Review Article

National nutrition surveys in Asian countries: surveillance and monitoring efforts to improve global health

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Asian regions have been suffering from growing double burden of nutritional health problems, such as undernutrition and chronic diseases. National nutrition survey plays an essential role in helping to improve both national and global health and reduce health disparities. The aim of this review was to compile and present the information on current national nutrition surveys conducted in Asian countries and suggest relevant issues in implementation of national nutrition surveys. Fifteen countries in Asia have conducted national nutrition surveys to collect data on nutrition and health status of the population. The information on national nutrition survey of each country was obtained from government documents, international organizations, survey website of governmental agencies, and publications, including journal articles, books, reports, and brochures. The national nutrition survey of each country has different variables and procedures. Variables of the surveys include sociodemographic and lifestyle variables; foods and beverages intake, dietary habits, and food security of individual or household; and health indicators, such as anthropometric and biochemical variables. The surveys have focused on collecting data about nutritional health status in children aged under five years and women of reproductive ages, nutrition intake adequacy and prevalence of obesity and chronic diseases for all individuals. To measure nutrition and health status of Asian populations accurately, improvement of current dietary assessment methods with various diet evaluation tools is necessary. The information organized in this review is important for researchers, policy makers, public health program developers, educators, and consumers in improving national and global health.

Key Words: national nutrition survey, surveillance, monitoring, Asia, global health

INTRODUCTION

Asian countries are increasingly facing a double burden of chronic diseases, which are directly related to food consumption and dietary practices of the populations.[1] The nutrition transition currently occurring in Asian countries is characterized by disparity in food intake, influx of western foods, increasing availability of processed foods, and high intakes of animal foods, sugars, and fats.[1,2] It has resulted in an increasing prevalence of obesity and chronic diseases, such as metabolic syndrome, diabetes, and cardiovascular disease in recent decades.[3-6] On the other hand, undernutrition, including protein energy malnutrition and micronutrient deficiencies, and infectious diseases have remained persisting nutritional concerns in many parts of Asia.[7] These problems are related to deficit in food intake and food insecurity. South Asia shows a higher prevalence of child malnutrition, such as underweight, wasting, and stunting, and children under five mortality rates compared with those in other Asian countries and average status of the world.[8]

International organizations, such as the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) have input into these issues in this region according to goals for improvement of global health and reduction of health disparities.[9] They fulfill the objectives through providing technical support and nutritional health programs, monitoring the health situation, and assessing health trends. Nutrition surveillance and monitoring system at national level play an essential role in helping to achieve these goals.

Regular, continuous assessment and monitoring of nutritional health status for individuals and the entire population by national nutrition survey has become important for public health in each nation and global regions. National nutrition surveys are important tools to obtain information on the nutrition and health status of the population. Findings from the national nutrition survey can be used to identify nutritional and health problems in the populations, to plan prevention programs, and to formulate nutrition guidelines and public health policies. In addition, information derived by the nutrition surveillance and monitoring system can be used to detect changes in the nutritional status and evaluate the effectiveness of nutrition programs.[10]

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National nutrition surveys are indispensable to improve nutritional status and handle health issues for Asian populations, but the collective information on current national nutrition surveys conducted in Asian countries are limited. More proactive measures and effective implementation of national nutrition surveys are also needed. Therefore, the aim of this review was to compile and present the information about current national nutrition surveys conducted in Asian countries and suggest relevant issues in implementation of national nutrition surveys.

CURRENT INFORMATION ON NATIONAL NUTRITION SURVEYS IN ASIAN COUNTRIES

Source of information (Table 1)

In this review, a national nutrition survey is defined as a method designed to obtain information on the nutritional status and nutrition-related health status for nationally representative sample of the country's population. In several countries, nutrition survey is one section of national health and nutrition surveys. According to the definition, fifteen Asian countries were chosen for the summary of information on current national nutrition surveys: Cambodia,[11] China,[12,13] India,[14] Indonesia,[15] Japan,[16,17] Malaysia,[18,19] Mongolia,[20] Nepal,[21] Pakistan,[22] Philippines,[23] Singapore,[24,25] South Korea,[26] Taiwan,[27] Thailand, [28] and Vietnam.[29] These countries have published information on nutrition- and/or health-related surveys at the national level.

The information on national nutrition survey of each country was obtained from government documents; data from international organizations, such as WHO and UNICEF; survey website of governmental agencies; and publications, including journal articles, books, reports, and brochures. Information was based on the latest survey published in each country. However, several countries had limited publications (in English), outdated webpages, or webpages in non-English. In order to overcome the limitation and include the most updated information in this study, we e-communicated with the responsible person(s) in each country. According to the information provided in their responses, each country's information on the survey was updated. In addition, the list of websites or URL for nutrition survey of each country was included in Table 1.

National nutrition surveys have been conducted by governmental agencies, such as National Institute of Nutrition (NIN) in China and India or Center for Disease Control and Prevention (CDC) in South Korea with different survey period and procedures. For example, Japan and South Korea have done surveys annually while other countries have conducted the survey every 5 to 10 years. These surveys have intended to produce extensive nutrition and health data for the whole population as well as for specific age and gender groups. The participants included in the survey may somewhat differ according to countries. For instance, all individuals aged one year or older have been selected in China, Japan, Philippines, and South Korea, or individuals in specific sex and age group in other countries. Especially, several surveys in Cambodia, Mongolia, Nepal, Pakistan, and Vietnam have focused on children under five years of age and women of reproductive age.

Information on survey contents (Table 2)

Information collected by national nutrition surveys can be summarized in the following categories: 1) sociodemographic and lifestyle variables; 2) detailed information on foods and beverages intake, dietary habits, and food security of individual or household; and 3) health indicators, such as anthropometric and biochemical variables. Demographic variables include age, gender, marital status, ethnicity, living area, and family structure, and socioeconomic variables are education, income, and occupation. Lifestyle variables are smoking status, drinking, physical activity, medication use, family history of diseases, and diagnosed diseases. Dietary intake data are obtained by 24-hour recall method, dietary record, or food-frequency questionnaire (FFQ) on individual and household level. Information on dietary habits and food security is obtained through questionnaires. Several surveys also include health examination, such as anthropometric assessment, blood pressure measurement, fasting blood test, and urine test.

National nutrition surveys in Cambodia, Mongolia, Nepal, Pakistan, and Vietnam reflect interest in the nutritional and health status of child aged less than five years and women of reproductive age. These surveys include measurement of height, weight, BMI, and blood indicators of survey participants to assess undernutrition and micronutrient deficiencies. In addition, questions about breastfeeding practice, vitamin and mineral rich food consumption, vitamin supplementation, and iodized salt usage in household are included. National nutrition surveys in China, Japan, Singapore, and South Korea focus on the assessment of nutrition intake adequacy for all individuals and prevalence of obesity and chronic diseases, such as hypertension, diabetes, cardiovascular disease, certain cancers, and osteoporosis.

ISSUES IN IMPLEMENTATION OF NATIONAL NUTRITION SURVEYS

There are some issues we need to consider in implementation of national nutrition surveys. Dietary assessment methods of the national nutrition survey are considered in order to obtain accurate and precise information about all the foods, beverages, and supplements consumed by individual or household. Diets in Asian countries are characterized by a diverse variety of foods, condiments and seasonings, mixed dishes with many ingredients together, and sharing foods from the same bowl with other people.[30] Therefore, it can be very difficult to measure the amount of foods and ingredients each person consumed or their usual intake frequencies. Therefore, improvement of current dietary assessment or development of new approaches is necessary to obtain dietary intake data in the national nutrition survey.

To assess nutrition and health status accurately, diet evaluation tools, such as Dietary Reference Intakes (DRIs), dietary guidelines, food guidance systems, and food composition database are needed.[30,31] These tools can be used to guide a healthy diet and evaluate nutrient and food intake for individual or population based on the dietary data from national nutrition surveys. Several Asian countries, including China,[32] India,[33,34] Indonesia,[35,36] Japan,[37-39] Malaysia,[40] Philippines,[41] Singapore,[42]

Table 1. Current national nutrition surveys in Asian countries

Country	Survey title (webpage URL)	Institution	Survey design			
			Survey period	The latest survey	Participants	Sampling method
Cambodia	Demographic and Health Survey (CDHS) (http://www.nis.gov.kh)	Directorate General for Health/National Institute of Statistics	Every 5 years	2010	Individuals (15-49 y) and children (<5 y)	Multi-stage, stratified sampling design
China	China Health and Nutrition Survey (CHNS) (http://www.cpc.unc.edu/projects/china)	Carolina Population Center/National Institute of Nutrition and Food Safety	Every 2 or 3 years	2009	All individual (≥1 y)	Multi-stage, stratified sampling design
India	National Nutrition Monitoring Bureau (NNMB) (http://ninindia.org/nnmb.htm)	National Institute of Nutrition	Every 3 years	2011-2012	All individual (≥1 y)	Multi-stage, stratified sampling design
Indonesia	National Social economic Survey (SUSENAS) (http://catalog.ihsn.org/index.php/catalog/3031)	Central Bureau of Statistic	Every year	2012	Household survey	Multi-stage, stratified sampling design
Japan	National Health and Nutrition Survey (http://www.mhlw.go.jp/bunya/kenkou/kenkou_eiyou_chousa.html)	National Institute Health and Nutrition	Every year	2012	All individual (≥1 y)	Multi-stage, stratified sampling design
Malaysia	Malaysian Adult Nutrition Survey (MANS)	Family Health Development Division	Not available	2002-2003	Adults (18-59 y)	Multi-stage, stratified sampling design
Mongolia	National Nutrition Survey	Nutrition Research Center of Public Health Institute	Every 5 years	2010	Mothers and children (6-59 mo)	Multi-stage, stratified sampling design
Nepal	Nepal Demographic and Health Survey (NDHS) (http://countryoffice.unfpa.org/nepal/?publications=6511)	Population Division	Every 5 years	2011	Individuals (15-49 y) and children (<5 y)	Multi-stage, stratified sampling design
Pakistan	National Nutrition Survey (https://pak.humanitarianresponse.info)	Pakistan Medical Research Council/ Nutrition Wing, Cabinet Division	Every 10-15 years	2011	Women (15-49 y), Children (6-59 mo), and Elderly (>50 y)	Multi-stage, stratified sampling design
Philippines	National nutrition survey (http://www.fnri.dost.gov.ph)	Food and Nutrition Research Institute	Every 5 years	2008	All individual (≥1 y)	Multi-stage, stratified sampling design

Table 1. Current national nutrition surveys in Asian countries (cont.)

Country	Survey title (webpage URL)	Institution	Survey design			
			Survey period	The latest survey	Participants	Sampling method
Singapore	National Nutrition Survey (https://www.hpb.gov.sg)	Health Promotion Board	Every 5 or 6 years	2010	Adults (18-69 y)	Sub-sample of the National Health Survey
	National Health Survey (https://www.moh.gov.sg)	Epidemiology and Disease Control Division	Every 6 years	2010	Adults (18-79 y)	Multi-stage, stratified sampling design
South Korea	Korea National Health and Nutrition Examination Survey (KNHANES) (https://knhanes.cdc.go.kr)	Centers for Disease Control and Prevention	Every year	2010-2012	All individual (≥1 y)	Multi-stage, stratified sampling design
Taiwan	Nutrition and Health Survey in Taiwan (NAHSIT) (http://www.mohw.gov.tw)	Bureau of Food Sanitation of the Department of Health	Every 3 years	2005-2008	Adults (≥19 y) and children (<6 y)	Multi-stage, stratified sampling design
Thailand	National Food and Nutrition Survey	Nutrition Division of the Department of Health	Every 10 years	2003	Households with children (<5 y)	Not available
Vietnam	General Nutrition Survey (GNS) (http://www.unicef.org/vietnam/resources_21138.html)	National Institute of Nutrition	Every 10 years	2009-2010	Mothers and child (<5 y)	Multi-stage, stratified sampling design

Table 2. Contents of national nutrition surveys in Asian countries

Country	Survey title	General characteristics				Health indicators				Dietary information			
		Demo-graphic	Socio-economic	Life-style	Health-related	Blood pressure	Anthro-pometric	Fasting blood	Urine	Dietary intake (individual)	Dietary intake (household)	Dietary behavior	Food security
Cambo-dia	Demographic and Health Survey (CDHS)	Y	Y	Y	Y	N	Y	Y, for as-sessment of micronutri-ent status and anemia	N	N	N	Y	N
China	China Health and Nutrition Survey (CHNS)	Y	Y	Y	Y	Y (for adults)	Y	Y (for ≥7 y)	N	Y, 3 consec-utive days of 24HRs	Y	Y	N
India	National Nutrition Monitoring Bureau (NNMB)	Y	Y	Y (After 2007, for ≥20 y)	Y (After 2007, for ≥20 y)	Y (After 2007, for ≥20 y)	Y, for assess-ment of malnutri-tion	N	N	Y, 1 day of 24HR	Y	N	N
Indonesia	National Social economic Survey (SUSENAS)	Y	Y	Y	N	N	Y, for assess-ment of malnutri-tion	N	N	Y, compute average intake of the household members from the household food intake data	Y, from question-naire and record	N	N
Japan	National Health and Nutrition Survey	Y	Y	Y (for ≥15 y)	Y (for ≥15 y)	Y (for ≥15 y)	Y	Y (for ≥20 y)	N	Y, 1 day of semi-weighed dietary record (household based)	N	Y	N
Malaysia	Malaysian Adult Nutrition Survey (MANS)	Y	Y	Y	N	N	Y	N	N	Y, Semi-quantitative FFQ	N	N	N

24HR: 24-hour recall; FFQ: food frequency questionnaire.
The "N" means survey does not include the information and the "NA" means the information is not available.

Table 2. Contents of national nutrition surveys in Asian countries (cont.)

Country	Survey title	General characteristics				Health indicators				Dietary information			
		Demo-graphic	Socio-economic	Life-style	Health-related	Blood pressure	Anthro-pometric	Fasting blood	Urine	Dietary intake (Individual)	Dietary intake (Household)	Dietary behavior	Food security
Mongolia	National Nutrition Survey	Y	Y	N	N	N	Y	N	N	N	N	Y for assessment of micronutrient deficiency	N
Nepal	Nepal Demographic and Health Survey (NDHS)	Y	Y	Y	Y	N	Y (for women and children)	Y, for assessment of anemia	N	N	N	Y, for assessment of micronutrient deficiency	N
Pakistan	National Nutrition Survey	Y	Y	Y	Y	N	Y	Y, for assessment of micronutrient status	Y, for assessment of urinary iodine status	Y, 1 day of 24HR	N	Y	Y
Philippines	National nutrition survey	Y	Y	Y	Y	Y (for ≥20 y)	Y	Y (for ≥20 y)	Y, for assessment of urinary iodine status	Y, 2 non-consecutive days of 24HRs	Y, household food weighing	Y	Y
Singapore	National Nutrition Survey	N	N	N	N	N	N	N	N	Y, Semi-quantitative FFQ	N	Y	N
	National Health Survey	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
South Korea	Korea National Health and Nutrition Examination Survey (KNHANES)	Y	Y (for ≥12 y)	Y	Y	Y (for ≥10 y)	Y	Y (for ≥10 y)	Y (for ≥10 y)	Y, 1 day of 24HR and FFQ	N	Y	Y
Taiwan	Nutrition and Health Survey in Taiwan (NAHSIT)	Y	Y	Y	Y	Y	Y	Y	Y	Y, 1 day of 24HR and FFQ	N	Y	N
Thailand	National Food and Nutrition Survey	NA											
Vietnam	General Nutrition Survey (GNS)	Y	N	N	N	N	Y	Y, for assessment of micronutrient status	N	Y, 1 day of 24HR	Y	Y	Y

24HR: 24-hour recall; FFQ: food frequency questionnaire.
The "N" means survey does not include the information and the "NA" means the information is not available.

Table 3. Current dietary evaluation tools in Asian countries

Country	Dietary assessment tools			
	Dietary Reference Intakes	Dietary Guidelines	Food Guide systems	Food Composition Tables
Cambodia	NA	NA	NA	NA
China	Chinese Dietary Reference Intakes (2001)	Dietary Guidelines for Chinese Residents (2007)	Chinese Food Guide Pagoda (2007)	Food Composition Table (2004)
India	Recommended Dietary Allowance for Indians (2010)	Dietary Guidelines for Indians (2011)	Food Pyramid (2011)	Nutritive Value of Indian Foods (1990)
Indonesia	Indonesian Recommended Dietary Allowances (1998)	Indonesian Nutrition Guidelines (1995)	"Tumpeng Gizi Seimbang" (2011)	Indonesian Food Composition Table (1995)
Japan	Dietary reference intakes for Japanese (2010)	Japan's Dietary Guidelines (2000) Japan's Dietary Guidelines for maternity (2006)	Japanese Food Guide Spinning Top (2005)	Standard Tables of Food Composition in Japan (2005)
Malaysia	Recommended Nutrient Intakes for Malaysia (2005)	Malaysian Dietary Guidelines (2010) Malaysian Dietary Guidelines for Children and Adolescents (2013)	The Malaysian food pyramid (2010)	Nutrient Composition of Malaysian Foods (1997)
Mongolia	NA	NA	NA	NA
Nepal	NA	NA	NA	NA
Pakistan	NA	NA	NA	NA
Philippines	Recommended Energy and Nutrient Intakes (2002)	Nutritional Guidelines for Filipinos (2000)	Daily Nutritional Guide Pyramid for Filipinos (2000)	Food Composition Tables recommended for use in the Philippines (1997)
Singapore	Recommended Dietary Allowances for Singaporeans (2012)	Food-based Dietary Guidelines for Adults (2003)	Singapore's Healthy Diet Pyramid (2009)	Food Composition Book (2003) Food Composition System Singapore
South Korea	Dietary reference intakes for Koreans (2010)	Dietary Goals and Dietary Guidelines for Koreans (2009)	Food Balance Wheels (2010)	Food Composition Table (2011)
Taiwan	Dietary Reference Intakes (2012)	Taiwanese Dietary Guidelines (2011)	Daily Food Guide for Taiwanese (2011)	Food Composition Table and Database (1998)
Thailand	Dietary Reference Intake for Thais (2003)	Food-based Dietary Guidelines for Thai (1996)	Nutrition Flag (1998)	Thai Food Composition Database (1995)
Vietnam	Vietnam Recommended Dietary Allowances (2007)	Food-based Dietary Guidelines (2007)	NA	Food Composition Table for Use in East Asia

NA: not available.

South Korea,[43,44] Taiwan,[45] Thailand,[46-48] and Vietnam,[49,50] have developed these tools and have updated regularly. In other countries (eg, Cambodia, Mongolia, Nepal, and Pakistan), these tools are lacking, so regional and international cooperation is needed (Table 3).

The countries and regions in Asia have different nutritional problems and health issues, so more specific assessments of nutrient, food group, or health indicators are necessary to identify and evaluate each country's nutritional and health problems. In addition, for assessment of malnutrition and micronutrient deficiencies in mothers and children, environmental factors, such as food security and sanitation, need to be considered through the national nutrition survey.

IMPLICATIONS FOR RESEARCH AND PRACTICE

The primary purpose of national nutrition surveys is to collect basic information required for the understanding of nutritional status and health problems of the population. This information contributes to formulate appropriate nutrition policies, plan intervention programs, and monitor present nutrition and health-related programs regularly. One of the major long-term objectives of the surveys is to obtain trend data of nutritional and health status of the country.

Asian countries have their own dietary practice and health problems, which are different from Western countries. Appropriate measures and efficient procedures of national nutrition surveys in Asian counties would be helpful to assess their nutrition status and identify health problems of the population. In addition, data from the nutrition survey are used to understand nutritional gaps and health disparities according to the countries and re-

gions. The current information organized in this review might be useful for researchers in studying nutrition and health relationships and important for policy makers, public health program developers, and educators in improving national and global health.

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REFERENCES

1. Hawks SR, Merrill RM, Madanat HN, Miyagawa T, Suwanteerangkul J, Guarin CM, Chen SF. Intuitive eating and the nutrition transition in Asia. Asia Pac J Clin Nutr. 2004;2: 194-203.
2. Kosulwat V. The nutrition and health transition in Thailand. Public Health Nutr. 2002;5:183-9. doi: 10.1079/Phn2001 292.
3. Kwong JS, Yu CM. The need for multicentre cardiovascular clinical trials in Asia. Nat Rev Cardiol. 2013;6:355-62. doi: 10.1038/nrcardio.2013.49.
4. Pan WH, Yeh WT, Weng LC. Epidemiology of metabolic syndrome in Asia. Asia Pac J Clin Nutr. 2008;S1:37-42.
5. Ramachandran A, Snehalatha C. Rising burden of obesity in Asia. J Obes. 2010. doi: 10.1155/2010/868573.
6. Yoon KH, Lee JH, Kim JW, Cho JH, Choi YH, Ko SH, Zimmet P, Son HY. Epidemic obesity and type 2 diabetes in Asia. Lancet. 2006;9548:1681-8. doi: 10.1016/S0140-6736 (06)69703-1.
7. Khor GL. Food-based approaches to combat the double burden among the poor: challenges in the Asian context. Asia Pac J Clin Nutr. 2008;17(Suppl 1):111-5.
8. United Nations Children's Fund. The state of the world's children 2012: Children in an Urban World. New York: United Nations Children's Fund; 2012.
9. World Health Organization. Health inequities in the South-East Asia region. Geneva: World Health Organization; 2007.
10. Boyle MA, Holben DH. Community nutrition in action: an entrepreneurial approach. Belmont, CA: Wadsworth; 2012.
11. National Institute of Statistics, Directorate General for Health, and ICF Macro. Cambodia demographic and health survey 2010. Phnom Penh, Cambodia and Calverton, Maryland, USA: National Institute of Statistics, Directorate General for Health, and ICF Macro; 2011.
12. Carolina Population Center. China Health and Nutrition Survey. Chapel Hill, NC: Carolina Population Center; 2009. [cited 2013/5/1]; Available from: http://www.cpc.unc.edu/projects/china.
13. Popkin BM, Du SF, Zhai FY, Zhang B. Cohort Profile: The China Health and Nutrition Survey-monitoring and understanding socio-economic and health change in China, 1989-2011. Int J Epidemiol. 2010;6:1435-40. doi: 10.1093/Ije/Dyp322.
14. National Institute of Nutrition. Diet and nutritional status of rural population, prevalence of hypertension & diabetes among adults and infant & young child feeding practices - report of third repeat survey. Hyderabad: Indian Council of Medical Research; 2012.
15. Central Bureau of Statistic. National Social Economic Survey (SUSENAS). Indonesia: Central Bureau of Statistic; 2002.
16. National Institute of Health and Nutrition. Outline for the Results of the National Health and Nutrition Survey Japan, 2007. Japan: Ministry of Health, Labour and Welfare; 2007.
17. Nakamura M, Yoshiike N. Current systems of national and regional nutrition surveys and future direction. J Comm Nutr. 2003;5:59-64.
18. Poh BK Jr, Safiah MY, Tahir A, Siti Haslinda MD, Siti Norazlin N, Norimah AK et al. Physical activity pattern and energy expenditure of Malaysian adults: Findings from the Malaysian Adult Nutrition Survey (MANS). Malays J Nutr. 2010;1:13-37.
19. Norimah AK Jr, Safiah M, Jamal K, Haslinda S, Zuhaida H, Rohida S et al. Food donsumption patterns: Findings from the Malaysian Adult Nutrition Survey (MANS). Malays J Nutr. 2008;1:25-39.
20. Otgonjargal D, Woodruff BA, Batjargal J, Gereljargal B, Davaalkham D. Nutritional status of under - five children in Mongolia. J Med Med Sci. 2012;3:341-9.
21. Population Division. Nepal demographic and health survey 2011. Kathmandu: Ministry of Health and Population; 2012.
22. Nutrition Wing. National Nutrition Survey Report 2011. Pakistan: Cabinet Division; 2011.
23. Food and Nutrition Research Institute. The Seventh National Nutrition Survey. Philippines: Department of Science and Technology; 2008.
24. Epidemiology and Disease Control Division. National Health Survey 2010. Singapore: Ministry of Health; 2011.
25. Health Promotion Board. Report of the National Nutrition Survey 2010. Singapore: Health Promotion Board, Research and Strategic Planning Division; 2013.
26. Korea Centers for Disease Control and Prevention. The Fifth Korea National Health and Nutrition Examination Survey (KNHANES V). Cheongwon: Korea Centers for Disease Control and Prevention; 2011.
27. Tu SH, Chen C, Hsieh YT, Chang HY, Yeh CJ, Lin YC, Pan WH. Design and sample characteristics of the 2005-2008 Nutrition and Health Survey in Taiwan. Asia Pac J Clin Nutr. 2011;2:225-37.
28. Winichagoon P. Thailand nutrition in transition: situation and challenges of maternal and child nutrition. Asia Pac J Clin Nutr. 2013;1:6-15.
29. National Institute of Nutrition. Summary report general nutrition survey 2009-2010. Hanoi: National Institute of Nutrition; 2012.
30. Paik HY. The issues in assessment and evaluation of diet in Asia. Asia Pac J Clin Nutr. 2008;S1:294-5.
31. Murphy SP. Using DRIs for dietary assessment. Asia Pac J Clin Nutr. 2008;S1:299-301.
32. Ge K. The transition of Chinese dietary guidelines and the food guide pagoda. Asia Pac J Clin Nutr. 2011;3:439-46.
33. National Institute of Nutrition. Nutrient requirements and Recommended Dietary Allowances for Indians. Hyderabad: National Institute of Nutrition; 2010.
34. National Institute of Nutrition. Dietary guidelines for Indians - A manual. In: Nutrition NIo, ed. Hyderabad: National Institute of Nutrition; 2011.
35. Usfar AA, Fahmida U. Do Indonesians follow its Dietary Guidelines? - evidence related to food consumption, healthy lifestyle, and nutritional status within the period 2000-2010. Asia Pac J Clin Nutr. 2011;3:484-94.
36. Soekirman. Taking the Indonesian nutrition history to leap into betterment of the future generation: development of the Indonesian Nutrition Guidelines. Asia Pac J Clin Nutr. 2011; 3:447-51.

37. Yoshiike N, Hayashi F, Takemi Y, Mizoguchi K, Seino F. A new food guide in Japan: The Japanese food guide spinning top. Nutr Rev. 2007;4:149-54. doi: 10.1301/nr.2007.apr. 149-154.
38. Sasaki S. Dietary Reference Intakes (DRIs) in Japan. Asia Pac J Clin Nutr. 2008;S2:420-44.
39. Nakamura T. Nutritional policies and dietary guidelines in Japan. Asia Pac J Clin Nutr. 2011;3:452-4.
40. Tee ES. Development and promotion of Malaysian Dietary Guidelines. Asia Pac J Clin Nutr. 2011;3:455-61.
41. Barba CVC, Cabrera MAIZ. Recommended energy and nutrient intakes for Filipinos 2002. Asia Pac J Clin Nutr. 2008;S2:399-404.
42. Lee BLC. Dietary Guidelines in Singapore. Asia Pac J Clin Nutr. 2011;3:472-6.
43. The Korean Nutrition Society. Dietary Reference Intakes for Koreans. Seoul: The Korean Nutrition Society; 2010.
44. Paik HY, Kim CI, Moon HK, Yoon JS, Joung H, Shim JE, Jung HJ. 2008 Dietary goals and dietary guidelines for Korean adults. Korean J Nutr. 2008;8:887-99.
45. Tzeng MS. From dietary guidelines to daily food guide: the Taiwanese experience. Asia Pac J Clin Nutr. 2008;17(Suppl 1):59-62.
46. Committee on Thai DRI. Dietary Reference Intake for Thais. Bangkok: Health Department, Ministry of Public Health; 2003.
47. Sirichakwal PP, Sranacharoenpong K, Tontisirin K. Food based dietary guidelines (FBDGs) development and promotion in Thailand. Asia Pac J Clin Nutr. 2011;3:477-83.
48. Sirichakwal PP, Sranacharoenpong K. Practical experience in development and promotion of food-based dietary guidelines in Thailand. Asia Pac J Clin Nutr. 2008;17(Suppl 1):63-5.
49. Hop LT, Van TK, Thanh HK. Food based dietary guidelines in Vietnam: progress and lessons learned. Asia Pac J Clin Nutr. 2011;3:495-9.
50. Khan NC, Van Hoan P. Vietnam recommended dietary allowances 2007. Asia Pac J Clin Nutr. 2008;S2:409-15.

Original Article

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亚洲国家的全国营养普查：利用监测和监控来提高全球健康水平

亚洲地区现在正出现双重营养健康问题，比如营养不良和慢性疾病。全国营养普查在帮助提高国家和全球健康水平和减少健康不平等至关重要的作用。本综述的目的是整理和呈现当前亚洲各个国家中全国营养普查信息，并对全国营养普查出现的一些问题提出建议。亚洲有 15 个国家开展了全国性的营养普查来收集人群营养健康状况资料。每个国家营养普查的资料来源于政府文件、国际组织、政府机构的调查网站、一些出版物，包括发表在期刊的文章、书籍、报道以及一些小册子等。各个国家营养普查有其不同变量和程序。普查的变量包括，社会人口和生活方式、食物和饮料、饮食习惯和个人或家庭的食品保障；还有一些健康指标方面的变量，比如人体测量指标和生化指标。调查主要侧重于收集 5 岁以下儿童和育龄妇女的营养健康状况、个人的营养摄入是否充足、肥胖以及慢性疾病的发病情况。为了精确测量亚洲人群的营养和健康状况，改进目前的饮食评估方法与不同的饮食评估工具是必要的。本综述中收集整理的信息对研究人员、政策制定者、公共卫生计划发展人员、教育学者以及消费者在提高国家和全球健康状况方面都有重要意义。

关键词：国家营养普查、监测、监控、亚洲、全球健康