius remains to be seen. ASEAN countries already have their respective forms of national standards on nutrition labeling and are at different development phases of national food regulations and/or adopting Codex guidelines. This results in many differences between countries on the specifics of nutrition labeling.

According to Tee (2002), the journey on the standardization of nutrition labeling and health claims started in 2001 among regulators and other experts in Southeast Asia. The stakeholders recognized that for a long time, standardized food regulations did not exist. Even though the formation of the ASEAN Economic Community (AEC) in 2015 standardized regulations and reduced technical barriers to trade, nutrition labeling and health claim standards have yet to be unified across the region. Malaysia remains the first and only country that has mandatory nutrition labeling for a wide variety of foods

since 2005, in addition to enriched foods and food with nutrition and health claims. While the other ASEAN nations have expressed interest in adopting the Codex guidelines, no definitive time line has been provided, and labeling regulations remain disparate among countries.

In neighboring Northeast Asia, China and South Korea have imposed mandatory nutrition labeling, while Japan has adopted voluntary nutrition labeling with state-sponsored guidelines to be followed by food manufacturers (European Food Information Council, 2013).

Reviewing Existing Literature in ASEAN

In the United States and Europe, scholars have extensively studied the development of food labeling, the regulatory environment, and the effects of labeling information and food packaging claims on consumer food perceptions and dietary choices. What is much less known are the coverage of similar issues in Southeast Asian countries and across the region. This entry addresses the gap in related research by focusing on ASEAN's rapidly changing economies and societies, with selected reference to ASEAN's prominent Asian trading neighbours in Northeast Asia. This entry also contributes to a better understanding of nutrition research in the region by providing a historical and current snapshot of the regulatory landscape.

A review of scholarly articles focused on nutrition labeling in any of the 10 individual ASEAN countries, as well as the Northeast Asian countries (China, Japan and South Korea) between 1995 and 2016 that were published in peer-reviewed English language publications, as well as unpublished literature in English such as conference papers is provided here. The articles were sourced from the Google Scholar search engine and accessed using the university's Library e-credentials.

Articles were first sought using the keywords "nutrition label," "nutrition labeling," and "food labeling" with the addition of any Southeast Asian country. We later expanded our search to include regional tags (e.g., "ASEAN," "Southeast Asia"), Northeast Asian country tags (e.g., "China," "Japan"), as well as relevant international organizations (e.g., "World Health Organization"). These search parameters were chosen to provide the reader with a holistic selection of studies on the state and development of nutrition labeling among the Southeast Asian countries between 1995 and 2015. We also included relevant studies focusing on Northeast Asia for future reading in light of the increasing economic cooperation between ASEAN, China, Japan and South Korea toward the formation of an East Asian Economic Community in 2020 (ASEAN, 2016). In total, our search yielded 55 manuscripts that covered at least one country in the Asian region. We filtered the selected articles that covered at least one country from Southeast Asia,

leaving 35 manuscripts across the region. Of these, our focal region, ASEAN, was covered in 25 papers, and another 10 articles covered at least one country from Northeast Asia.

Global Perspective—Missing the Mark

The extant research includes several research papers consisting of global reviews or commentary. These studies typically include the USA and European Union (EU) with a small sampling of Asian countries. Thematically, most papers mentioned in this section tend to provide a broad review of relevant issues related to the state of nutrition labeling on a global or multi-regional level. By design, nearly all the studies that fall into this section are not able to provide the reader with expansive knowledge of the current state of nutrition labeling and claims regulation within Southeast Asia.

For example, Tee's (2002) review provided a regional overview of nutrition labeling and claims in the Asia Pacific region, namely six ASEAN countries (Brunei, Indonesia, Malaysia, Singapore, Philippines, Thailand), two Northeast Asian countries (China, Japan), and Australia-New Zealand. Tee (2002) observed that most of the countries covered in the review possessed voluntary labeling policies with a wide variation of formatting guidelines. At the time of writing, only Malaysia, Australia and New Zealand possessed mandatory labeling regulations. The paper highlighted developments in policy development, namely in the Philippines and Thailand, and also discussed the status of health and nutrition claims in the region. While the author highlighted the potential benefits of enhanced collaboration between countries with regard to enacting more similar regulatory practices and discussed the challenges facing all parties, Tee's (2002) review remains very much a macro-level report that engages the state of nutrition labeling and claims in the Asia Pacific predominantly on a regional scale.

In contrast, several reviews that adopted a global perspective often include a small sample of studies conducted in Asia. Often, these studies make the assumption that the overall findings can be generalized across cultural contexts. For example, Campos, Doxley and Hammond's (2011) systematic review on consumer use and the understanding of nutrition labels broadly examined the impact of nutrition labeling on consumer dietary habits globally. The authors included 120 articles mainly focused on the United States (88 studies) and Europe (12 studies), with a handful of papers from Thailand and the Australia-New Zealand region. Campos and colleagues (2011) found that nutrition labeling on packaged foods was one of the more prominent and widely available sources of nutrition information and that most consumers perceived such labeling as a relatively credible guide to product selection. Campos et al. (2011) also noted that label use varied across consumer subgroups, with a lower degree of use among older obese adults, adolescents, and children. The authors provided a helpful overview of existing challenges to nutrition labeling, including consumer understanding of the labels and the accessibility

of such information in a global context. Nonetheless, Campos et al.'s (2011) review did not examine geographical regions as a potential moderator, leaving potential cultural effects that might be unique to Asia and Southeast Asia unaddressed.

In 2013, a review of literature from three databases (Emerald, Science Direct, Social Science Index) spanning more than 20 years was conducted by Azman and Sahak. It focused on the effect of nutrition labeling on the consumer purchase decision process, suggesting that the use of nutrition labels by consumers may be a key influence in shifting consumption habits toward more healthy foods. The authors also examined how the definition of nutrition labeling tended to vary among studies, and they provided a summary and conceptualization of a common definition for nutrition labeling. The authors also discussed the types of labeling formats that could influence consumer decisions, and they highlighted various areas and issues relevant to future research in this area with reference to prior literature from the United States, Europe, Australia and New Zealand, as well as Malaysia. Overall, Azman and Sahak's (2013) paper provides an in-depth look at the relationship between labeling and the consumer decision-making process.

Kasapila and Shaarani (2016) provided a review of the relevant peer-reviewed, scholarly, and government literature to describe regulations enacted to date, evolving and future trends, and the likely impact of food product labels. While the paper focused mainly on the nutrition labeling environment in the United States, and the European Union, the authors also provided a brief highlight of discrepancies in nutrition labeling standards across regions including North Asia, the Gulf Cooperation countries, and the ASEAN member states. The paper also identified research gaps and provided directions for future directions in nutrition labeling research. Citing a Nielsen study in 2012, the authors noted that 92% of consumers in the Asia pacific region mostly understood nutrition information on labels—similar to numbers in other regions in the world. The authors also examined the determinants of nutrition label use, such as gender, education, psychological variables like self-control, etc., but they utilized American/European studies to generalize findings across the world (Kasapila & Shaarani, 2016). Likewise, the authors tended to generalize from U.S./E.U. studies when considering nutrition label use and its impact on healthful food choices. As is the case with Campos et al. (2011), Asia-Pacific countries, despite their unique sociocultural context, are assumed from the review to exhibit similar effects as regions in the West.

Another review by Mandle and colleagues (2015) examined research on consumer and industry response in the global South aimed to explore research on attitudes and usage of nutrition labels, as well as the industry response to labeling regulations outside North America, Europe, and Australia. The authors examined nutrition labeling research from 20 countries, including two ASEAN members Singapore and Thailand, as well as China and South Korea. Mandle and colleagues identified consumer preferences with regards to how nutrition information is presented on the package and suggested that further research into expanding food labeling policies should be a priority. The review also highlighted the potential benefits of sharing research findings in the global South in formulating strategies to combat NDCs. In contrast to Kasapila and Shaarani (2016),

Mandle et al. (2015) compared the determinants of label use across countries, highlighting differences across countries. Although this was encouraging, the researchers highlighted the fact that there is a serious knowledge gap in the global south (parts of Asia and Africa), and studies that make meaningful comparisons are rare.

Regional Perspective—Insufficient Outcome Assessments

The present search identified five papers that have attempted to review and address the different food labeling regulations among the ASEAN member states. Two such works are from Tee et al. (2002), who addressed the status of nutrition labeling and claims in the South-East Asian region in terms of standardization, and Kasapila and Shaarani (2011). Both papers discussed the discrepancies that exist among the ASEAN countries' regulation of food and nutrition labeling. The paper by Tee and colleagues (2002) also explored existing developments regarding food labeling guidelines within the individual member states, providing an in-depth look into the policies and trends put in place by health authorities. Tee et al. (2002) observed that apart from Malaysia, none of the other countries reviewed (i.e., Singapore, Brunei, Indonesia, Philippines, Thailand) had mandatory nutrition labeling regulations in place in 2016. The authors also highlighted developments within the region with regard to standardization efforts among the ASEAN members.

In contrast, Kasapila and Shaarani's (2011) work focused on the process of standardizing regulations within the region and discussed implications and barriers to the standardization process. The authors examined regional discrepancies in various areas of nutrition labeling, such as legislation, nutrient declaration, health claims, and languages used. Kasapila and Shaarani (2011) also discussed potential benefits of standardized regional food regulations such as better clarity of nutritional information for consumer use, indirectly reducing national healthcare costs as a result of improved consumer diets. The authors nonetheless recognized significant barriers to this process, especially in the large variance in socioeconomic development and national determination among the SEA nations, which could hamper regional standardization of regulations.

Tan et al. (2015) explored the regulatory framework of health claims in ASEAN with the objective of highlighting existing barriers and opportunities; thus, they found that five ASEAN nations (i.e., Malaysia, Thailand, Indonesia, Singapore and the Philippines) have regulations in place that permit the use of various health claims on food packaging. However, Tan and colleagues (2015) found discrepancies between countries in the regulations and the process required by manufacturers when registering health claims. Consequently, the authors suggest that further research and development should be

conducted for all to better understand the regulatory framework in the interests of improving nutrition quality in Southeast Asia.

Our review revealed another group of more recent studies exclusively focused on either the entire ASEAN region or a subset of the regional countries. Lwin (2015) compared ASEAN food packaging practices against the food label claim practices of products from the United States and the European Union via an examination of food product packaging in five ASEAN nations: Malaysia, , Thailand, Indonesia, Singapore, and the Philippines. The research aimed to better understand food packaging practices in Southeast Asia by examining the informational content of food labels on a variety of packaged foods. Lwin (2015) found a general presence of various claims in Southeast Asian food products, with a substantial proportion containing nutrient content and nutrient function claims. The presence of general marketing claims and nonnutrional claims was also noted, although there were differences among the five Southeast Asian countries examined. For example, Lwin (2015) observed that nutrient-function claims and nonnutritional claims were more commonly used by marketers in Singapore and Malaysia as compared to other ASEAN countries. The author highlighted that food claims are of concern especially to consumers with lower literacy because the sophisticated language used in such claims could be misinterpreted.

Most recently, Devadason, Govindaraju, and Tang (2016) examined the regulatory environment and highlighted various barriers hampering food trade in the ASEAN region from a Malaysian perspective. Their work assessed nontariff measures (NTMs) in the food sector and estimated their impact on the country’s imports from ASEAN. Devadason et al. (2016) highlighted the prevalence of technical barriers to trade such as product quality and labeling restrictions as limitations to food import in Malaysia and posited that similar barriers are likely to exist in the other ASEAN countries. The authors also discussed efforts by ASEAN members to standardize regulations as a welcome response to the growing regional food trade, but they noted that there was little progres, due to differences among member countries in the International Guidelines adopted by their respective national authorities. The paper concluded with the suggestion that greater consistency of food standards on a regional level would be a crucial boon to the development of the food trade industry in ASEAN, with a priority emphasis on building common ground especially in the regulation of regional food safety.

These papers have each attempted to address various pertinent issues in the state of nutrition labeling within Southeast Asia. A common theme across these studies seems to be the tendency to steer discussion along a policy-oriented route involving both regional and local regulatory authorities. While the authors collectively suggested potential solutions to make standards more consistent across the region by the relevant authorities, little research has been conducted to examine how the implementation of these regulations might influence actual consumer behavior.

Local Perspective—Theoretical and Methodological Weakness Abounds

The third group of studies focused on labeling and research claims within the context of a single ASEAN country. Of the ten countries, Malaysia appeared to be the most represented in published research to date, with several research papers focusing on a variety of aspects of nutrition labeling concerns in that country. Thematically, contrary to authors that covered the ASEAN region (which tend to be policy-oriented), these local papers address very specific topics derived from the broader landscape of nutrition labeling and claims within their country of study. For instance, Norazlanshah and colleagues (2013) aimed to explore attitudinal and gender differences predicting consumer use of nutrition labels in Malaysia.

There are, however, key limitations within this group of papers. First, we noted that most studies were generally atheoretically. Only Latif et al. (2016) and Vijaykumar et al. (2013) employed adapted versions of the theory of planned behavior to explain variances in consumer behavior regarding the influence of nutrition labels on purchase choices. Second, there are general methodological limitations. Many of the studies in this section consisted of cross-sectional survey designs with small sample sizes that limit the generalizability of findings to a whole country, much less ASEAN. The exception to this was Abdul Latif's et al. (2016) survey, which involved nearly 2,000 participants. However, these participants were sampled from a single geographical region in Malaysia that may not be demographically representative of the country in its entirety.

Malaysia

One of the earliest single country assessments was Tee's (1999) piece that examined the state of dietary patterns in Malaysia, nutrition programs, and their implications for the country. Malaysian researchers also covered nutrition labeling in a restaurant context; Din et al. (2011) examined nutritional labeling in a Malaysian full-service restaurant menu.

Norazlanshah et al. (2013) undertook a consumer research study in which 165 tertiary students completed a 25-item survey to determine the relationship between gender, attitude, and knowledge with the use of nutrition labeling. The study found that some 57.6% of participants showed moderate use of nutrition labels, with little difference between genders. However, Norazlanshah and colleagues observed a significant association between participant attitude and the use of nutrition labeling on participant food purchase decisions.

Din, Salehuddin, Zahari, and Shariff (2011) investigated 160 consumer perceptions toward the provision of nutrition information in Malaysian full-service restaurant menus using a self-report survey comprising 28 items. The authors found that nutrition information

regarding menu items (i.e., caloric value, protein, fat, and dietary fiber content) was positively perceived by the customers of these restaurants. Slight gender differences were observed; female consumers were more concerned with certain elements of nutritional information presentation. Din and colleagues (2011) noted that consumer attitudes tend to change with the acquisition of nutrition knowledge, leading to healthier eating habits and purchase decisions. The paper concluded with recommendations encouraging restaurant operators to provide accessible nutritional information to consumers.

In a doctoral dissertation, Kasapila (2013) engaged participants in Malawi and Sabah, Malaysia, to examine industry and consumer practices, as well as to explore regional legislation on food labeling regulations. Kasapila (2013) observed that while the use of food labels was high among participants in Malaysia (70.8%), only a minority of participants were able to correctly interpret the labels. The findings of the study identified three main factors governing consumer use of food labels, namely the marketing environment, consumers' nutrition knowledge, and the attributes of the product.

Abdul Latif's et al. (2016) also assessed label impact on consumer purchasing behavior in Malaysia via a survey grounded in an extended theory of planned behavior study. Using 2,014 consumers selected using stratified random sampling from the Klang Valley in Malaysia, the authors used structural equation modelling to test a model on the influence of consumer attitude and food labeling on purchase intention. Abdul Latif's et al. (2016) observed that consumers were more likely to purchase food items when satisfied with the information that could be found on the nutrition labels of said items. The paper also highlighted that Malaysian consumer behavior seemed to depend not only on the labeling information but also on consumer attitude toward food labeling.

Thailand

Our search identified two studies that focused on the state of food labeling in Thailand. The first was a nutrient assessment written by Judprasong and team (2013) and the second study was a maiden effort to review the state of food and nutrition labeling regulations in the country (Rimpeekool et al., 2015).

Judprasong et al. (2013) analyzed output from 17 participating laboratories on nutrient content of salted, fried broad bean (a common snack food) for the purpose of accurate nutrition labeling of food products based on existing Thai food label regulations. The study found that less than 20% of the participating laboratories were able to demonstrate satisfactory performance in preparing nutrition labels for the product. Judprasong and colleagues (2013) noted that the common mistakes made by most laboratories included the estimation of serving size and servings per pack, as well as the formatting of the nutrition

label itself. With these outcomes, the authors highlighted that quality training was necessary to ensure acceptable standards for nutrition label preparation.

Rimpeekool et al.'s (2015) paper reviewed the history and development of Thailand's nutrition labeling policies and the country's contributions to international food safety. The authors collected data from the Royal Thai Government Gazette e-database which resulted in a sample size of 137 documents relating to packaged food and food labels in Thailand. The paper discussed existing Thai Food and Drug Authority regulations on various food categories and included an extensive breakdown of the components that make up the Thai Nutrition Information Panel as stipulated by health authorities (Rimpeekool et al., 2015).

The Philippines

Kintanar (1995) conducted a review of existing regulatory practices established by the Philippines Bureau of Food and Drugs. The author examined the process in evaluating and approving food products within the country, various criteria for the classification of vitamins into either food supplements or drugs, as well as newly approved health claims for food products following the Nutrition Labeling and Education Act (NLEA).

In contrast, Tumulak et al.'s (2015) paper involved a survey of participants in Digos City, Philippines. These researchers observed that consumers were mainly motivated to use nutrition labels on food products when they were health conscious and that the ingredient list was the most commonly read part of the label alongside the product expiry date. The authors also found that greater nutrition knowledge was exhibited by participants who possessed a college education. Lastly, various improvements to existing food label presentation in the interests of providing easily accessible information for consumers were suggested in the study.

Singapore

Vijaykumar et al. (2013) conducted a point-of-purchase survey in Singapore using 200 participants from two supermarkets to examine factors that influenced the use of nutrition labels among supermarket shoppers using the theory of planned behavior. Independent variables of the study included participant attitudes and subjective norms, perceived behavioral control and dietary health concerns, as well as knowledge. The authors observed that in general, consumers possessed a low level of healthy literacy and nutrition knowledge, but attitudes and behavioral control differed based on participant age and ethnicity. Subjective norms and health concerns were also found to be significant predictors of consumer intent to utilize nutrition labels. The authors suggested that consumers with positive attitudes toward food labeling but a lack of nutritional

knowledge could be at risk of being misled by nutrition labeling information. This finding has highlighted the need for educational interventions based on demographic differences.

Lwin and colleagues (2015) also examined the state of food claims in Singapore via a product analysis, focusing on the claim terms “natural” and “fresh.” Using quantitative content analysis of 383 food packets sourced from five supermarkets, the authors drew attention to the proliferation of nonnutrient claims that were largely found in products originating from Oceania and North America and highlighted the risk of consumers being misled by the presentation of such claims. Food products from Asia were also noted to use “natural” and “fresh” claims, even when the product contained food additives of potentially carcinogenic nature. As in the study above, Lwin (2015) suggested that local authorities take the lead in implementing community education interventions to raise awareness and enhance health literacy, especially among school-aged children. The authors also stressed the need for urgent development of a regulatory framework to govern food claims in Singapore and within the ASEAN region.

The local Agri-food & Veterinary Authority (AVA) released a guidebook to provide food industry stakeholders with a reference to permitted food claims and regulations governing food labels in Singapore (AVA, 2016). The document contained an extensive coverage of food labeling requirements and warned of penalties for noncompliance with such regulations. The AVA (2016) also included definitions and specific details governing the use of permissible nutrition, health, function, and nutrient-specific diet-related health claims.

General Discussion

Our review and geographical analyses of the articles surfaced several key idiosyncrasies and important points about nutrition labeling research in Southeast Asia. These differences are best highlighted by examining the studies categorized by their geographical focus. Global studies tended to utilize one or a number of Asian countries representative of Asia; regional studies tended to focus on legal and regulatory environments; and single-country studies featured more original quantitative research examining the relationships between the determinants of nutrition label use and comprehension, as well as some related effects.

First, in articles with a global focus, studies tended to be review articles that included an Asian country, or a group of countries, as representative of Asia. These global review articles examined the legal and regulatory backdrop and sought to explain the key determinants and outcomes of nutrition label use. Two important limitations pertain to these reviews. First, some global reviews have proceeded with the assumption that US/EU research findings can be generalized to Asian countries (Kasapila & Shaarani, 2016). Second, even among reviews that sought to compare determinants and outcomes of nutrition label use between countries, the use of a handful of studies from a small number "Asian" countries do not provide a comprehensive understanding of nutrition labeling use in Asia for comparison with the international community (Mandle et al., 2015). This largely stems from the lack of single-country studies available in Asia, which considers the unique sociocultural context of each country's landscape and populations. Food consumption is a cultural practice, and research regarding food purchases and consumption, such as nutrition labeling, needs to take into account the sociocultural context. Because Asia is highly diverse, with distinct cultural divisions between countries, a large research gap needs to be filled.

Second, articles with a regional focus tended to consider the legal and regulatory environments of different Asian countries. One study conducted a content analysis of available food packaging labels in various Asian countries (Lwin, 2015). The rest of the critical pieces called for regulation changes and greater standardization of practices (Devadason & Govindaraju, 2016; Kasapila & Shaarani, 2011; Tan et al., 2015; Tee et al., 2002). A key implication for the concentration of critical regulatory pieces means that there are few region-focused studies investigating what regulatory decisions mean for the consumer. In addition, the lack of empirical research as well as overreliance on US/EU-centric studies, can lead to regulatory recommendations that are not suitable for Asian markets. In the future, original Asian research studies can help provide an empirical basis for any local or regional regulatory recommendations.

Finally, single-country studies are the only category of research that includes original research studies on the determinants and outcomes of nutrition label use among Asians. Whilst this is encouraging, the number of studies conducted are relatively scarce when

compared to the United States and the European Union. Existing quantitative studies have focused on determinants of use such as gender, knowledge, diet-health concern, and attitudes. However, few of these studies have strongly focused on theory to account for nutritional label use (except Abdul Latif's et al., 2016). Studies that examine the outcomes of nutritional label use are also scarce. Methodologically, existing studies have also mainly used cross-sectional surveys to examine these relationships. Therefore, there are three areas which Asian research on nutritional labeling can grow. First, Asian nutritional label research should employ strong theoretical frameworks in their study design to better explain nutritional label use and its outcomes. Second, studies that examine outcomes should be conducted to examine whether the effects of nutritional label use are homogenous across populations in Asia, as well as across the world. Last, there is a need for more methods to be deployed to attain a nuanced understanding of issues surrounding nutritional label use (e.g., in-depth interviews, case studies, ethnographic work or scanner data analyses).

Overall, a serious outcome from our assessment is the relative lack of nutrition labeling research that focuses on consumer understanding and message evaluations among Asian consumers. Even among those that exist, the lack of theory, methodological diversity, and limited study focus means that existing scientific understanding of Asian nutritional label use is quite incomplete. Much of what we know about nutritional label use is assumed from studies conducted in the United States and the European Union. This is problematic because (a) food consumption is a cultural practice and (b) food products manufactured in several Southeast Asian countries have more nutrition claims than products in the United States or the European Union (Lwin, 2015). Because the cognitive process of nutrition label comprehension and use, along with its contextual factors, are highly complex, it is likely that Asia-centric findings regarding nutritional label use can be quite different from those found in the United States or the European Union. This is an empirical question, and the lack of studies in the area makes it difficult to answer. A greater number of original research conducted in Asia, utilizing strong theoretical frameworks and methodological diversity, with a focus on both the determinants and outcomes of nutritional label use, can go a long way toward answering this important question.

Limitations & Implications for Future Research

One limitation of our entry is that it considers research published only in English, thereby eliminating inclusion and consideration of Asian research published in other regional languages. Future research should certainly involve works published in indigenous languages. Another limitation is our geographical coverage of studies pertaining to Southeast Asia, with a cursory count of similar research in neighboring Northeast Asian

region. Certainly, a full comprehensive assessment of the entire continent covering all 48 countries would be useful to both researchers and authorities in the continent.

One major observation of our assessment was the lack of Asian consumer-centric studies. While nutrition labeling has been touted by policy makers and some researchers as an effective way of helping consumers to make healthier food options, there are substantial gaps in understanding how facets of nutrition labeling can help consumers most at the point of purchase. Future research should certainly consider facets pertaining to Asian consumer psycho-social preferences, literacy, and decision making.

More glaringly, the findings presented here point to large vacuums in understanding different cultural contexts within and across countries pertaining to this field of research. Arguably, variation can be expected amongst populations within a country itself; Southeast Asian countries span a vast geographical boundary from rural to urban areas with diverse culture, food habits, literacy levels, motivation to seek and analyze information.

Notably, there is a lack of research on issues that matter strongly in various national contexts but may not have large presence on global nutrition radar. Future research should consider localized nutrition facets of importance to Asian consumers such as those incorporating traditional concepts of nutrition and health. A good example is Abdul Latif's et al. (2016) work, which incorporated halal seals as an item of investigation in Malaysia.

Many of the researchers we reviewed share the strong view that Southeast Asian health authorities should regulate not just at the local but should also work towards greater standardization at the regional level due to the rise of imported foods across Southeast Asia. These researchers point to Europe where concerns about the potentially misleading information led European Commission (EC) to establish, in 2006–2007, standardized regulation related to nutrition and health claims (Enserink, 2010; European Food Safety Authority, 2006). ASEAN and country authorities should be made aware of these concerns.

Finally, it is clear that more Asian research is needed in the area of food and labeling as Asian countries develop economically and increase food imports. Hopefully, researchers based in Asia will fill these pressing gaps to advance the existing research.

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