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SPECIAL INVITED REVIEW

Review of recommended energy and nutrient intake values in Southeast Asian countries

E Siong Tee[1,2*], Rodolfo F Florentino[1,3], Nalinee Chongviriyaphan[1,4], Hardinsyah Ridwan[1,5], Mahenderan Appukutty [1,2] & Truong Tuyet Mai[1,6]

[1]*Southeast Asia Public Health Nutrition Network;* [2]*Nutrition Society of Malaysia;* [3]*Nutrition Foundation of the Philippines, Inc;* [4]*Nutrition Association of Thailand;* [5]*Food and Nutrition Society of Indonesia;* [6]*Vietnam Nutrition Association*

ABSTRACT

This review summarises the officially published recommended energy and nutrient intake values in five Southeast Asia (SEA) countries namely Indonesia, Malaysia, Philippines, Thailand and Vietnam. The background information, general approaches and references used for setting up recommendations and the recommended intakes levels for energy, protein, fat and carbohydrate, dietary fibre, sugars,14 vitamins and 15 minerals of these countries were tabulated and compared. The recommended intake values show remarkable similarities in terms of approaches and principles taken, as well as references used as the basis for the recommendations development and the application of the recommendations in respective country. There are nevertheless some differences in age groupings, reference height and weight used, as well as the final recommendations of the intake levels for some nutrients, after adjustment to suit local situations. All five countries had provided recommendations in terms of recommended nutrient intakes (RNI) or recommended dietary allowance (RDA) for almost all the nutrients. Due to the limited availability of local data and resources, countries in the region have referred to several references, including those from Food and Agriculture Organization/World Health Organization (FAO/WHO) consultation report and recommendations from research organisations in United States and Europe and adapted the values for local uses. Opportunities should be created to enable closer dialogue and collaboration regarding future developments in nutrient recommendations for populations in the region. These could include consideration of establishing more appropriate nutrient recommendations and the call for setting up harmonised approaches to establishing recommended nutrient intake values for the region.

Keywords: nutrients, recommended energy intake, recommended nutrient intakes, Southeast Asia

INTRODUCTION

The concept of recommended energy and nutrient intake values is widely used by many health authorities around the world. Many countries, including those in Southeast Asia (SEA), have established such recommended values for the populations of their respective

*Corresponding author: Dr Tee E Siong
Chairman
Southeast Asia Public Health Nutrition (SEA-PHN) Network
Email: president@nutriweb.org.my
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country. Such recommendations are important to determine whether the average person's intake of a particular nutrient is adequate. At the population level, these recommended values are also crucial in evaluating the dietary intakes of the population, to identify risk of inadequate nutrient intakes for certain groups, to help reduce the risk of chronic disease as well as for setting up nutrition requirements in nutritional guidelines. These recommendations are also used for planning nutritionally adequate diets for people receiving meals in various institutions and settings.

Countries in SEA have developed their respective national recommended energy and nutrient intake values independently over the years. Each country established its own expert working group within the Ministry of Health or research institution and developed its own national recommended intakes. Various approaches were used in developing these recommendations. These were published at different times over the past decades, for the use of a wide variety of activities related to food and nutrition. The Philippines had their first version of energy and nutrient recommendations 80 years ago.

To understand the status of recommended nutrient intakes in SEA countries, Tee (1998) conducted a review of the recommendations in six countries in the region, including the recommendations for energy, protein, three minerals (calcium, iron and iodine) and six vitamins (vitamin A, thiamin, riboflavin, folic acid, vitamin B_{12}, vitamin C). Tabulations for the recommendations for Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam as well as for World Health Organization (WHO) (1985) and Food and Agriculture Organization (FAO)/WHO (1988) and United States of America (National Research Council, 1989) were presented. The review noted that there were general similarities for the different recommended nutrient intakes, although in some cases a country lists an exceptionally high or low recommendation for particular nutrients for specific groups for specific reasons.

The first regional effort to provide a platform for discussion on recommended dietary allowances (RDAs) in SEA was by the International Life Sciences Institute Southeast Asia Region (ILSI SEA Region). A series of six workshops and one working group meeting was organised between 1997 and 2003, participated by country representatives from Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam, as well as other international and regional nutrition experts and regulators. As a result of these meetings, a harmonised set of RDAs was published in 2005 (Tee & Florentino, 2005). The monograph documents the process of developing and establishing the harmonised RDAs and papers on 14 selected core nutrients prepared by several country representatives. This monograph was to serve as a working document and reference for countries in the region that are formulating or revising their national RDAs.

Recognising the importance of providing a regional perspective of such nutritional recommendations, Southeast Asia Public Health Nutrition (SEA-PHN) Network compiled, reviewed and analysed the official recommendations of five SEA countries who are members of the Network. This publication is an output of this work. It aims to provide an overview of the availability of nutrient recommendations in SEA countries and the approaches and scientific principles undertaken by countries to formulate their own national energy and nutrient recommendations. Additionally, this paper provides an understanding of the similarities and differences of the recommendations among the countries.

The paper also discusses future work on recommended nutrient intakes in the region, including opportunities for collaboration.

METHODS

The official documents of recommended energy and nutrient intake values currently in use in five countries (Indonesia, Malaysia, Philippines, Thailand, Vietnam) were obtained for this review, namely: Regulation of the Ministry of the Republic of Indonesia Number 28 of 2019 Concerning the Nutritional Adequacy Values for Indonesian Population (MOH Indonesia, 2019), Recommended Nutrient Intakes (RNI) for Malaysia (NCCFN, 2017), Philippine Dietary Reference Intakes (PDRI) 2015 (DOST-FNRI, 2017), Dietary Reference Intakes (DRI) for Thais 2020 (MOPH Thailand, 2020), and Nutritional Requirements Recommendations for Vietnamese People (NIN Vietnam, 2016). Several key aspects of these documents were extracted and analysed. These include background of the development of the recommended energy and nutrient intake values in the respective countries, nomenclature used, age-categories and reference weight used, coverage of nutrients, uses of these recommended intake values in each country, and sources of recommended intakes, general principles and approach for setting recommended intakes. The recommendations for energy and all nutrients (macronutrients, vitamins and minerals) were also tabulated according to age and compared for the different countries. Findings from this review are presented based on the key aspects listed above.

RESULTS

Development of recommended energy and nutrient intake values in SEA

The five sets of recommended energy and nutrient intake values have widely differing years of initial establishment, most of which were first introduced in the late 1980s or early 1990s. The oldest is the Philippine's DRIs which was introduced in 1941.

In Malaysia, the first published recommended daily dietary intake was by Teoh (1975) in a simple publication in a medical journal. After close to three decades, a multi-institution Technical Working Group (TWG) on Nutritional Guidelines was established under the National Coordinating Committee on Food and Nutrition (NCCFN), Ministry of Health Malaysia to review this first set of recommendations. A multi-chapter comprehensive 207-page monograph of Recommended Nutrient Intakes (RNI) was published in 2005 (NCCFN 2005). With the developments of scientific knowledge and driven by the deteriorating health status of the population, the RNI was further revised, and an updated Malaysian RNI 2017 was published (NCCFN, 2017). The RNI review process involved writers from multi-institutions including representatives from Ministry of Health, academia, research institutes and professional organisations.

In Indonesia, the first RDAs for Indonesians was formulated at the first National Workshop on Food and Nutrition (*Widyakarya Nasional Pangan dan Gizi,* WNPG) in 1968 and since then has been reviewed and revised every 5 to 10 years. The RDAs were formulated by food, nutrition and health experts from reputable universities, led by the Ministry of Health and the Indonesian Institute of Sciences through the National Workshop on Food and Nutrition. The current version was established based on consultations in the XI National Workshop on Food and Nutrition in 2018 and released as a Ministry of Health decree in 2019. This legal document is known as the

Regulation of the Minister of Health Concerning the Nutritional Adequacy Values for Indonesian Population (MOH Indonesia, 2019).

Recommended energy and nutrient intakes were first developed in the Philippines in 1941. These recommendations have undergone several revisions and expansions in 1953, 1960, 1965, 1970, 1989, and 2002 (Barba & Cabrera, 2008). These revisions were all undertaken by the research agency of the government, now known as the Food and Nutrition Research Institute of the Department of Science and Technology (FNRI-DOST). The current version is the PDRI 2015. This edition took on a new nomenclature of dietary reference intakes, to reflect up-to-date concepts on dietary standard-setting and expanding applications. The establishment of this set of DRI went through a comprehensive consultation process led by the PDRI 2015 committee headed by FNRI-DOST, which composed of experts from various disciplines in the field of nutrition research and education (DOST-FNRI, 2017).

In Thailand, the DRI for Thai was first published in 1973. Revised versions were published in 1989, 2003, and 2020. The current 4th edition of DRI 2020 was compiled and developed by a national committee made up of experts specialised in nutrition from multiple institutions including nutritionists, dietitians, clinicians, researchers, and healthcare personnel working in nutrition-related areas. The national committee was led by the Ministry of Public Health, which was responsible for coordinating the contributions among the DRI Technical committee (MOPH Thailand, 2020).

The Vietnamese RDAs was first developed in 1996 by an expert group from the National Institute of Nutrition, following the adoption of the National Plan of Action for Nutrition by the prime minister. Prior to this, Vietnam had only provisional RDAs based on a few international references on nutritional needs. The Vietnamese RDAs 1996 was reprinted in 2003 and later revised in 2007, and in 2015 to provide updates for the recommended nutritional needs that are appropriate for Vietnamese as well as serve as the basis for the National Nutrition Strategy. The revision and formulation of Vietnam's Recommended Nutrition Needs Table was led by the Scientific Council of the Ministry of Health (NIN Vietnam, 2016).

Main components and formats of documents

Most of the sets of recommended energy and nutrient intakes of these countries (Malaysia, Philippines, Thailand and Vietnam) were published as monographs and shared similar structure and organisation of information. These publications generally start with an introduction to the evolution or the concept of the nutrient recommendations in the country, followed by a description of reference height and weight used and the usage of the publication. This is followed by individual chapters or sections describing each nutrient in detail. Information provided for each nutrient includes principles in setting the recommended intakes and summary tables for recommended values for different age groups.

Different from other countries, the Indonesian document was officially released as a Ministry of Health regulation. Much of the background information mentioned above for other countries are not provided in this regulatory document. Nevertheless, appendices in the regulation tabulate the nutritional adequacy values recommended for energy and various nutrients for different age groups, similar

to those contained in the monographs of the other four countries.

Nomenclature and definitions used for nutrient recommendations

The publications from the five countries used different terms for the main set of nutrient recommendations published: Nutritional Adequacy Values for the Indonesian Population, Recommended Nutrient Intakes for Malaysia, Philippines Dietary Reference Intakes, Dietary Reference Intake for Thais, and Nutritional Requirements Recommendations for Vietnamese People.

The definitions of the terms used for the associated reference values are shown in Table 1. It can be noted that definitions for the five main values used in the documents of all the countries except for Indonesia are conceptually similar: RNI, RDA, estimated average requirement (EAR), adequate intake (AI) and tolerable upper intake level (UL). In addition to these, the Philippines also included the concept of acceptable macronutrient distribution range (AMDR). At the same time, Vietnam also included the concept of dietary goals (DG), which is the recommended intake levels that the diet should achieve in order to ensure additional health benefits and prevent certain diseases.

Population groups covered and age-categories used

The different national recommended energy and nutrient intake values covered all ages in the entire life cycle, but countries had adopted different age groupings (Table 2). For the infant category, all countries presented energy and nutrient requirements in two separate groups, i.e. 0-5 months and 6-11 months. However, Malaysia's recommended energy requirement for infants were given in four equal age groups of two months each.

The age groupings adopted for children onwards differ widely among countries (Table 2). Malaysia and Indonesia used similar age groupings (1-3, 4-6 and 7-9 years) for children, while the Philippines (1-2, 3-5, and 6-9 years), Thailand (1-3, 4-5, 6-8 years) and Vietnam (1-2, 3-5, 6-7, 8-9 years) adopted different age groupings. In terms of adolescents, most countries used a range from 9 to 18 years old. While Indonesia, Philippines, and Thailand referred to adults as 19 years and above, Malaysia and Vietnam used 18 years old and 20 years old respectively as cut-offs for adults.

There are differences in the way countries categorise nutrient intake recommendations for the elderly group or older adults (Table 2). Except for Vietnam, the other countries further separate the elderly group into two subgroups: 65-80 and >80 years for Indonesia; 60-65 and >65 years for Malaysia; 60-69 and ≥70 years for Philippines; and 61-70 and ≥71 years for Thailand. For Vietnam, recommendations are given for older adults ≥70 years.

Pregnancy and lactation were categorised separately by all the countries. For pregnancy, recommendations were provided for the three trimesters, whereas requirements for lactation were provided for the first and second six months of lactation.

Reference weight and height used

Several countries (Malaysia, Philippines, Thailand, Vietnam) referred to the WHO child growth standard (WHO, 2006) and WHO growth reference (WHO, 2007) respectively for the reference weight of children (below 5 years) and children and adolescents (5-19 years). For adults, countries used median (Malaysia, Philippines) or average height (Vietnam) data obtained from national nutrition surveys [i.e. Malaysia's

Table 1. Nomenclature and definitions used for nutrient recommendations

Terminology used	*Definition*
Recommended Dietary Allowances for Indonesian 2019	A value that indicates the average need for certain nutrient that must be met every day for almost all people with certain characteristics which include age, sex, level of physical activity, and physiological conditions, to live healthy.
Recommended energy intake (REI)	The recommended daily energy intake for energy, set at estimated average requirement (EAR), which meets the nutrient requirement of almost all apparently healthy individuals in an age, sex, level of physical activity, and physiological conditions, to live healthy.
Recommended nutrient intake (RNI)	The recommended daily nutrient intake for certain nutrient, set at estimated average requirement (EAR) plus 2 standard deviations (SD), which meets the nutrient requirement of almost all apparently healthy individuals in an age, sex, level of physical activity, and physiological conditions, to live healthy.
Recommended Nutrient Intakes for Malaysia 2017	
Recommended nutrient intake (RNI)	The daily intake, set at estimated average requirement (EAR) plus 2 standard deviations (SD), which meets the nutrient requirement of almost all apparently healthy individuals in an age- and sex-specific population group.
Estimated average requirement (EAR)	Median intake value that is estimated to meet the requirement, as defined by specified indicator of adequacy, in half of the individuals in a life-stage or sex group.
Adequate intake (AI)	Derived when there is no sufficient scientific evidence to established an EAR and set a RNI, based on experimentally derived intake levels or approximations of observed mean nutrient intakes by groups of healthy people who are maintaining a defined nutritional state.
Tolerable upper intake level (UL)	The highest level of continuing daily nutrient intake that is likely to pose no risk of adverse health effects in almost all individuals in the specified life stage group.

Table 1. Nomenclature and definitions used for nutrient recommendations *(continued)*

Terminology used	*Definition*
Philippines Dietary Reference Intakes 2015	Collective term comprising the set of multi-level reference values for energy and nutrients.
Recommended energy and nutrient intake (RENI)	Specific term describing the intake level needed to meet the requirements of nearly all of the healthy population of individuals.
Estimated average requirement (EAR)	Average intake level estimated to meet the nutrient requirement of half of the healthy individuals in a particular life stage and sex group.
Adequate intake (AI)	Daily nutrient intake level that is based on observed or experimentally-determined approximation of the average nutrient intake or of a group (or groups) of apparently healthy people.
Tolerable upper level of intake (UL)	Highest average daily nutrient intake level likely to pose no adverse health effects to almost all individuals in the general population.
Acceptable macronurient distribution range (AMDR)	Range of intakes for a particular energy source (carbohydrate, protein, fat) that is associated with a reduced risk of chronic diseases while providing adequate intakes of essential nutrients.
Dietary Reference Intake for Thais 2020	
Recommended dietary allowances (RDAs)	Daily average intakes of nutrients required for almost all healthy people (97-98%) according to gender, age, and/or physiological conditions.
Estimated average requirement (EAR)	Lowest amount of a nutrient to maintain normal nutritional status in a healthy person. It is expected to satisfy the needs of 50% of people who are healthy according to age and gender.
Adequate intake (AI)	For nutrients that have no data of EAR, AI is used when experts have confidence that there is sufficient data for basic requirement of such nutrients; and additional studies are necessary to determine EAR and RDA.
Tolerable upper intake levels (ULs)	ULs are the highest amount of nutrients consumed daily without any risk of detrimental effects in general population.

Table 1. Nomenclature and definitions used for nutrient recommendations *(continued)*

Terminology used	*Definition*
Nutritional Requirements Recommendations for Vietnamese People 2015	
Recommended Dietary Allowances (RDAs)	Energy and nutrients need that, on the basis of current scientific knowledge, are considered adequate to maintain health and well-being of all normal individuals in a population.
Estimated average requirement (EARs)	The estimated average need represents the average of the nutritional needs that an average group of people by age and sex to maintain in good nutritional status.
Adequate intake (AI)	Average recommended daily intake is believed to be adequate for one or more healthy groups of people based on estimates. observation or experiment, where the RDA cannot be determined.
Dietary goal (DG)	Sufficient scientific evidence to recommend the level of consumption that the diet should achieve to ensure additional health benefits and fight related diseases.

National Health and Morbidity Survey (NHMS) 2015 (IPH, 2015); the 8th National Nutrition Survey (NNS) of Philippines (FNRI-DOST, 2015); Vietnam's National Nutrition Survey 2010] to derive the reference weight based on body mass index (BMI) of 22kg/m^2. The local datasets were also used to derive reference height for the various age categories in Malaysia and Philippines.

Coverage of nutrients

The nutrients included in each of the country's recommended energy and nutrient intakes are shown in Table 3. Indonesia RDAs provide recommendations for a total of 34 nutrients. For Malaysia, recommendations are given for a total of 30 nutrients. A total of 26, 39 and 32 nutrients are listed in Philippines DRI, Thai DRIs and Vietnamese RDAs, respectively. The key nutrients covered in the recommended energy and nutrient intakes of these countries are similar, including energy, carbohydrate, fat, protein, fat-soluble vitamins, water-soluble vitamins, macro minerals calcium, phosphorus, magnesium, trace minerals iron, zinc, iodine, selenium, fluoride, and electrolytes sodium, potassium and chloride.

Thailand also provided recommendations for several other bioactive food components such as polyphenols, lutein, zeaxanthin and isoflavones. There is little or no discussion on recommendations for these non-nutrients in the recommendations of the other four countries.

Uses and applications

The recommended energy and nutrient intakes in the five SEA countries were intended to be used by a wide range of stakeholders including policymakers, food industry, academia and researchers, nutrition and clinical practitioners. In terms of policymaking,

Table 2. Characteristics of age groupings in official documents of recommended energy and nutrient intake values of SEA countries

Country	*Age groupings*				
	Infants	*Children*	*Adolescents*	*Adults*	*Elderly (Older adults)*
Indonesia	0-5months, 6-11months	1-3 years, 4-6 years, 7-9 years	10-12 years, 13-15 years, 16-18 years	19-29 years, 30-49 years, 50-64 years	65-80 years 80+ years
Malaysia	0-5months, 6-11months	1-3 years, 4-6 years, 7-9 years	For energy and protein: 10-12 years, 13-15 years, 16-<18 years	19-29 years, 30-50 years, 51-59 years	60-65 years >65 years
	For energy: 0-2 months, 3-5 months, 6-8 months, 9-11 months		For thiamin, riboflavin, niacin, pantothenic acid, pyridoxine, folate, cobalamin, vitamin C, vitamin A, vitamin D, vitamin E, vitamin K, calcium, iodine, selenium, zinc and iron: 10-12 years, 13-14 years, 15 years, 16-18 years	For energy and protein: ≥18-29 years, 30-59 years, ≥60 years	For phosphorus, sodium, potassium, magnesium, chromium, copper, manganese, molybdenum, fluoride: 60-69 years >70years
	For phosphorus, sodium, potassium, magnesium, chromium, copper, manganese, molybdenum, fluoride: 0-6months 7-12months	For phosphorus, sodium, potassium, magnesium, chromium, copper, manganese, molybdenum, fluoride: 1-3 years 4-8 years	For phosphorus, sodium, potassium, magnesium, chromium, copper, manganese, molybdenum, fluoride: 9-13 years, 14-18 years	For total fat: 19-29 years 30-59 years	
Philippines	0-5months, 6-11months	1-2 years, 3-5 years, 6-9 years	10-12 years, 13-15 years, 16-18 years	19-29 years, 30-49 years, 50-59 years	60-69 years ≥70 years
Thailand	0-5months, 6-11months	1-3 years, 4-5 years, 6-8 years	9-12 years, 13-15 years, 16-18 years	19-30 years, 31-50 years, 51-60 years	61-70 years ≥71 years
Vietnam	0-5months, 6-11months	1-2 years, 3-5 years, 6-7 years, 8-9 years	10-11 years, 12-14 years, 15-19 years	20-29 years, 30-49 years, 50-69 years	≥70 years

Table 3. Energy and nutrients listed in the recommended intake values of SEA countries

Nutrients	*Covered in the recommendations*				
	Indonesia	*Malaysia*	*Philippines*	*Thailand*	*Vietnam*
Energy	x	x	x	x	x
Macronutrients					
Carbohydrate	x	x	x	x	x
Protein	x	x	x	x	x
Fats	x	x	x	x	x
Dietary fibre	x	x	x	x	x
Water	x		x		
Vitamins					
Thiamin (Vitamin B1)	x	x	x	x	x
Riboflavin (Vitamin B2)	x	x	x	x	x
Niacin (Vitamin B3)	x	x	x	x	x
Pyridoxine (Vitamin B6)	x	x	x	x	x
Folate (Vitamin B9)	x	x	x	x	x
Cobalamin (Vitamin B12)	x	x	x	x	x
Ascorbic Acid (Vitamin C)	x	x	x	x	x
Vitamin A	x	x	x	x	x
Vitamin D	x	x	x	x	x
Vitamin E	x	x	x	x	x
Vitamin K	x	x	x	x	x
Pantothenic Acid (Vitamin B5)	x	x		x	x
Biotin	x			x	x
Choline	x			x	x
Minerals					
Calcium	x	x	x	x	x
Iron	x	x	x	x	x
Iodine	x	x	x	x	x
Zinc	x	x	x	x	x
Selenium	x	x	x	x	x
Phosphorus	x	x	x	x	x
Sodium	x	x	x	x	x
Potassium	x	x	x	x	x
Magnesium	x	x	x	x	x
Chromium	x	x		x	x
Copper	x	x		x	x
Manganese	x	x		x	x
Fluoride	x	x	x		x
Chloride	x		x	x	x
Molybdenum		x		x	

these recommendations were to serve as the blueprint for the development of several national guidelines including dietary and nutrition guidelines, the nutrition action plan, a food balance sheet and also a food production plan to ensure national and local food security. The recommended energy and nutrient intake values were also indicated to be used for the assessment and evaluation of the population's dietary intakes, to ensure nutrient adequacy

and to identify the risk of inadequate or potentially excessive usual intakes of a group or population in the country. These recommended values also played important roles in the food industry of these countries as they served as the reference for nutrition labelling and claims, and the development of food products that serve the nutritional requirements for consumer health. Other common applications include being used as educational materials by academia, and as a scientific reference for research involving nutritional needs assessment, food and meal formulation, nutrition interventions, and dietary analysis. Indonesia's DRI has also been used to determine the poverty line and minimum wage for the population. In Vietnam, the RDAs were adopted by an inter-ministerial scientific council as an official document for healthcare and nutrition programmes.

General approach/principles used in setting the recommended values

For the five countries in this review, the general principle for developing national recommendations for energy and nutrients were mainly based on recommendations of several international and renowned research organisations. Table 4 indicates for each of the nutrients the main organisation and reference(s) cited or adapted by each of the countries. The most frequently cited references were publications from WHO/FAO, Food and Nutrition Board of Institutes of Medicine (FNB-IOM) (IOM 1997, 1998, 2000, 2005a, 2018) and European Food Safety Authority (EFSA). Vietnam also referred extensively to the DRI for Japanese 2015 and report by the ILSI SEA region publication on the harmonisation of RDAs in SEA (Tee & Florentino, 2005). Some countries also refer to nutritional requirement documents of neighbouring countries. The outputs of nutrition surveys and related research such as local studies on dietary patterns and diet quality were also being considered and used as background information in setting up the requirements.

For energy requirements, while most countries (Malaysia, Philippines, Vietnam) referred to FAO/WHO/United Nations Organization (UNO) (2004) and IOM (2005a) reports for their recommendation, the data from local studies and national nutrition surveys, i.e. weight, height, physical activity levels were used to derive basal metabolic rate (BMR). In Malaysia's RNI, local median height data from the National Health and Morbidity Surveys (NHMS) (IPH, 2015) were used and BMR for adolescents (13-18 years old) and adults (19-59 years old) were derived from local studies (Ismail *et al.*, 1998; Poh *et al.*, 2004). In Philippines, reference weights from the 8th NNS (FNRI-DOST, 2015) to achieve a BMI of 22kg/m^2 was used for BMR calculation. The recommended energy requirements for Vietnamese people by age, sex, type of labour and physiological status were adjusted based on average weight and height, current practices of Vietnamese adults according to the National Nutrition Survey 2010.

The physical activity levels (PAL) of the populations were also being considered in setting the recommendations. Indonesia used PAL 1.1 for children up to the age of 1 year, 1.14 for children 1-3 years, 1.26 for children and adults 4-64 years, and 1.12 for the elderly. For Malaysia RNI 2017 (NCCFN, 2017), energy recommendations for infants were calculated by adding the energy deposited in growing tissues to total energy expenditure (TEE). For the general population, for children 1-6 years PAL 1.4 was recommended for use, whereas for children aged 7 years and above, PAL of 1.6 (i.e. moderately active) was recommended. For individuals, energy recommendation were to be based

Table 4. Main references used for setting recommended intakes of by nutrients and country

Nutrients	*Main references used for recommendations*
Energy	Indonesia: Based on estimated BMR by oxford equation, median healthy body weight of Indonesian based on age and sex groups, physical activity level. Recommendations for pregnant and lactating women are based on IOM (2005a). Malaysia: FAO/WHO/UNO (2004); physical activity level values from EFSA (2013a) Philippines: IOM (2005a) Vietnam: WHO (1985), FAO/WHO/UNU (2004), FAO/WHO/UNU (2007), ILSI SEA-RDAs (Tee & Florentino, 2005), WHO (2006) standard population for children under 5 years old, WHO (2007) reference population for children 5-19 years old.
Carbohydrate	Indonesia: Calculated by difference based on macronutrient distribution ranges. Malaysia: FAO/WHO Scientific Update (2007), IOM (2002), IOM (2005a) Vietnam: ILSI SEA-RDAs (Tee & Florentino, 2005)
Dietary fibre	Indonesia: ADA (2002); WHO (2003) Malaysia: ADA (2002); WHO (2003) Philippines: Children intake: American Academy of Pediatrics (Dwyer, 1995); adults: Kranz *et al* (2012); WHO (1990) Vietnam: IOM (2005a), DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015)
Sugars	Malaysia: WHO (2015)
Protein	Indonesia: IOM (2005a), FAO/WHO/UNU (2007), and the local study Malaysia: References used include Report of DRI committee of IOM (2002, 2005a), FAO/WHO/UNU (2007), scientific report of EFSA (2012); FAO/WHO/UNU (2007) recommendations were adopted in estimating protein requirements for all age groups. Philippines: Joint FAO/WHO/UNU (2007) Expert Consultation on Protein and Amino Acid Requirements in human nutrition, in consideration of the protein quality of rice-based Filipino diets. Vietnam: WHO (1985), FAO/WHO/UNU (2004), ILSI SEA-RDAs (Tee & Florentino, 2005), WHO/FAO/UNU (2007)

Table 4. Main references used for setting recommended intakes of by nutrients and country *(continued)*

Nutrients	*Main references used for recommendations*
Fats	Indonesia: IOM (2005a) Malaysia: USDA (2015), PHE (2016), PHC (2016), FAO (2010), Siri-Tarino *et al.* (2010) and Appel *et al.* (2005) Philippines: US IOM-FNB (IOM, 2005a) recommendations were used. Vietnam: FAO (2010) recommendations were adopted, and based on the tradition and actual lipid consumption of Vietnamese people.
Thiamin (Vitamin B1)	Indonesia: IOM (1998) Malaysia: Adapted WHO/FAO (2004) consultation report, IOM (1998) DRI Recommendations were referred, reports of thiamin status of communities in the country were considered. Philippines: Adapted IOM (1998) DRI recommendations; vitamin nutritional status from national nutrition surveys were used as background information. Vietnam: IOM (1997), FAO/WHO (2002), nutritional requirements for regional countries by ILSI (Tee & Florentino, 2005), DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015) were referred.
Riboflavin (Vitamin B2)	Indonesia: IOM (1998) Malaysia: Adopted WHO/FAO (2004) consultation report's values, IOM (1998) DRI recommendations were also referred. Philippines: IOM (1998) recommendations were adopted for infants, children, adults and elderly. Vietnam: ILSI (Tee & Florentino, 2005), DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015) were referred.
Niacin (Vitamin B3)	Indonesia: IOM (1998) Malaysia: Adopted WHO/FAO (2004) consultation report, IOM (1998) DRI recommendations, report of the EFSA (2014a), recommendations by the working group for the harmonisation of RDAs in SEA (Tee & Florentino, 2005) were referred. Philippines: Adopted IOM (1998) DRI recommendations. Vietnam: The recommended requirements are based on US IOM (1998) DRI for niacin.

Table 4. Main references used for setting recommended intakes of by nutrients and country *(continued)*

Nutrients	*Main references used for recommendations*
Pantothenic Acid (Vitamin B5)	Indonesia: IOM (1998) Malaysia: WHO/FAO (2004), IOM (1998) and EFSA (2014b) were referred. The recommendation levels of pantothenic acid by WHO/FAO (2004) were adopted. Vietnam: Recommendations are based on DRI for Japanese (Ministry of Health, Labour & Welfare Japan, 2015) and the US IOM (1998) DRI for pantothenic acid.
Pyridoxine (Vitamin B6)	Indonesia: IOM (1998) Malaysia: WHO/FAO (2004), IOM (1998) and EFSA (2016) were referred. Recommendations are based on WHO/FAO (2004) report. Philippines: Recommendations are based on IOM (1998). The EAR for adults 50 years and above were adopted from IOM (2006). Vietnam: The recommended requirements are based on DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015), and the US IOM (1998) DRI for Vitamin B6.
Folate (Vitamin B9)	Indonesia: IOM (1998) Malaysia: WHO/FAO (2004) consultation report, the IOM (1998) DRI recommendations, EFSA (2014c), and Working group for the harmonisation of RDAs in SEA by ILSI (Tee & Florentino, 2005) were referred. The final recommendation values are adapted from WHO/FAO (2004). Philippines: Folate requirements for Filipinos mostly considered the recommendation of IOM-FNB (IOM, 1998). Newer studies were considered after the recommendation of the 1998 IOM-FNB was published. Vietnam: The recommended requirements are based on the US IOM (1998) Dietary reference intakes for folate.
Cobalamin (Vitamin B12)	Indonesia: IOM (1998) Malaysia: The main references used were the reports from the IOM (1998), WHO/FAO (2004) and the EFSA (EFSA, 2015a), the final recommendations adopted values proposed by EFSA (EFSA, 2015a). Philippines: The recommendations are based on IOM-FNB (IOM, 1998) and FAO/WHO Expert consultation panel (for pregnant women). Vietnam: The recommended requirements are based the US IOM (IOM, 1998) Dietary reference intakes for cobalamin (Vitamin B12).

Table 4. Main references used for setting recommended intakes of by nutrients and country *(continued)*

Nutrients	*Main references used for recommendations*
Ascorbic Acid (Vitamin C)	Indonesia: IOM (2000) Malaysia: The main references used included WHO/ FAO (2004) consultation report, the IOM (2000) DRI recommendations, recommended intake published by EFSA (2013b), and working group for the harmonisation of RDAs in Southeast Asia (Tee & Florentino, 2005). The final recommendations were adapted from WHO/FAO (2004), with the addition of 25 mg per day for all age groups above 10 years of age, in order to increase absorption or iron in the diet among population of which anaemia is still prevalent. Philippines: IOM (2000) were used as reference for defining vitamin C requirements for adults. Vietnam: The recommendations are based on DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015), Nutritional requirements for regional countries by ILSI (Tee & Florentino, 2005) - Recommended Dietary Allowance: Harmonization in Southeast Asia.
Vitamin A	Indonesia: WHO/FAO (2004), IOM (2001), and the local study. Malaysia: The main references used were WHO/FAO (2004) consultation paper, IOM DRI committee (IOM, 2001), and the EFSA on Dietary Reference Values for vitamin A (EFSA, 2015b). WHO/FAO (2004) recommendations for vitamin A were adopted. Philippines: The main references used were WHO/FAO (2004), IOM-FNB (2001), Olson 1987. Vietnam: The recommendation is based on the DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015).
Vitamin D	Indonesia: IOM (2011) Malaysia: The main references used were WHO/FAO (2004) recommendations & IOM (2011). Numerous studies conducted by various investigators in different part of Malaysia on prevalence of vitamin D deficiency and insufficiency were considered. The IOM (2011) values were adapted. Philippines: The recommendations are based on the IOM (2011). Vietnam: The recommendations are based on the IOM (2011) and the situation of vitamin D deficiency in Vietnamese in recent years.
Vitamin E	Indonesia: IOM (2000) Malaysia: The main references were the reports from the WHO/FAO (2004), IOM (2000) and EFSA (2015c). The dietary pattern of the community was taken into consideration. The final RNI adopted the WHO/FAO (2004) vitamin E intake recommendations.

Table 4. Main references used for setting recommended intakes of by nutrients and country *(continued)*

Nutrients	*Main references used for recommendations*
	Philippines: The recommendations are based on the IOM (2000) and WHO/FAO (2004). Vietnam: The recommendations are based on the DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015).
Vitamin K	Indonesia: IOM (2001) Malaysia: The WHO/FAO (2004) consultation report as well as the IOM (2001) DRI recommendations were referred. The WHO/FAO (2004) values were adopted. Philippines: The recommendations are based on consultation report WHO/FAO (2004). Vietnam: The recommendations are based on the DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015).
Calcium	Indonesia: IOM (2011) Malaysia: The main references used were the updated IOM DRI recommendations in 2011 (IOM, 2011) and the existing FAO/WHO (2002) reference. Philippines: In the absence of sufficient Philippines data on calcium requirements for different population groups, the FAO/WHO (2004) recommendations were adopted. Vietnam: The recommendations by the IOM (2011), and studies in Vietnam and Asian countries (Japan, Malaysia, Singapore) were referred.
Iron	Indonesia: WHO/FAO (2004) Malaysia: The RNIs for iron are based on the WHO/FAO (2004) recommendations. Taking into consideration available local reports on iron intake of communities such as Malaysian Adult Nutrition Survey (MANS) (IPH, 2014) and the magnitude of iron deficiency problem in the country, 10% and 15% iron bioavailability levels of WHO/FAO (2004) were adopted. Philippines: Philippines adopted 8.5% iron bioavailability levels of WHO/FAO (2004) based on food consumption pattern seen in national nutrition surveys, absorption rates of non-heme iron from local diets at 6.4% (Trinidad *et al.*, 1986) and heme iron at 23% (Monsen *et al.*, 1978). Vietnam: The iron requirements applied according to the recommendations of FAO / WHO (2004), SEA-RDAs (Tee & Florentino, 2005), studies in Asia and Vietnam, Needs are calculated based on different levels of dietary iron bioavailability (5%, 10% & 15%) and changes in iron requirements in menstruating women.

Table 4. Main references used for setting recommended intakes of by nutrients and country *(continued)*

Nutrients	*Main references used for recommendations*
Iodine	Indonesia: IOM (2001)
	Malaysia: The WHO/ FAO (2004) expert consultation and the IOM (2001) reports were the main references used. Several local reports on the magnitude of iodine deficiency disorders and the intervention measures taken were also considered. The approach of the WHO/ FAO (2004) was adapted, based on the mean body weight of Malaysians.
	Philippines: Prevalence of iodine deficiency from national nutrition surveys were referred. Recommendations for children and adolescents were based on iodine balance studies in children WHO/FAO (2004) and IOM (2001). The recommendation of the WHO/UNICEF/ICCIDD (2001) for children and adolescents were adopted.
	Vietnam: The recommendations are based on the IOM (2006) report on DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015).
Zinc	Indonesia: IOM (2006)
	Malaysia: The zinc intake recommendations by WHO/FAO (2004), IOM (2001, 2006), IZiNCG (2004) and EFSA (2014d) were referred and considered. The WHO/FAO (2004) zinc values of diet with zinc absorption of 30% (moderate bioavailability) were adopted but adjusted according to the local reference body weight.
	Philippines: The recommendations by WHO (1996), WHO/FAO (2004), IOM (2001), IZiNCG (2004) were referred. Philippines' recommendations are based on WHO (1996), WHO/FAO (2004) recommendeds. Studies on the effect of malnutrition concentration of zinc in hair of Filipino children; data on zinc content in breast milk; zinc intake from national surveys were considered.
	Vietnam: Zinc in the Vietnamese diet (phytate/zinc ratio) is considered. The recommendation is based on the recommendations of WHO/FAO (2004) and SEA-RDAs 2005 (Tee & Florentino, 2005).
Selenium	Indonesia: IOM (2000)
	Malaysia: The WHO/FAO Expert Consultation report of 2004 (WHO/FAO, 2004), the DRI Committee of IOM (2000) and the the WHO/FAO/IAEA report WHO (1996) were referred. The approach and the recommendations of WHO/FAO (2004) were adapted and adjusted using reference body weights of Malaysians.
	Philippines: The WHO/FAO/IAEA report (WHO, 1996) recommendations were adapted and adjusted using Filipino reference weight. For pregnant women, WHO/FAO (2004) recommendations of additional +2 µg/day were adapted with higher value (4 µg/day) to allow for build-up of selenium stores.

Table 4. Main references used for setting recommended intakes of by nutrients and country *(continued)*

Nutrients	*Main references used for recommendations*
	Vietnam: The recommendations are based on IOM (2006), FAO/WHO (2004), DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015), and SEA-RDAs 2005 (Tee & Florentino, 2005).
Phosphorus	Indonesia: IOM (2006)
	Malaysia: The main references used include IOM (2006), National Health and Medical Research Council (NHMRC) for Australia and Ministry of Health New Zealand (NHMRC, 2006), EFSA (2015d). The values from IOM (2006) were adopted.
	Philippines: Phosphorus concentration in breast milk was considered. The IOM (1997) recommendations were adapted.
	Vietnam: References used include IOM (2006), and DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015).
Sodium	Indonesia: WHO (2012a), IOM (2006)
	Malaysia: WHO (2012a), IOM (2006) were referred, the IOM (2006) recommendation for sodium was adapted.
	Philippines: The values adopted were obtained from the 1989 RDA for electrolytes (DOST-FNRI, 1989).
	Vietnam: WHO (2012a) Guideline on sodium intake for adults and children, and DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015) were referred.
Potassium	Indonesia: WHO (2012b), IOM (2006)
	Malaysia: Main references used include National Health and Nutrition Examination Survey (NHANES) study (USDA, 2007); EFSA, (2013c); WHO (2012b); Malaysian Health and Adolescents Longitudinal Research Team Study (Abdul Majid *et al*, 2016); IOM (2006). The recommendations from IOM (2006) were adapted for the RNI values for potassium since it has proposed a set of dietary reference intake values for different age groups as well as pregnant and lactating women.
	Philippines: Holliday & Segar's (1957) recommendation of 78 mg per 100 kcal to maintain potassium balance in children was used for infants, children and adolescents. IOM (2005b) and WHO (2012b) were referred for adults, elderly, pregnancy & lactating women.
	Vietnam: WHO (2012b) Guideline on potassium intake for adults and children, and DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015) were referred.

Table 4. Main references used for setting recommended intakes of by nutrients and country *(continued)*

Nutrients	*Main references used for recommendations*
Magnesium	Indonesia: IOM (2006) Malaysia: The IOM (1997, 2006), WHO /FAO (2004), and EFSA (2015e) were referred. RDA recommendations of IOM (2006) were adopted. Philippines: The recommendations by WHO/FAO (2004) were adopted. Vietnam: DRI for Japanese 2015 (Ministry of Health, Labour & Welfare Japan, 2015) was adopted.
Chromium	Indonesia: IOM (2001) Malaysia: The recommendations by IOM (2001) were adopted. Vietnam: IOM (2006) paper on Dietary Reference Intakes. The essential Guide to Nutrient Requirements was referred.
Copper	Indonesia: IOM (2001) Malaysia: The recommendations by IOM (2001), the National Health and Medical Research Council (NHMRC) for Australia and Ministry of Health New Zealand (NHMRC, 2006), and the European Food Safety Authority (EFSA, 2015f) were referred. IOM (2001) recommendations were adopted. Vietnam: The main reference used for recommendations was IOM (2006) paper on Dietary Reference Intakes: The Essential Guide to Nutrient Requirements.
Manganese	Indonesia: IOM (2006) Malaysia: The main references used were IOM recommendations (2006), EFSA (2013c) and United States Food and Drug Administration Total Diet Study (US TDS) report. The IOM recommendations (2006) for the AI values for manganese were adopted. The median intakes reported from the US TDS was used as the basis to set the AI values for manganese. Vietnam: IOM (2006)
Molydenum	Malaysia: Main references referred include the EFSA (2013d) recommendations and IOM (2006) recommendations. IOM (2006) recommendations were adopted.
Flouride	Indonesia: IOM (2006) Malaysia: IOM (2006) recommendations were adopted.

Table 4. Main references used for setting recommended intakes of by nutrients and country *(continued)*

Nutrients	*Main references used for recommendations*
Chloride	Indonesia: IOM (2006) Philippines: The values adapted were obtained from the 1989 US RDA for electrolytes (National Research Council, 1989). Vietnam: WHO (2012) guidelines on sodium intake for adults and children; and IOM (2006) DRI recommendations on sodium and chloride were referred.

Note: For Indonesia, certain values from the reference or formula were corrected or adjusted according to Indonesians healthy body weight by age and sex groups, as well as by nutrient bio-availability factors

on individual PAL whereby the EFSA recommendations of PAL 1.4, 1.6, 1.8 and 2.0 to reflect sedentary, moderately active, active and very active lifestyles were adopted (EFSA, 2013). In the Philippines' recommendation, the PAL factors used were 1.67 for males from ages 19 to 59 years, 1.55 for females for the same age range, whereas for 60-69 years, PAL values of 1.58 for male and 1.45 for females were used. Vietnam used three PAL namely light, medium and heavy based on the energy demand coefficient of Japan (NIHN Japan, 2010).

For most of the nutrients, recommendations from prevailing resources were either adopted or modified for specific groups or age categories after considering the nutritional status and dietary intake patterns of the local populations. Besides, when data specific for any physiological state were not available to estimate requirements for certain nutrients, extrapolation approach was used. For example, nutrient requirements for children, adolescents, elderly, pregnant and lactating women were extrapolated from the recommendations for adults. For infants, the countries indicated that the recommended values were based on observed mean intake data from infants fed human milk exclusively or extrapolated from the composition of breast milk.

Recommendations for energy

While undernutrition is still a concern in many SEA countries, the problem of overweight, obesity and associated non-communicable diseases (NCDs) have been on the rise. The recommendations for energy requirements are therefore of importance to the population in these countries.

Table 5 shows that the five countries have provided differing daily energy requirements. The daily energy recommendations for males are higher than those for females for all age groups in all countries. In Indonesia, the trend is slightly different in that for infants and children up to 9 years of age, where there is no difference by sex in the daily energy recommendations. It can also be noted that Indonesia recommends higher daily requirements for children aged 1-3 and 4-6 years groups as compared to children of the same age groups in other countries.

In all the countries, the highest recommended energy requirements are for males and females in the 16-18 years group. In Indonesia, it is slightly different in that the highest requirement is for

Table 5. Recommended energy requirements (kcal/day) in SEA countries

Age group	*Indonesia*[†]		*Malaysia*[‡]		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	550[§]		470-540	420-500	620	560	490	460	550	500
6-11 months	800		630-720	570-660	720	630	680	610	650-700	600-650
Children										
1-3 years old	1350		980	900	1000 (1-2yo)	920 (1-2yo)	1050	980	1000 (1-2yo)	950
4-6 years old	1400		1300	1210	1350 (3-5yo)	1260 (3-5yo)	1290 (4-5yo)	1200 (4-5yo)	1320 (3-5yo)	1250
7-9 years old	1650		1750	1610	1600 (6-9yo)	1470 (6-9yo)	1440 (6-8yo)	1320 (6-8yo)	1360 (light labour); 1570 (average labour); 1770 (heavy labour) (6-7yo)	1270 (light labour); 1460 (average labour); 1650 (heavy labour) (6-7yo)
									1600 (light labour); 1820 (average labour); 2050 (heavy labour) (8-9yo)	1510 (light labour); 1730 (average labour); 1940 (heavy labour) (8-9yo)
Adolescent										
10-12 years old	2000	1900	1930	1710	2060	1980	1800 (9-12yo)	1650 (9-12yo)	1880 (light labour); 2150 (average labour); 2400 (heavy labour) (10-11yo)	1740 (light labour); 1980 (average labour); 2220 (heavy labour) (10-11yo)
13-15 years old	2400	2050	2210	1810	2700	2170	2200	1860	2200 (light labour); 2500 (average labour); 2790 (heavy labour) (12-14yo)	2040 (light labour); 2310 (average labour); 2580 (heavy labour) (12-14yo)
16-18 years old	2650	2100	2340 (16-<18yo)	1890 (16-<18yo)	3010	2280	2370	1890	2500 (light labour); 2820 (average labour); 3140 (heavy labour) (15-19yo)	2110 (light labour); 2380 (average labour); 2650 (heavy labour) (15-19yo)

Table 5. Recommended energy requirements (kcal/day) in SEA countries (continued)

Age group	*Indonesia*[†]		*Malaysia*[‡]		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Adult										
19-29 years old	2650	2250	2240 (≥18-29yo)	1840 (≥18-29yo)	2530	1930	2260 (19-30yo)	1780 (19-30yo)	2200 (light labour); 2570 (average labour); 2940 (heavy labour) (20-29yo)	1760 (light labour); 2050 (average labour); 2340 (heavy labour) (20-29yo)
30-59 years old	2550 (30-49yo) 2150 (50-64yo)	2150 (30-49yo) 1800 (50-64yo)	2190	1900	2420	1870	2190 (31-50yo); 2180 (51-60yo)	1780 (31-50yo); 1770 (51-60yo)	2010 (light labour); 2350 (average labour); 2680 (heavy labour) (30-49yo)	1730 (light labour); 2010 (average labour); 2300 (heavy labour) (30-49yo)
Elderly										
60–69 years old	1800 (65-80yo)	1550 (65-80yo)	2030 (≥60yo)	1770	2140	1610	1790 (61-70yo)	1560	2000 (light labour); 2330 (average labour); 2660 (heavy labour) (50-69yo)	1700 (light labour); 1980(average labour); 2260 (heavy labour) (50-69yo)
≥70 years old	1600 (80+yo)	1400 (80+yo)			1960	1540	1740 (≥71yo)	1540 (≥71yo)	1870 (light labour); 2190 (average labour); 2520 (heavy labour)	1550 (light labour); 1820 (average labour); 2090 (heavy labour)
Pregnancy										
1st trimester	-	+180	-	+80	-	-	-	+50-100	-	+50
2nd trimester	-	+300	-	+280	-	+300	-	+250-300	-	+250
3rd trimester	-	+300	-	+470	-	+300	-	+450-500	-	+450
Lactation										
1st 6 months	-	+330	-	+500	-	+500	-	+500	-	+500
2nd 6 months	-	+400	-		-		-	+300	-	+675

yo: years old

[†]Energy for physical activity is calculated using physical activity factors for each age group, namely 1.1 for children up to the age of 1 year, 1.14 for children 1-3 years, and 1.26 for children and adults 4-64 years, and 1.12 for the elderly.

[‡]The recommended energy requirement value based on PAL 1.4 is recommended for children aged 1-3 and 4-6 years old, PAL 1.6 is recommended for children above 7 years, adolescents and adults

[§]Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding

the female young adult group of 19-29 years. All countries have recommended lower requirements for the elderly (>60 years) than for adults.

All countries, except the Philippines, recommended additional energy requirements during the three trimesters of pregnancy, with increasing amounts for each trimester. The Philippines recommended the same additional energy requirement only the 2nd and 3rd trimesters. Additional energy requirements have been recommended during the lactation period for all countries. The additional amounts recommended range from 300kcal to 675kcal. Malaysia and Philippines do not recommend additional energy requirements for the latter half of the lactation period.

Recommendations for macronutrients

Protein

Table 6 summarises the RDAs/RNIs for protein by the five countries in the review. For infants 0-5 months, Vietnam has used AI for this recommendation. In addition to the international references used, most countries considered the protein quality of the population in setting the recommendations. Recommendations for daily protein intakes are rather similar for infants aged 0-5 months in all the country recommendations. For all other age groups, there are considerable variations among the recommendations. Generally, lower amounts are recommended by Malaysia and Thailand. The highest recommendations are, in most cases, for the adolescents 16-18 years group. The exception is Malaysia recommendations, where the adult group had the highest recommended intakes. Different from other countries, Philippine DRI recommends the same daily protein intake for the adults and elderly groups (71g male, 62g for female, respectively). It can also be noted that these provisions are also slightly higher compared to that recommended for the same age groups by the other four countries. All countries have also made recommendations for additional daily protein intake during pregnancy and lactation. The recommendation for additional amounts over the daily intake is higher in Philippine DRI, which is +27g throughout pregnancy and lactation period.

Fat

The RDAs/RNIs for daily fat intake by the five countries are shown in Table 7. Except for Indonesia which has provided the recommendations in g/day, the other countries have listed theirs as percentage of total energy intake (% TEI). It can be noted that for all countries, the highest fat % of TEI is for infants aged 0-5 months (ranging from 40-60%). This percentage decreases with the increase of age, from older infants, children, adolescents and adults. The fat intake recommendations for adults aged 18 and above in most countries are restricted to a conservative range of 20-35% TEI. The Philippines and Vietnam have recommended a lower range of fat intake of 18-25% TEI. Generally, no extra fat intake has been recommended for pregnancy and lactation. Some countries (e.g. Indonesia, Malaysia, Philippines and Vietnam) also discussed in general terms the requirements for specific fatty acids including saturated fatty acid, trans-fat, and essential fatty acids.

Carbohydrate

Similar to that for fat intake, the recommended carbohydrate intakes have been calculated based on the % TEI and taking into consideration the proportion of energy contributed by protein and fat. Except for Indonesia, which has presented the recommended intake as g/day, the other countries have presented the RDAs/RNIs as % TEI (Table 8).

Table 6. RDAs/RNIs for protein (g/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	9[†]		8		9	8	Breast milk	Breast milk	11[‡]	11[‡]
6-11 months	15		10		17	15	14	12	18 (6-8mths) 20 (9-11mths)	18 (6-8mths) 20 (9-11mths)
Children										
1-3 years old	20		12		18 (1-2yo)	17 (1-2yo)	16	15	20 (1-2yo)	19 (1-2yo)
4-6 years old	25		16		22 (3-5yo)	21 (3-5yo)	19 (4-5yo)	19 (4-5yo)	25 (3-5yo)	25 (3-5yo)
7-9 years old	40		23		30 (6-9yo)	29 (6-9yo)	24 (6-8yo)	24 (6-8yo)	33 (6-7yo) 40 (8-9yo)	32 (6-7yo) 40 (8-9yo)
Adolescent										
10-12 years old	50	55	30	31	43	46	39 (9-12yo)	40 (9-12yo)	50 (10-11yo)	48 (10-11yo)
13-15 years old	70	65	45	42	62	57	55	51	65 (12-14yo)	60 (12-14yo)
16-18 years old	75	65	51 (16-<18yo)	42 (16-<18yo)	72	61	61	51	74 (15-19yo)	63 (15-19yo)
Adult										
19-29 years old	65	60	62 (≥18-29yo)	53 (≥18-29yo)	71	62	61 (19-30yo)	53 (19-30yo)	69 (20-29yo)	60 (20-29yo)
30-59 years old	65 (30-64yo)	60 (30-64yo)	61	52	71	62	60 (31-60yo)	52 (31-60yo)	68 (30-49yo)	60 (30-49yo)
Elderly										
60–69 years old	64 (65-80yo)	58 (65-80yo)	58 (≥60yo)	50	71	62	59 (61-70yo)	50 (61-70yo)	70 (50-69yo)	62 (50-69yo)
≥70 years old	64 (80+yo)	58 (80+yo)			71	62	56 (≥71yo)	49 (≥71yo)	68	59
Pregnancy										
1st trimester	-	+1	-	+0.5	-	-	-	+1	-	+1
2nd trimester	-	+10	-	+8	-	+27	-	+10	-	+10
3rd trimester	-	+30	-	+25	-	+27	-	+31	-	+31
Lactation										
1st 6 months	-	+20	-	+19	-	+27	-	+19	-	+19
2nd 6 months	-	+15	-	+13	-	+27	-	+13	-	+13

mths: months; yo: years old

[†]Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding

[‡]Adequate intake

Table 7. RDAs/RNIs for total fat (g/day or % TEI) in SEA countries

Age group	*Indonesia*[†] (g/day)		*Malaysia (% TEI)*		*Philippines (% TEI)*		*Thailand (% TEI)*		*Vietnam*[‡] *(% TEI)*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	31[§]		40-60%		40-60%		40-60%		45-50%	
6-11 months	35		30-40%		30-40%		35-40%		40%	
Children										
1-3 years old	45		25-35%		25-35% (1-2yo)		35-40% (1-2yo) 25-35% (2-3yo)		35-40%	
4-6 years old	50		25-35%		15-18% (3-18yo)		25–35% (4-5yo)			
7-9 years old	55		25-35%				25–35% (6-8yo)			
Adolescent										
10-12 years old	65		25-35% (10-18yo)				25–35% (9-12yo)			
13-15 years old	80	70					25–35%			
16-18 years old	85	70					25–35%			
Adult										
19-29 years old	75	65	25-30%		15-30% (>=19 years)		20-35% (19-30yo)		18-25% (adults)	
30-59 years old	70 (30-49yo)	60 (30-49yo)	25-35%				20-35% (31-50yo)			
	60 (50-64yo)	50 (50-64yo)					20-30% (51-70yo)			
Elderly										
60–69 years old	50 (65-80yo)	45 (65-80yo)	25-30% (≥60yo)							
≥70 years old	45 (80+yo)	40 (80+yo)					20-35% (≥71yo)			
Pregnancy	-	+2.3	-	25-30%			-	20-35%	-	20-25%, up to 30%
Lactation	-	+2.2	-	25-30%			-	20-35%	-	20-25%, up to 30%

yo: years old

[†]The recommended fat intake in Indonesia RDA is presented in g/day

[‡]The recommended fat requirements in % TEI for children aged 4-9 years old, adolescent and elderly are not described in Vietnam RDA

[§] Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding

For each age group, the recommended carbohydrate intakes vary considerably among the countries. Malaysia, Thailand and Vietnam have provided the same recommended carbohydrate intake for all age groups, from infants to the elderly, at 50-65%, 45-65% and 60-65% of TEI, respectively. The Malaysian RNI provides carbohydrate recommendations of 50-65% TEI for all age groups. The Philippines has recommended different levels of % TEI for infants, children and adults and has the highest carbohydrate intake in the range from 55 to 75% of TEI for adults.

Dietary fibre

Dietary fibre is not traditionally recognised as an essential nutrient. Nevertheless, all countries have included recommendations on this in their recommended nutrient intakes, indicating the importance attributed to this food component for human health.

For dietary fibre intake, the recommendations for the adult population are rather similar in most countries reviewed, with most recommending a minimum intake of 20 g per day (Malaysia 20-30 g/day, Philippines 20-25 g/day, Vietnam 20-22 g/day) for adults while Thai DRI recommends 25 g/day for adults and elderly. Malaysia's recommendation of 20-30 g/day is applicable for all age groups, whereas, for the Philippines and Thailand, the amount of dietary fibre recommended for children is equivalent to age in years plus 5 g.

Dietary fibre intake recommendations for Indonesia are different from other countries, where specific recommendations have been provided for different age groups. For infants and children, males and females share the same recommendations, with the recommended amount higher with increasing age. For adolescents, adults and elderly, the recommendations for males are higher than those for females. The highest recommendations are for the adults 19-29 years group (37 g/day for males and 32 g/day for females). Lower intakes are recommended for elderly aged 65 years and above (20-25 g/day).

Sugar

In terms of recommendations for sugar intake, the majority of the countries (Malaysia, Philippines, Vietnam) adopted the WHO (2015) recommendation that intake of free sugar should be less than 10% of TEI. While, the Thai RDI provides recommendations that sugar intake should not be more than 5% of total energy or be less than six teaspoons (24 g/day). The document on nutritional adequacy values by Indonesia does not include recommendations for sugar intake.

Recommendations for vitamins and minerals

Much has been highlighted regarding the scaling up of efforts to combat double-burden of malnutrition in SEA countries. A great deal of emphasis has been given to reducing the burden of overweight, obesity and diet-related NCDs. It is important for countries to continue to pay intention to undernutrition problems, including wasting, stunting and micronutrient deficiency and insufficiency (WHO, 2022; ASEAN, 2022). This review has therefore included the vitamins and minerals that are of common concern in the five SEA countries and compare the recommendations for these micronutrients. There is a total of 14 vitamins and 15 minerals contained in the nutrient recommendation documents of the five countries (Table 3).

Recommended vitamin intakes

For the first 11 of the 14 vitamins in Table 3, all five countries have provided recommended intakes. For the remaining

Table 8. RDAs/RNIs for carbohydrate (g/day or % TEI) in SEA countries

Age group	*Indonesia*[†] *(g/ day)*		*Malaysia (% TEI)*		*Philippines (% TEI)*		*Thailand (% TEI)*		*Vietnam (% TEI)*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	59[‡]		50-65% of total energy		35-55%		45 - 65% of total		60-65% of total	
6-11 months	105		intake for all age groups		45-62%		energy intake for all age groups		energy intake for all age groups	
Children										
1-3 years old	215				50-69% (1-2yo)					
4-6 years old	220				55-79% (3-18yo)					
7-9 years old	250									
Adolescent										
10-12 years old	300	280								
13-15 years old	350	300								
16-18 years old	400	300								
Adult										
19-29 years old	430	360			55-75% (>=19 years)					
30-49 years old	415	340								
50-64 years old	340	280								
Elderly										
65–80 years old	275	230								
>80 years old	235	200								
Pregnancy										
1st trimester	-	+25								
2nd trimester	-	+40								
3rd trimester	-	+40								
Lactation										
1st 6 months	-	+45								
2nd 6 months	-	+55								

yo: years old

[†]The recommended fat requirement in terms of % TEI is not described in Indonesia RDA

[‡]Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding

three vitamins, only four countries have made provisions for pantothenic acid intake and three countries for biotin and choline. Recommended intakes for these 14 vitamins by the five countries, given as RDAs/RNIs, unless otherwise mentioned, are tabulated in Tables 9-22. A summary discussion comparing the recommended intakes for each of these vitamins among the countries are given in the following paragraphs.

Vitamin A

Table 9 presents the recommendations for Vitamin A (expressed as retinol equivalents, RE) by country. All countries provide RDA/RNI values for the vitamin A recommendations for all age groups except infants where the provisions by the Philippines and Vietnam are in AI. There are no great variations in vitamin A recommendations in Indonesia, Malaysia, Philippines and Thailand for all age groups. There are also no differences between recommendations according to sex for infants, children and adolescents aged 10-12 years old except in Vietnam. The highest recommendations are, in most cases, for the adolescents, 16-18 years group. For groups aged more than 13 years old, Vietnam's vitamin A recommendations are generally higher as compared to other countries.

All country recommendations provide for additional amounts of vitamin A during pregnancy and lactation, with considerable differences in recommendations. With the exception of Vietnam and Thailand, the intakes recommended range from +100 µg/day to +300 µg/day for pregnancy (except Vietnam) and range from +250 µg/day to +450 µg/day for lactation (except Thailand). Vietnam has the lowest recommendation for additional vitamin A during pregnancy (+80 µg/day and only during the third trimester) whereas Thai DRIs recommend the highest additional vitamin A amount for lactating women at +700 µg/day.

Vitamin B1 (Thiamin)

Vitamin B1 recommendations by the five countries are rather similar for the different age groups, as indicated in Table 10. The recommendations are RDA/RNI values for all age groups in all countries except infants where the provisions are in AI for infants aged 0-5 months in Philippines, infants aged 6-11 months in Thailand and infants aged 0-11 months in Vietnam. In general, there are no differences in recommendations according to sex for infants (0.1-0.3 mg/day) and children (0.4-0.9 mg/day). For adolescents, adults and elderly, the recommendations for males (0.9-1.4 mg/day) are slightly higher than for females (0.9-1.3 mg/day). The highest daily amount of thiamin recommended are for the males, 13-15 years group (1.2 mg) and remained the same for males in the adolescents 16-18 years, adults and elderly groups. An additional 0.2-0.4 mg/day is recommended by all countries for pregnant and lactating women.

Vitamin B2 (Riboflavin)

Table 11 indicates that all countries generally provide relatively similar RDAs/RNIs for vitamin B2 for most age groups. AI is used for vitamin B2 recommendations for infants aged 0-5 months in the Philippines, infants aged 6-11 months in Thailand and infants aged 0-11 months in Vietnam. The infants and children, male and female groups share the same recommendations. For adolescent, adult and elderly groups, the recommendations for males are marginally higher than those for females. Vietnam has higher vitamin B2 intake recommendations for adolescents (1.3-1.7 mg/day) as compared to the similar age groups of other countries (0.9-1.5 mg/day). All countries provide additional

Table 9. RDAs/RNIs for vitamin A (µg Retinol Equivalent – RE/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*‡		*Vietnam*§	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	375†		375		380¶		Breast milk		300¶ (0-5mths)	
6-11 months	400		400		400		250		400¶ (6-12mths)	
Children										
1-3 years old	400		400		400 (1-2yo)		300		400 (1-2yo)	350 (1-2yo)
4-6 years old	450		450		400 (3-5yo)		350 (4-5yo)		500 (3-5yo)	400 (3-5yo)
7-9 years old	500		500		400 (6-9yo) 500 (8-9yo)		350 (6-8yo)		450 (6-7yo)	400 (6-7yo)
Adolescent										
10-12 years old	600		600		500		550 (9-12yo)		600 (10-11yo)	
13-15 years old	600		600		700	500	750	700	800 (12-14yo)	700 (12-14yo)
16-18 years old	700	600	600		800	600	750	600	900 (15-17yo) 850 (18-19y)	650 (15-17yo) 650 (18-19y)
Adult										
19-29 years old	650	600	600		700	600	700 (19-30yo)	600 (19-30yo)	850 (20-29yo)	650 (20-29yo)
30-49 years old	650	600	600 (30-50yo)		700	600	700 (31-50yo)	600 (31-50yo)	900	700
50-59 years old	650 (50-64yo)	600 (50-64yo)	600 (51-59yo)		700	600	700 (51-60yo)	600 (51-60yo)	850 (50-69yo)	700 (50-69yo)
Elderly										
60–69 years old	650 (65-80yo)	600 (65-80yo)	600 (60-65y)		700	600	700 (61-70yo)	600 (61-70yo)		
≥70 years old	650 (80+yo)	600 (80+yo)	600 (>65y)		700	600	700 (≥71yo)	600 (≥71yo)	800	650
Pregnancy										
1st trimester	-	+300	-	+200	-	+300	-	+100	-	+0
2nd trimester	-	+300	-	+200	-	+300	-	+100	-	+0
3rd trimester	-	+300	-	+200	-	+300	-	+100	-	+80
Lactation										
1st 6 months	-	+350	-	+250	-	+400	-	+700	-	+450
2nd 6 months	-	+350	-	+250	-	+400	-	+700	-	+450

mths: months; yo: years old

†Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding

‡Retinol activity equivalent (RAE), 1 RAE = 1 µg retinol, 12 mg ß-carotene, 24 mg α-carotene, or 24 mg ß-cryptoxanthin

§Retinol activity equivalents (µg RAE) = Retinol (µg) + β-carotene (µg) × 1/12 + α- carotene (µg) × 1/24 + B-cryptoxanthin (µg) × 1/24 + other provitamin A carotenoid (µg) × 1/24

¶Adequate intake

Table 10. RDAs/RNIs for thiamin (vitamin B1) (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	0.2†		0.2		0.2‡		Breast milk		0.1‡	
6-11 months	0.3		0.3		0.4	0.3	0.3‡		0.2 (6-8mths)‡	
									0.2 (9-11mths)‡	
Children										
1-3 years old	0.5		0.5		0.5 (1-2yo)	0.4 (1-2yo)	0.5 (1-3yo)		0.5 (1-2yo)	
4-6 years old	0.6		0.6		0.5 (3-5yo)		0.6 (4-5yo)		0.7 (3-5yo)	
7-9 years old	0.9		0.9		0.7 (6-9yo)		0.6 (6-8yo)		0.8 (6-7yo)	
									1.0 (8-9yo)	0.9 (8-9yo)
Adolescent										
10-12 years old	1.1	1.0	1.2	1.1	0.9		0.9 (9-12yo)		1.2 (10-11yo)	1.1 (10-11yo)
13-15 years old	1.2	1.1	1.2	1.1	1.2	1.0	1.2	1.0	1.4 (12-14yo)	1.3 (12-14yo)
16-18 years old	1.2	1.1	1.2	1.1	1.4	1.1	1.2	1.0	1.4 (15-19yo)	1.2 (15-19yo)
Adult										
19-29 years old	1.2	1.1	1.2	1.1	1.2	1.1	1.2 (19-30yo)	1.1 (19-30yo)	1.3 (20-29yo)	1.1 (20-29yo)
30-49 years old	1.2	1.1	1.2 (30-50yo)	1.1 (30-50yo)	1.2	1.1	1.2 (31-50yo)	1.1 (31-50yo)	1.2	1.0
50-59 years old	1.2 (50-64yo)	1.1 (50-64yo)	1.2 (51-59yo)	1.1 (51-59yo)	1.2	1.1	1.2 (51-60yo)	1.1 (51-60yo)	1.2 (50-69yo)	1.0 (50-69yo)
Elderly										
60–69 years old	1.2 (65-80yo)	1.1 (65-80yo)	1.2 (60-65y)	1.1 (60-65y)	1.2	1.1	1.2 (61-70yo)	1.1 (61-70yo)		
≥70 years old	1.2 (80+yo)	1.1 (80+yo)	1.2 (>65y)	1.1 (>65y)	1.2	1.1	1.2 (≥71yo)	1.1 (≥71yo)	1.1	1.0
Pregnancy										
1st trimester	-	+0.3	-	+0.3	-	+0.3 +0.3 +0.3	-	+0.3	-	+0.2 +0.2 +0.2
2nd trimester	-	+0.3	-	+0.3	-		-	+0.3	-	
3rd trimester	-	+0.3	-	+0.3	-		-	+0.3	-	
Lactation										
1st 6 months	-	+0.4	-	+0.4	-	+0.2	-	+0.3	-	+0.2
2nd 6 months	-	+0.4	-	+0.4	-	+0.2	-	+0.3	-	+0.2

mths: months; yo: years old
†Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding
‡Adequate intake

Table 11. RDAs/RNIs for riboflavin (vitamin B2) (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	0.3†		0.3		0.3‡		Breast milk		0.3‡	
6-11 months	0.4		0.4		0.4	0.3	0.4‡		0.4 (6-8mths)‡	
									0.4 (9-11mths)‡	
Children										
1-3 years old	0.5		0.5		0.5 (1-2yo)	0.4 (1-2yo)	0.5 (1-3yo)		0.6 (1-2yo)	0.5 (1-2yo)
4-6 years old	0.6		0.6		0.6 (3-5yo)	0.5 (3-5yo)	0.6 (4-5yo)		0.8 (3-5yo)	
7-9 years old	0.9		0.9		0.7 (6-9yo)		0.6 (6-8yo)		0.9 (6-7yo)	
									1.1 (8-9yo)	1.0 (8-9yo)
Adolescent										
10-12 years old	1.3	1.0	1.3	1.0	1.0	0.9	0.9 (9-12yo)		1.4 (10-11yo)	1.3 (10-11yo)
13-15 years old	1.3	1.0	1.3	1.0	1.3	1.0	1.3	1.0	1.6 (12-14yo)	1.4 (12-14yo)
16-18 years old	1.3	1.0	1.3	1.0	1.5	1.1	1.3	1.0	1.7 (15-19yo)	1.4 (15-19yo)
Adult										
19-29 years old	1.3	1.1	1.3	1.1	1.3	1.1	1.3 (19-30yo)	1.1 (19-30yo)	1.5 (20-29yo)	1.2 (20-29yo)
30-49 years old	1.3	1.1	1.3 (30-50yo)	1.1 (30-50yo)	1.3	1.1	1.3 (31-50yo)	1.1 (31-50yo)	1.4	1.2
50-59 years old	1.3 (50-64yo)	1.1 (50-64yo)	1.3 (51-59yo)	1.1 (51-59yo)	1.3	1.1	1.3 (51-60yo)	1.1 (51-60yo)	1.4 (50-69yo)	1.2 (50-69yo)
Elderly										
60–69 years old	1.3 (65-80yo)	1.1 (65-80yo)	1.3 (60-65y)	1.1	1.3	1.1	1.3 (61-70yo)	1.1 (61-70yo)		
≥70 years old	1.3 (80+yo)	1.1 (80+yo)	1.3 >65y	1.1	1.3	1.1	1.3 (≥71yo)	1.1 (≥71yo)	1.3	1.1
Pregnancy										
1st trimester	-	+0.3	-	+0.3	-	+0.7	-	+0.3	-	+0.3
2nd trimester	-	+0.3	-	+0.3	-	+0.7	-	+0.3	-	+0.3
3rd trimester	-	+0.3	-	+0.3	-	+0.7	-	+0.3	-	+0.3
Lactation										
1st 6 months	-	+0.5	-	+0.5	-	+0.6	-	+0.5	-	+0.6
2nd 6 months	-	+0.5	-	+0.5	-	+0.6	-	+0.5	-	+0.6

mths: months; yo: years old
†Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding
‡Adequate intake

amounts of vitamin B2 during pregnancy and lactation. In most cases +0.3mg/day for pregnancy and +0.5-0.6mg/day for the lactation period. Philippines has recommended a higher amount of +0.7 mg/day for pregnancy.

Vitamin B3 (Niacin)

Generally, the RDAs/RNIs for infants and children are rather similar among the five countries (Table 12). There are also no differences in recommendations according to sex for these two groups. For infants aged 0-5 months in Philippines and infants aged 6-11 months in Thailand, the provisions are AI values. Considerable differences in recommendations for vitamin B3 among adolescents are observed among the countries. Recommendations for adolescent aged 10-12 years old in Malaysia is higher (16 mg NE/day) as compared to the similar age groups of other countries (11-12 mg NE/day). For older adolescents, the recommendations for females are all higher than those for the males.

Countries show similar vitamin B3 recommendations for adult and elderly groups, with the provision for males (16mg NE/day) slightly higher than those for females (14mg NE/day). The additional amounts recommended during pregnancy and lactation in all countries are also similar, which are +4mg NE/day and +3mg/day, respectively.

Vitamin B6 (Pyridoxine)

The RDAs/RNIs for vitamin B6 are presented in Table 13. Philippines, Thailand and Vietnam use AI values for vitamin B6 recommendations for infants. The recommended intakes for infants, and children 1-3 and 4-6 years groups are rather similar for all the countries. For children aged 7-9 years old, the recommendations by Indonesia and Malaysia (1.0 mg/day) are slightly higher than those provided by Philippines and Thailand (0.6-0.8 mg/day). For adolescents, while Indonesia and Malaysia recommend the same vitamin B6 intakes throughout the adolescent period 10-18 years old (1.3 mg/day for males & 1.2 mg/day for females), Philippines, Thailand and Vietnam have different recommendations for each of the adolescent sub-groups, increasing for the older adolescents. For the entire adolescent group, the intakes recommended for males are marginally higher than those for females. All countries recommend the same amount of 1.3 mg/day for adult males and females 19-49 years. Countries generally recommend higher vitamin B6 intake for adults aged 50-59 years and the elderly group (1.7 mg/day for males; 1.5-1.6 mg/day for females). The additional amounts recommended during pregnancy and lactation are the same for all countries, the recommended intakes per day being 1.9 mg to 2.0 mg per day respectively.

Vitamin B9 (Folate)

Table 14 summarises the RDAs/RNIs for folate in the five countries; the recommended intake values for infants (65-80 µg/day) in the Philippines are AI values. Infants in Indonesia and Malaysia have higher recommended intakes (80 µg/day) compared with the other countries which recommend 65-80 µg/day. For children, all countries recommend higher intakes than for infants, and are higher with increasing age. Indonesia, Malaysia and Philippines have higher recommendations for this group (160-300 µg/day) than Thailand (120-180 µg/day) and Vietnam (100-200 µg/day). Most countries recommend 300-400 µg/day for adolescents and 400 µg/day for adults and elderly. Thailand, however, has lower folate recommendations for adolescents (240-300 µg/day) as well as adults and

Table 12. RDAs/RNIs for niacin (vitamin B3) intake (mg NE/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	2[†]		2		1[‡]		Breast milk[§]		2	
6-11 months	4		4		5		4[‡]		4 (6-8mths)	
									4 (9-11mths)	
Children										
1-3 years old	6		6		6 (1-2yo)		6 (1-3yo)		6 (1-2yo)	
4-6 years old	8		8		7 (3-5yo)		8 (4-5yo)		8 (3-5yo)	
7-9 years old	10		12		9 (6-9yo)		8 (6-8yo)		8 (6-7yo)	
									12 (8-9yo)	
Adolescent										
10-12 years old	12		16		11	12	12 (9-12yo)		12 (10-11yo)	
13-15 years old	16	14	16		15	13	16	14	12 (12-14yo)	
16-18 years old	16	14	16		18	14	16	14	16 (15-19yo)	14 (15-19yo)
Adult										
19-29 years old	16	14	16	14	16	14	16 (19-30yo)	14 (19-30yo)	16 (20-29yo)	14 (20-29yo)
30-49 years old	16	14	16 (30-50yo)	14 (30-50yo)	16	14	16 (31-50yo)	14 (31-50yo)	16	14
50-59 years old	16 (50-64yo)	14 (50-64yo)	16 (51-59yo)	14 (51-59yo)	16	14	16 (51-60yo)	14 (51-60yo)	16 (50-69yo)	14 (50-69yo)
Elderly										
60–69 years old	16 (65-80yo)	14 (65-80yo)	16 (60-65y)	14	16	14	16 (61-70yo)	14 (61-70yo)		
≥70 years old	16 (80+yo)	14 (80+yo)	16 (>65y)	14	16	14	16 (≥71yo)	14 (≥71yo)	16	14
Pregnancy										
1st trimester	-	+4	-	+4	-	+4	-	+4	-	+4
2nd trimester	-	+4	-	+4	-	+4	-	+4	-	+4
3rd trimester	-	+4	-	+4	-	+4	-	+4	-	+4
Lactation										
1st 6 months	-	+3	-	+3	-	+3	-	+3	-	+3
2nd 6 months	-	+3	-	+3	-	+3	-	+3	-	+3

mths: months; yo: years old
[†]Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding
[‡]Adequate intake
[§]niacin equivalent (NE), 1 mg niacin = 60 mg tryptophan; 0-6 mo = preformed niacin (not NE)

Table 13. RDAs/RNIs for pyridoxine (vitamin B6) (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	0.1†		0.1		0.1‡		Breast milk		0.1‡	
6-11 months	0.3		0.3		0.2‡	0.3‡	0.3‡		0.3‡ (6-8mths)	
									0.3‡ (9-11mths)	
Children										
1-3 years old	0.5		0.5		0.5 (1-2yo)		0.5 (1-3yo)		0.5 (1-2yo)	
4-6 years old	0.6		0.6		0.6 (3-5yo)	0.7 (3-5yo)	0.6 (4-5yo)		0.5 (3-5yo)	
7-9 years old	1.0		1.0		0.7 (6-9yo)	0.8 (6-9yo)	0.6 (6-8yo)		0.8 (6-7yo)	
									1.0 (8-9yo)	
Adolescent										
10-12 years old	1.3	1.2	1.3	1.2	1.0	1.1	1.0 (9-12yo)		1.0 (10-11yo)	
13-15 years old	1.3	1.2	1.3	1.2	1.3	1.2	1.3	1.2	1.2 (12-14yo)	1.1 (12-14yo)
16-18 years old	1.3	1.2	1.3	1.2	1.5	1.3	1.3	1.2	1.3 (15-19yo)	1.2 (15-19yo)
Adult										
19-29 years old	1.3		1.3		1.3		1.3 (19-30yo)		1.3 (20-29yo)	
30-49 years old	1.3		1.3 (30-50yo)		1.3		1.3 (31-50yo)		1.3	
50-59 years old	1.7 (50-64yo)	1.5 (50-64yo)	1.7 (51-59yo)	1.5 (51-59yo)	1.7	1.6	1.7 (51-60yo)	1.5 (51-60yo)	1.7 (50-69yo)	1.5 (50-69yo)
Elderly										
60–69 years old	1.7 (65-80yo)	1.5 (65-80yo)	1.7 (60-65y)	1.5	1.7	1.6	1.7 (61-70yo)	1.5 (61-70yo)		
≥70 years old	1.7 (80+yo)	1.5 (80+yo)	1.7(>65yo)	1.5	1.7	1.6	1.7 (≥71yo)	1.5 (≥71yo)	1.7	1.5
Pregnancy										
1st trimester	-	+0.6	-	+0.6	-	+0.6	-	+0.6	-	+0.6
2nd trimester	-	+0.6	-	+0.6	-	+0.6	-	+0.6	-	+0.6
3rd trimester	-	+0.6	-	+0.6	-	+0.6	-	+0.6	-	+0.6
Lactation										
1st 6 months	-	+0.6	-	+0.7	-	+0.7	-	+0.7	-	+0.7
2nd 6 months	-	+0.6	-	+0.7	-	+0.7	-	+0.7	-	+0.7

mths: months; yo: years old
†Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding
‡Adequate intake
Pregnancy and lactation recommendations are in addition to the amount recommended for women 19-49 years

Table 14. RDAs/RNIs for folate (vitamin B9) (µg dietary folate equivalents/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	80†		80		65‡		Breast milk		65	
6-11 months	80		80		80‡	70‡	85		80 (6-8mths)	
									80 (9-11mths)	
Children										
1-3 years old	160		160		150 (1-2yo)		120 (1-3yo)		100 (1-2yo)	
4-6 years old	200		200		200 (3-5yo)		140 (4-5yo)		150 (3-5yo)	
7-9 years old	300		300		300 (6-9yo)		180 (6-8yo)		200 (6-7yo)	
									200 (8-9yo)	
Adolescent										
10-12 years old	400		400		300		240 (9-12yo)		300 (10-11yo)	
13-15 years old	400		400		400		300		300 (12-14yo)	400 (12-14yo)
16-18 years old	400		400		400		300		300 (15-19yo)	400 (15-19yo)
Adult										
19-29 years old	400		400		400		300 (19-30yo)		400 (20-29yo)	
30-49 years old	400		400 (30-50yo)		400		300 (31-50yo)		400	
50-59 years old	400 (50-64yo)		400 (51-59yo)		400		300 (51-60yo)		400 (50-69yo)	
Elderly										
60–69 years old	400 (65-80yo)		400 (60-65y)		400		300 (61-70yo)			
≥70 years old	400 (80+yo)		400 (>65yo)		400		300 (≥71yo)		400	
Pregnancy										
1st trimester	-	+200	-	+200	-	+200	-	+250	-	+200
2nd trimester	-	+200	-	+200	-	+200	-	+250	-	+200
3rd trimester	-	+200	-	+200	-	+200	-	+250	-	+200
Lactation										
1st 6 months	-	+100	-	+100	-	+150	-	+150	-	+100
2nd 6 months	-	+100	-	+100	-	+150	-	+150	-	+100

mths: months; yo: years old
†Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding
‡Adequate intake

elderly (300 µg/day). Overall, there is no difference in recommendations by sex for all age groups, in all countries.

The recommendations for additional folate intake during pregnancy are the same for all countries (+200 µg/day), except for Thailand which recommends an additional amount of +250 µg/day. The same trend can be seen for lactation, wherein all countries have the same recommendation of an addition of +100 µg/day, whereas Thailand has a slightly higher additional amount of +150 µg/day.

Vitamin B12 (Cobalamin)

Indonesia and Malaysia have higher RDAs/RNIs for vitamin B12 than other countries (Table 15) for all age groups. The AI values are used by Philippines and Vietnam for provisions for infants aged 0-11 months and 6-11 months for Thailand. For infants age 6-11 months, the amounts recommended by Indonesia and Malaysia are triple the recommendations of Philippines, Thailand and Vietnam. For adolescents and adults, Indonesia and Malaysia recommend intakes of 3.5-4.0 µg/day while others recommend 1.8-2.4 µg/day. All countries have also recommended higher daily vitamin B12 intakes for pregnancy and lactation, with the recommendations by Indonesia and Malaysia double that of other countries.

Vitamin C

In Philippines and Vietnam, the recommendations for vitamin C intakes for infants use AI while other countries use RNI/RDA for all age groups. There are considerable variations in these vitamin C intake recommendations for all age groups (Table 16). There are generally no difference in recommendations for males and females for the younger age groups (e.g. infants, children and adolescents). For adults and elderly groups in Indonesia, Philippines and Thailand, males have higher recommended intakes than females. Malaysia has lower recommendations for infants and children (25-30 mg/day) compared with the other countries (30-50 mg/day). For adolescents, intake recommendations range from 45-70 mg/day for Philippines to 75-100 mg/day for Vietnam. Intake recommendations for adults and elderly range from 60 mg/day for Philippines females to 100 mg/day for Vietnamese males and females.

All countries recommend additional amounts of vitamin C during pregnancy and lactation. The additional amount recommended during pregnancy is the same for all countries, at +10 mg/day. The additional amount recommended for lactation varies considerably, ranging from +25 to +60 mg/day for Malaysia and Thailand, respectively.

Vitamin D

Philippines provides AI recommendations for vitamin D for all age groups while Thailand provide an AI recommendation for infants. The RNI/RDA values are used by Indonesia, Malaysia, Vietnam for all age groups. Recommendations for vitamin D intake (Table 17) for infants are the same (at 10 µg/day) for four of the countries reviewed, namely Indonesia, Malaysia, Thailand and Vietnam. The recommended intake trend is the same for children, adolescents and adults (up to 50 years old), where the same intake of 15 µg/day is recommended for these four countries. There are no different intake recommendations for males and females. Notable differences are observed for the recommendations by Philippines, in which the recommended amounts are three times lower for all age groups compared to the other four countries. There is also no recommendation provided for Filipino infants. All countries have recommended higher

Table 15. RDAs/RNIs for cobalamin (vitamin B12) (µg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	0.4†		1.2		0.3‡		Breast milk		0.4‡	
6-11 months	1.5		1.5		0.4‡		0.5‡		0.5‡ (6-8mths)	
									0.5‡ (9-11mths)	
Children										
1-3 years old	1.5		1.5		0.9 (1-2yo)	1.0 (1-2yo)	0.9 (1-3yo)		0.9 (1-2yo)	
4-6 years old	1.5		1.5		1.1 (3-5yo)	1.2 (3-5yo)	1.2 (4-5yo)		1.0 (3-5yo)	
7-9 years old	2.0		2.5		1.3 (6-9yo)	1.5 (6-9yo)	1.2 (6-8yo)		1.2 (6-7yo)	
									1.5 (8-9yo)	
Adolescent										
10-12 years old	3.5		3.5		1.8	2.1	1.8 (9-12yo)		1.8 (10-11yo)	
13-15 years old	4.0		4.0		2.3	2.2	2.4		2.4 (12-14yo)	
16-18 years old	4.0		4.0		2.7	2.4	2.4		2.4 (15-19yo)	
Adult										
19-29 years old	4.0		4.0		2.4		2.4 (19-30yo)		2.4 (20-29yo)	
30-49 years old	4.0		4.0 (30-50yo)		2.4		2.4 (31-50yo)		2.4	
50-59 years old	4.0 (50-64yo)		4.0 (51-59yo)		2.4		2.4 (51-60yo)		2.4 (50-69yo)	
Elderly										
60–69 years old	4.0 (65-80yo)		4.0 (60-65yo)		2.4		2.4 (61-70yo)			
≥70 years old	4.0 (80+yo)		4.0 (>65yo)		2.4		2.4 (≥71yo)		2.4	
Pregnancy										
1st trimester	-	+0.5	-	+0.5	-	+0.2	-	+0.2	-	+0.2
2nd trimester	-	+0.5	-	+0.5	-	+0.2	-	+0.2	-	+0.2
3rd trimester	-	+0.5	-	+0.5	-	+0.2	-	+0.2	-	+0.2
Lactation										
1st 6 months	-	+1.0	-	+1.0	-	+0.5	-	+0.4	-	+0.4
2nd 6 months	-	+1.0	-	+1.0	-	+0.5	-	+0.4	-	+0.4

mths: months; yo: years old
†Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding
‡Adequate intake

Table 16. RDAs/RNIs for vitamin C (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*[†]	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	40[‡]		25		30[§]		Breast milk		40[§]	
6-11 months	50		30		40[§]		50		40[§] (6-8mths) 40[§] (9-11mths)	
Children										
1-3 years old	40		30		45 (1-2yo)		25 (1-3yo)		35 (1-2yo)	
4-6 years old	45		30		45 (3-5y0)		30 (4-5yo)		40 (3-5yo)	
7-9 years old	45		35		45 (6-9yo)		40 (6-8yo)		55 (6-7yo) 60 (8-9yo)	
Adolescent										
10-12 years old	50		65		45		60 (9-12yo)		75 (10-11yo)	
13-15 years old	75	65	65		60	55	85	80	95 (12-14yo)	
16-18 years old	90	75	65		70	60	100	80	100 (15-19yo)	
Adult										
19-29 years old	90	75	70		70	60	100 (19-30yo)	85 (19-30yo)	100 (20-29yo)	
30-49 years old	90	75	70 (30-50yo)		70	60	100 (31-50yo)	85 (31-50yo)	100	
50-59 years old	90 (50-64yo)	75 (50-64yo)	70 (51-59yo)		70	60	100 (51-60yo)	85 (51-60yo)	100 (50-69yo)	
Elderly										
60–69 years old	90 (65-80yo)	75 (65-80yo)	70 (60-65yo)		70	60	100 (61-70yo)	85 (61-70yo)		
≥70 years old	90 (80+yo)	75 (80+yo)	70 (>65yo)		70	60	100 (≥71yo)	85 (≥71yo)	100	
Pregnancy										
1st trimester	-	+10	-	+10	-	+10	-	+10	-	+10
2nd trimester	-	+10	-	+10	-	+10	-	+10	-	+10
3rd trimester	-	+10	-	+10	-	+10	-	+10	-	+10
Lactation										
1st 6 months	-	+45	-	+25	-	+35	-	+60	-	+45
2nd 6 months	-	+45	-	+25	-	+35	-	+60	-	+45

mths: months; yo: years old

[†]The loss due to processing and cooking is not included because vitamin C is easily destroyed by oxidation, light, alkali and temperature

[‡]Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding

[§]Adequate intake

Pregnancy and lactation recommendations are in addition to the amount recommended for women 19-49 years

Table 17. RDAs/RNIs for vitamin D (µg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*[†]		*Thailand*[‡]		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	10[§]		10		5		10[†]		10	
6-11 months	10		10		5		10[†]		10 (6-8mths)	
									10 (9-11mths	
Children										
1-3 years old	15		15		5 (1-2yo)		15 (1-3yo)		15 (1-2yo)	
4-6 years old	15		15		5 (3-5yo)		15 (4-5yo)		15 (3-5yo)	
7-9 years old	15		15		5 (6-9yo)		15 (6-8yo)		15 (6-7yo)	
									15 (8-9yo)	
Adolescent										
10-12 years old	15		15		5		15 (9-12yo)		15 (10-11yo)	
13-15 years old	15		15		5		15		15 (12-14yo)	
16-18 years old	15		15		5		15		15 (15-19yo)	
Adult										
19-29 years old	15		15		5		15 (19-30yo)		15 (20-29yo)	
30-49 years old	15		15 (30-50yo)		5		15 (31-50yo)		15 (30-49yo)	
50-59 years old	15 (50-64yo)		15 (51-59yo)		10		15 (51-60yo)		20 (50-69yo)	
Elderly										
60–69 years old	20 (65-80yo)		15 (60-65y)		15		15 (61-70yo)			
≥70 years old	20 (80+yo)		20 (>65yo)		15		20 (≥71yo)		20	
Pregnancy										
1st trimester	-	+0	-	+0	-	+0	-	+0	-	+5
2nd trimester	-	+0	-	+0	-	+0	-	+0	-	+5
3rd trimester	-	+0	-	+0	-	+0	-	+0	-	+5
Lactation										
1st 6 months	-	+0	-	+0	-	+0	-	+0	-	+5
2nd 6 months	-	+0	-	+0	-	+0	-	+0	-	+5

mths: months; yo: years old

[†]Adequate intake

[‡]Recommendations are given in IU/day in Thais DRI, the values are converted to µg/day for comparison (cholecalciferol, 1µg cholecalciferol = 40 IU vitamin D)

[§]Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding

Pregnancy and lactation recommendations for Vietnam are in addition to the amount recommended for women 20-29 years

Table 18. RDAs/RNIs for vitamin E (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*[†]		*Thailand*		*Vietnam*[†]	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	4[‡]		3		3		Breast milk		3	
6-11 months	5		3		4		5		4 (6-12mths)	
Children										
1-3 years old	6		5		4 (1-2yo)		6 (1-3yo)		3.5 (1-2yo)	
4-6 years old	7		5		5 (3-5yo)		9 (4-5yo)		4.5 (3-5yo)	
7-9 years old	8		7		6 (6-9yo)		9 (6-8yo)		5.0 (6-7yo)	
									5.5 (8-9yo)	
Adolescent										
10-12 years old	11	15	10	7.5	7	9	13 (9-12yo)	11 (9-12yo)	5.5 (10-11yo)	
13-15 years old	15		10	7.5	10	9	13	11	7.5 (12-14yo)	6.0 (12-14yo)
16-18 years old	15		10	7.5	11	10	13	11	7.5 (15-17yo)	6.0 (15-17yo)
									6.5 (18-19yo)	6.0 (18-19yo)
Adult										
19-29 years old	15		10	7.5	10		13 (19-30yo)	11 (19-30yo)	6.5 (20-29yo)	6.0 (20-29yo)
30-49 years old	15		10 (30-50yo)	7.5 (30-50yo)	10		13 (31-50yo)	11 (31-50yo)	6.5	6.0
50-59 years old	15 (50-64yo)		10 (51-59yo)	7.5 (51-59yo)	10		13 (51-60yo)	11 (51-60yo)	6.5 (50-69yo)	6.0 (50-69yo)
Elderly										
60–69 years old	15 (65-80yo)	20 (65-80yo)	10 (60-65y)	7.5 60-65y)	10		13 (61-70yo)	11 (61-70yo)		
≥70 years old	15 (80+yo)	20 (80+yo)	10 (>65yo)	7.5 (>65yo)	10		13 (≥71yo)	11 (≥71yo)	6.5	6.0
Pregnancy										
1st trimester	-	+0	-	+0	-	+0	-	+0	-	+0.5
2nd trimester	-	+0	-	+0	-	+0	-	+0	-	+0.5
3rd trimester	-	+0	-	+0	-	+0	-	+0	-	+0.5
Lactation										
1st 6 months	-	+4	-	+0	-	+4	-	+0	-	+1
2nd 6 months	-	+4	-	+0	-	+4	-	+0	-	+1

mths: months; yo: years old
[†]Adequate intake
[‡]Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding

daily vitamin D intakes for older adults, especially for the age group of 70 and above (aged 65 and above for Malaysia).

For all countries except Vietnam, no additional intakes are recommended for pregnant and lactating women. In Vietnam, the vitamin D requirements for these population groups are set at 20 µg/day, or an additional 5 µg/day over the recommendation for adults (20-49 years).

Vitamin E

Table 18 lists the recommended intakes for vitamin E. Philippines and Vietnam use AI for vitamin E recommendations for all age groups while other three countries provide RDA/RNI values for the recommendations. There are considerable variations in the vitamin E intake recommendations for all age groups. For infants aged 6-11 months, the amounts recommended by Indonesia and Thailand (5 mg/day) are slightly higher than those recommended by other three countries (3-4 mg/day). For children aged 1-9 years old, Thailand has higher vitamin E intake recommendations (6-9 mg/day) as compared to the similar age groups of other countries (ranged from 3.5-8.0 mg/day). For adolescents, adults and elderly, the amounts recommended by Indonesia are highest (11-15 mg/day for adolescent, 15 mg/day for adults and 15-20 mg/day for elderly) as compared to other countries. Vietnam, on the other hand, has the lowest vitamin E intake recommendations for most age groups, from children to elderly, with the recommended amounts about half of that recommended by Indonesia. For the other three countries, the vitamin E intake recommendations ranged from 7-13 mg/day for adolescents, and 7.5-13 mg/day for both adults and elderly. Interestingly, for elderly groups in Indonesia, females have higher recommended intake whereas the other four countries respectively have higher recommended intake for male elderly groups.

Only Vietnam recommended additional vitamin E intake (+0.5 mg/day) for pregnant women. For lactating women, Indonesia and Philippines recommends additional intake of +4 mg/day over the recommendation for adults whereas Vietnam recommends +1 mg/day of vitamin E intake for lactation.

Vitamin K

The recommendations for daily vitamin K intake by the five countries are presented in Table 19. Thailand and Vietnam use AI for vitamin K recommendations while other three countries provide RNI/RDA values for this vitamin. For infant groups, Thailand has the lowest recommended intake for infant aged 6-11 months (2.5 µg/day) as compared to the other four countries (ranging from 7-10 µg/day) whereas for infant 0-5 months, no recommended intake value is provided in Thailand as the fulfilment of the needs are to be from exclusive breastfeeding. The recommendations for all other age groups vary among countries, with the recommendations by Thailand (ranging from 30-120 µg/day) double that of Indonesia, Malaysia and Philippines (ranging from 15-65 µg/day) whereas Vietnam's recommendations (60-150 µg/day), the highest among the five countries, are four times higher that of Indonesia, Malaysia and Philippines. For all countries, the recommendations increase with age and there is generally no difference in recommendations for males and females for the younger age groups (e.g. infants, children and adolescents) in all countries except Philippines. For adults and elderly, the amounts recommended for male are slightly higher than those recommended for female in all countries, with the exception of Vietnam, which show no difference in recommendations for males and females for all age groups. No

Table 19. RDAs/RNIs for vitamin K (μg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*†		*Vietnam*†	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	5‡		5		7	6	Breast milk		4	
6-11 months	10		10		9	8	2.5		7 (6-12mths)	
Children										
1-3 years old	15		15		12 (1-2yo)		30 (1-3yo)		60 (1-2yo)	
4-6 years old	20		20		18 (3-5yo)	17 (3-5yo)	55 (4-5yo)		70 (3-5yo)	
7-9 years old	25		25		23 (6-9yo)		55 (6-8yo)		85 (6-7yo)	
									100 (8-9yo)	
Adolescent										
10-12 years old	35		35-55		33	36	60 (9-12yo)		120 (10-11yo)	
13-15 years old	55		35-55		49	46	75		150 (12-14yo)	
16-18 years old	55		35-55		59	52	75		160 (15-17yo)	
Adult									150 (18-19yo)	
19-29 years old	65	55	65	55	61	53	120 (19-30yo)	90 (19-30yo)	150 (20-29yo)	
30-49 years old	65	55	65 (30-50yo)	55 (30-50yo)	61	53	120 (31-50yo)	90 (31-50yo)	150	
50-59 years old	65 (50-64yo)	55 (50-64yo)	65 (51-59yo)	55 (51-59yo)	61	53	120 (51-60yo)	90 (51-60yo)	150 (50-69yo)	
Elderly										
60–69 years old	65 (65-80yo)	55 (65-80yo)	65 (60-65yo)	55	61	53	120 (61-70yo)	90 (61-70yo)		
≥70 years old	65 (80+yo)	55 (80+yo)	65 (>65yo)	55	61	53	120 (≥71yo)	90 (≥71yo)	150	
Pregnancy										
1st trimester	-	+0	-	+0	-	+0	-	+0	-	+0
2nd trimester	-	+0	-	+0	-	+0	-	+0	-	+0
3rd trimester	-	+0	-	+0	-	+0	-	+0	-	+0
Lactation										
1st 6 months	-	+0	-	+0	-	+0	-	+0	-	+0
2nd 6 months	-	+0	-	+0	-	+0	-	+0	-	+0

mths: months; yo: years old
†Adequate intake
‡Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding

Table 20. RDAs/RNIs for pantothenic acid (Vitamin B5) (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*‡		*Philippines*†		*Thailand*‡		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants					-	-				
0-5 months	1.7§		1.7				Breast milk		1.7	
6-11 months	1.8		1.8				1.8		1.7 (6-8mths)	
									1.8 (9-11mths)	
Children					-	-				
1-3 years old	2.0		2.0				2.0 (1-3yo)		2.0 (1-2yo)	
4-6 years old	3.0		3.0				3.0 (4-5yo)		3.0 (3-5yo)	
7-9 years old	4.0		4.0				3.0 (6-8yo)		3.0 (6-7yo)	
									4.0 (8-9yo)	
Adolescent					-	-				
10-12 years old	5.0		5.0				4.0 (9-12yo)		4.0 (10-11yo)	
13-15 years old	5.0		5.0				5.0		4.0 (12-14yo)	
16-18 years old	5.0		5.0				5.0		5.0 (15-19yo)	
Adult					-	-				
19-29 years old	5.0		5.0				5.0 (19-30yo)		5.0 (20-29yo)	
30-49 years old	5.0		5.0 (30-50yo)				5.0 (31-50yo)		5.0	
50-59 years old	5.0 (50-64yo)		5.0 (51-59yo)				5.0 (51-60yo)		5.0 (50-69yo)	
Elderly					-	-				
60–69 years old	5.0 (65-80yo)		5.0 (60-65yo)				5.0 (61-70yo)			
≥70 years old	5.0 (80+yo)		5.0 (>65yo)				5.0 (≥71yo)		5.0	
Pregnancy					-	-				
1st trimester	-	+1.0	-	+1.0		-	-	+1.0	-	+1.0
2nd trimester	-	+1.0	-	+1.0		-	-	+1.0	-	+1.0
3rd trimester	-	+1.0	-	+1.0			-	+1.0	-	+1.0
Lactation					-	-				
1st 6 months	-	+2.0	-	+2.0			-	+2.0	-	+2.0
2nd 6 months	-	+2.0	-	+2.0			-	+2.0	-	+2.0

mths: months; yo: years old
†No recommendations for vitamin B5
‡Adequate intake
§Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding

country has provided additional vitamin K intake recommendations for pregnancy and lactation.

Vitamin B5 (Pantothenic acid)

There are no recommendations for vitamin B5 intake in the Philippine DRI (Table 20). Although Malaysia and Thailand use AI for the recommendations while Indonesia and Vietnam provide RDA/RNI values, no major differences are observed in vitamin B5 recommendations in these four countries for all age groups. There are also no differences in recommendations according to sex. The recommendations for children range from 2-4 mg/day while the recommendations for adolescents range from 4-5 mg/day. For adults and elderly, 5 mg/day has been recommended. For all countries, the same provisions have been made for additional vitamin B5 intake during pregnancy (+1 mg/day) and lactation (+2 mg/day).

Biotin

Only three countries in this review has provided recommendations for biotin, namely Indonesia, Thailand and Vietnam (AI is used by Thailand and Vietnam). In general, all three countries provide similar recommendations for biotin for most age groups (Table 21). Male and female share the same recommendation values, and the recommendations increase with age, from 5-6 µg/day for infants, to 30 µg/day for adults and elderly. While there is no additional recommendation for pregnancy by these 3 countries, an additional of +5 µg/day is recommended for lactating women.

Choline

Similar to biotin, only Indonesia, Thailand and Vietnam have made recommendations for choline. Thailand and Vietnam use AI for choline recommendations for all age groups. The recommended intakes for all age groups are rather similar for all the three countries, with the values increasing with age (Table 22). There is generally no difference in recommendations by sex for the younger age groups (i.e. infants, children and adolescent up to 12 years old). In this regard, Indonesia provides higher choline recommendations for children aged 7-9 years old (375 mg/day) than Thailand (250-375 mg/day) and Vietnam (250 mg/day). For adolescent aged 13 years and above, adults and elderly groups, all three countries provide the same recommendations, with higher recommended intakes for males (500 mg/day) than females (from 400-425 mg/day). The additional amounts recommended during pregnancy and lactation in these countries are also similar, which are +25 mg/day for pregnancy and +125 mg/day for lactation respectively.

Recommended mineral intakes

For the first nine of the 15 minerals in Table 3, all five countries have provided recommended intakes. For the next five minerals, only four countries have made provisions for recommended daily intake, while only two countries have made recommendations for molybdenum intake. Recommended intakes for these 15 minerals by the five countries, given as RDAs/RNIs, unless otherwise mentioned, are tabulated in Tables 23-37. A summary discussion comparing the recommended intakes for each of these minerals among the countries are given in the following paragraphs.

Calcium

Notable differences in recommendations for calcium intake are observed (Table 23). Indonesia, Malaysia, Philippines and Vietnam provide RDA/RNI recommendations whereas Thailand provides AI amounts. For infants aged

Table 21. RDAs/RNIs for biotin (µg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*†		*Philippines*†		*Thailand*‡		*Vietnam*‡	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants			-	-	-	-				
0-5 months	5§						Breast milk		5	
6-11 months	6						6		5 (6-8mths)	
									6 (9-11mths)	
Children			-	-	-	-				
1-3 years old	8						8 (1-3yo)		8 (1-2yo)	
4-6 years old	12						12 (4-5yo)		12 (3-5yo)	
7-9 years old	12						12 (6-8yo)		12 (6-7yo)	
									20 (8-9yo)	
Adolescent										
10-12 years old	20						20 (9-12yo)		20 (10-11yo)	
13-15 years old	25						25		25 (12-14yo)	
16-18 years old	30						25		25 (15-19yo)	
Adult			-	-	-	-				
19-29 years old	30						30 (19-30yo)		30 (20-29yo)	
30-49 years old	30						30 (31-50yo)		30	
50-59 years old	30 (50-64yo)						30 (51-60yo)		30 (50-69yo)	
Elderly			-	-	-	-				
60–69 years old	30 (65-80yo)						30 (61-70yo)			
≥70 years old	30 (80+yo)						30 (≥71yo)		30	
Pregnancy			-	-	-	-				
1st trimester	-	+0					-	+0	-	+0
2nd trimester	-	+0					-	+0	-	+0
3rd trimester	-	+0					-	+0	-	+0
Lactation			-	-	-	-				
1st 6 months	-	+5					-	+5	-	+5
2nd 6 months	-	+5					-	+5	-	+5

mths: months; yo: years old
†No recommendations for biotin
‡Adequate intake
§Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding

Table 22. RDAs/RNIs for choline (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*†		*Philippines*†		*Thailand*‡		*Vietnam*‡	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants			-	-	-	-				
0-5 months	125§						Breast milk		125	
6-11 months	150						150		150 (6-8mths)	
									150 (9-11mths)	
Children			-	-	-	-				
1-3 years old	200						200 (1-3yo)		200 (1-2yo)	
4-6 years old	250						250 (4-5yo)		250 (3-5yo)	
7-9 years old	375						250 (6-8yo)		250 (6-7yo)	
									250 (8-9yo)	
Adolescent			-	-	-	-				
10-12 years old	375						375 (9-12yo)		375 (10-11yo)	
13-15 years old	550	400					550	400	550 (12-14yo)	400 (12-14yo)
16-18 years old	550	425					550	400	550 (15-19yo)	425 (15-19yo)
Adult			-	-	-	-				
19-29 years old	550	425					550 (19-30yo)	425 (19-30yo)	550 (20-29yo)	425 (20-29yo)
30-49 years old	550	425					550 (31-50yo)	425 (31-50yo)	550	425
50-59 years old	550 (50-64yo)	425 (50-64yo)					550 (51-60yo)	425 (51-60yo)	550 (50-69yo)	425 (50-69yo)
Elderly			-	-	-	-				
60–69 years old	550 (65-80yo)	425 (65-80yo)					550 (61-70yo)	425 (61-70yo)		
≥70 years old	550 (80+yo)	425 (80+yo)					550 (≥71yo)	425 (≥71yo)	550	425
Pregnancy			-	-	-	-				
1st trimester	-	+25					-	+25	-	+25
2nd trimester	-	+25					-	+25	-	+25
3rd trimester	-	+25					-	+25	-	+25
Lactation			-	-	-	-				
1st 6 months	-	+125					-	+125	-	+125
2nd 6 months	-	+125					-	+125	-	+125

mths: months; yo: years old
†No recommendations for choline
‡Adequate intake
§Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding

Table 23. RDAs/RNIs for calcium (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*[†]		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	200[‡]		200 (bf)[†]; 250 (ff)[†]		200[†]		Breast milk		300	
6-11 months	270		260[†]		400		260		400 (6-8mths)	
									400 (9-11mths)	
Children										
1-3 years old	650		700		500 (1-2yo)		500 (1-3yo)		500 (1-2yo)	
4-6 years old	1000		1000		550 (3-5yo)		800 (4-5yo)		600 (3-5yo)	
7-9 years old	1000		1000		700 (6-9yo)		800 (6-8yo)		650 (6-7yo)	
									700 (8-9yo)	
Adolescent										
10-12 years old	1200		1300		1000		1000 (9-12yo)		1000 (10-11yo)	
13-15 years old	1200		1300		1000		1000		1000 (12-14yo)	
16-18 years old	1200		1300		1000		1000		1000 (15-19yo)	
Adult										
19-29 years old	1000		1000		750		800 (19-30yo)		800 (20-29yo)	
30-49 years old	1000		1000 (30-50yo)		750		800 (31-50yo)		800 (30-49yo)	
50-59 years old	1200 (50-64yo)		1000 (51-59yo)	1200 (51-59yo)	750	800	1000 (51-60yo)		800 (50-69yo)	900 (50-69yo)
Elderly										
60–69 years old	1200 (65-80yo)		1000 (60-65yo)	1200	800		1000 (61-70yo)			
≥70 years old	1200 (80+yo)		1000 (>65yo)	1200	800		1000 (≥71yo)		1000	
Pregnancy										
13-19 years old	-	-	-	+300	-	-	-	-	-	-
1st trimester	-	+200	-	+0	-	+0	-	+0	-	+400
2nd trimester	-	+200	-	+0	-	+0	-	+0	-	+400
3rd trimester	-	+200	-	+0	-	+0	-	+50	-	+400
Lactation										
13-19 years old	-	-	-	+300	-	-	-	-	-	-
1st 6 months	-	+200	-	+0	-	+0	-	+0	-	+500
2nd 6 months	-	+200	-	+0	-	+0	-	+0	-	+500

mths: months; yo: years old; bb: breast fed; ff: formula fed
[†]Adequate intake
[‡] Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding
Pregnancy and lactation recommendations are in addition to the amount recommended for women 19-49 years

6-11 months, Philippines and Vietnam recommend higher calcium intake (400 mg/day) whereas the recommendations by the other countries range from 260-270 mg/day. For children aged 1-9 years, the recommendations by Indonesia (650-1000 mg/day) and Malaysia (700-1000 mg/day) are higher than those recommended by Philippines, Thailand and Vietnam (ranging from 500-800 mg/day). Indonesia (1200 mg/day) and Malaysia (1300 mg/day) recommendations for adolescent are also higher as compared to the other three countries (1000 mg/day). The same trend is observed for recommendations for adults (19-59 years), with the highest intakes for Indonesia and Malaysia, ranging from 1000-1200 mg/day. For the other three countries, recommendations for adults range from 750-1000 mg/day. Philippines has the lowest calcium intake recommendations for adults (750 mg - 800 mg for aged 19-59 years old) and elderly (800 mg/day for elderly aged 60 and above). Calcium intake recommendations for elderly in most countries range from 1000-1200 mg/day, with the exception of Philippines with a provision of 800 mg/day. In all countries, for all age groups, the same calcium intake is recommended for males and females.

Only Indonesia and Vietnam provide for additional calcium intake starting from 1st trimester of pregnancy and lactation. Philippines recommends additional intake at 3rd trimester and no additional intake for lactation. Malaysia specifically indicated a recommended intake of 1300 mg/day (an additional amount of 300 mg/day) for teenage pregnancy and lactation at aged 13-19 years.

Iron

All countries provide RDA/RNI values for iron intake of all groups, except infants aged 0-5 months in Philippines where AI amount is provided. For iron intake recommendations, Malaysia and Vietnam recommendations are based on two different levels of dietary iron bioavailability (i.e. intermediate (10%) and high (15%) bioavailability) (Table 24). Indonesia RDAs assumed that 75% of the iron is from a haem iron source whereas Philippines DRI adopted 8.5% iron bioavailability based on food consumption pattern observed in national nutrition surveys.

In general, the recommendations for iron are approximately 1.5 times higher for adolescent females 16-18 years than their male counterparts in all the countries. The highest iron intake recommendations are for adult women (aged 19-49 years) in all countries, about twice the amount for men in the same age group. Philippines has the same iron recommendations for the adolescent girls from 10 years onwards till women 49 years of 28 mg/day. This amount is the highest among all country recommendations, being 2.3 times that of the males and has indicated that the requirement cannot be met by diet alone.

All countries recommend additional iron intake for pregnant women, wherein Malaysia, Thailand and Vietnam recommend iron supplements for all pregnant women. All countries recommend additional iron intake during lactation, except Indonesia. Malaysia and Vietnam provide the recommendations based on the menstruation status during lactation period with assumption that menstruation may resume after exclusive breastfeeding, and that much higher iron requirement is recommended for lactating women with menstruation. Philippines adopts a recommended intake of 30 mg/day for lactating women (additional 2 mg/day to that of non-pregnant adult women aged 19-49 years), regardless of menstruation in order to allow for build-up of iron stores for future increased needs. On

Table 24. RDAs/RNIs for iron (mg/day) in SEA countries

Age group	Indonesia†		Malaysia				Philippines		Thailand		Vietnam			
	Male	Female	Male		Female		Male	Female	Male	Female	Male		Female	
			10%	15%	10%	15%					10%	15%	10%	15%
Infants														
0-5 months	0.3‡		a	a	a	a	0.4§		Breast milk		0.93	-	0.93	-
6-11 months	11		9	6	9	6	10	9	9.0		8.5 (6-8mths) 9.4 (9-11mths)	5.6 (6-8mths) 6.3 (9-11mths)	7.9 (6-8mths) 8.7 (9-11mths)	5.2 (6-8mths) 5.8 (9-11mths)
Children														
1-3 years old	7		6	4	6	4	8 (1-2yo)		5.0 (1-3yo)		5.4 (1-2yo)	3.6 (1-2yo)	5.1 (1-2yo)	3.5 (1-2yo)
4-6 years old	10		6	4	6	4	9 (3-5yo)		6.0 (4-5yo)		5.5 (3-5yo)	3.6 (3-5yo)	5.4 (3-5yo)	3.6 (3-5yo)
7-9 years old	10		9	6	9	6	10 (6-9yo)	9 (6-9yo)	6.6 (6-8yo)		7.2 (6-7yo) 8.9 (8-9yo)	4.8 (6-7yo) 5.9 (8-9yo)	7.1 (6-7yo) 8.9 (8-9yo)	4.7 (6-7yo) 5.9 (8-9yo)
Adolescent														
10-12 years old	8		15	10	14 (nm) 33 (m)	9 (nm) 22 (m)	12	20	11.5 (9-12yo)	12.5 (nm) [puberty]) 15.6 (m) (9-12yo)	11.3 (10-11yo)	7.5 (10-11yo)	10.5 (nm) 24.5 (m) (10-11yo)	7 (nm) 16.4 (m) (10-11yo)
13-15 years old	11	15	15 (13-14yo) 19 (15yo)	10 (13-14yo) 12 (15yo)	14 (nm) 33 (m) (13-14yo) 31 (15yo)	9 (nm) 22 (m) (13-14yo) 21 (15yo)	19	28¶	15.0 (13-15yo)	16.0 (13-15yo)	15.3 (12-14yo)	10.2 (12-14yo)	14.0 (nm) 32.6 (m) (12-14yo)	9.3 (nm) 21.8 (m) (12-14yo)
16-18 years old	11	15	19	12	31	21	14	28¶	11.0 (16-18yo)	16.0 (16-18yo)	17.5 (15-19yo)	11.6 (15-19yo)	29.7 (15-19yo)	19.8 (15-19yo)
Adult														
19-29 years old	9	18	14	9	29	20	12	28¶	11.5 (19-30yo)	20.0 (19-30yo)	11.9 (20-29yo)	7.9 (20-29yo)	26.1 (20-29yo)	17.4 (20-29yo)
30-49 years old	9	18	14 (30-50yo)	9 (30-50yo)	29 (30-50yo)	20 (30-50yo)	12	28¶	11.5 (31-50yo)	20.0 (31-50yo)	11.9	7.9	26.1	17.4
50-59 years old	9 (50-64yo)	8 (50-64yo)	14 (51-59yo)	9 (51-59yo)	11 (51-59yo)	8 (51-59yo)	12	10	11.5 (51-60yo)	10.0 (51-60yo)	11.9 (50-69yo)	7.9 (50-69yo)	10.0 (nm) 26.1 (m) (50-69yo)	6.7 (nm) 17.4 (m) (50-69yo)

Table 24. RDAs/RNIs for iron (mg/day) in SEA countries *(continued)*

Age group	*Indonesia*[†]		*Malaysia*				*Philippines*		*Thailand*		*Vietnam*			
	Male	*Female*	*Male*		*Female*		*Male*	*Female*	*Male*	*Female*	*Male*		*Female*	
			10%	*15%*	*10%*	*15%*					*10%*	*15%*	*10%*	*15%*
Elderly														
60–69 years old	9 (65-80yo)	8 (65-80yo)	14 (60-65yo)	9 (60-65yo)	11 (60-65y)	8 (60-65y)	12	10	11.0 (61-70yo)	10.0 (61-70yo)				
≥70 years old	9 (80+yo)	8 (80+yo)	14 (>65yo)	9 (>65yo)	11 (>65yo)	8 (>65yo)	12	10	11.0 (≥71yo)	10.0 (≥71yo)	11.0	7.3	9.4	6.3
Pregnancy														
1st trimester	-	+0	-	-	b	b	-	+10¶	-	c	-	-	+15 (d)	+10 (d)
2nd trimester	-	+9	-	-	b	b	-	+10¶ +10¶	-	c	-	-	+15 (d)	+10 (d)
3rd trimester	-	+9	-	-	b	b	-		-	c	-	-	+15 (d)	+10 (d)
Lactation														
1st 6 months	-	+0	-	-	+4	+2	-	+2 +2	-	+3	-	-	Menopause 13.3	Menopause 8.9
2nd 6 months	-	+0	-	-	+4 (nm) +21 (m)	+2 (nm) +13 (m)	-		-	+10	-	-	Return of menstruation 26.1	Return of menstruation 17.4

nm: non-menstruating; m: menstruating; mths: months; yo: years old

[†]It is assumed that 75% of the iron is from a haem iron source

[‡]Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding

[§]Adequate intake

¶Requirement cannot be met by diet alone. Intake of iron-rich and iron-fortified foods and the use of supplements are recommended, if necessary.

% indicates iron bioavailability levels

a - No recommendations. Neonatal iron stores are sufficient to meet iron requirement for first 6 months in full-term infants. Premature infants and low birth weight infants require additional iron

b - Iron supplements in table form recommended for all pregnant women. In the non-anaemic pregnant women, daily supplements of 100mg iron given during second half of pregnancy are adequate. In the anaemic women, higher doses are usually required

c - pregnant women should receive 60 mg of iron supplement/day

d - Iron supplement is recommended for all pregnant women during pregnancy. Women with anaemia need a higher supplemental dose

Lactation recommendations for Malaysia are in addition to the amount recommended for women 51-59 years

Pregnancy and lactation recommendations for Philippines are in addition to the amount recommended for non-pregnant women 19-49 years

Pregnancy and lactation recommendations for Thailand are in addition to the amount recommended for women 51-60 years

the other hand, Thailand recommends that lactating/nursing mothers should receive 13 and 20 mg of dietary iron/day during 0-5 months and 6-11 months of lactation, respectively.

Iodine

Indonesia, Malaysia and Philippines provide an RDA/RNI for iodine intake for all age groups, whereas Thailand uses AIs for iodine intake recommendation. In Vietnam, AI amounts are provided for infants aged 0-11 months while RDA values are used for other age groups. The recommended iodine intake for Indonesia, Philippines, Thailand and Vietnam are rather similar for all age groups (Table 25). The amounts recommended increase with age, from 90-100 for infants, to 150 µg/day for adults and elderly. There are also no sex differences in the recommendations of these countries. The iodine recommendations by Malaysia are lower than those recommended by the other four countries for most age groups, and the intakes for males are generally higher than for females. All countries recommend additional iodine intake during pregnancy (200-250 µg/day) and lactation (200-290 µg/day).

Zinc

The RDAs/RNIs for zinc are presented in Table 26. For infants aged 0-5 months in Philippines, AI is used for the recommended values. Malaysia and Philippines recommend the zinc intakes based on zinc absorption of 30%. Thailand adjusted the value to Thai dietary pattern (mixed diet) with an average of 900 mg of phytate intake per day. Different from other countries, Vietnam provides recommendations for three levels of zinc bioavailability i.e. good absorption (50%), moderate absorption (30%) and poor absorption (15%). There are no major differences in the recommendations for infants, children and adolescents among the five countries, using the level for moderate absorption for Vietnam. There are greater variations in recommendations for adult and elderly groups, the amounts by Indonesia, Thailand and Vietnam (moderate absorption) are generally higher than those provided by Malaysia and Philippines. Females are recommended lower zinc intakes for all age groups, in all countries. All countries have recommended additional zinc intake for pregnant and lactating women, with varying amounts.

Sodium

Notable differences are observed for the sodium recommendation in these countries as well as the way the recommendations are presented (Table 27). Malaysia, Philippines and Thailand use AI amounts for recommendations for all age groups. Different from other countries, Thailand provide a sodium intake range for each age group, whereas the values recommended by Philippines are as electrolyte Na+. Vietnam introduces dietary goal for sodium recommendations and listed both recommended needs and diet goals for each age group. It is observed that for the prevention and control of NCDs, countries generally keep the sodium recommendations to <2000 mg/day for adults and lower provisions are made for children and elderly.

Selenium

There are considerable variations in the selenium intake recommendations for all age groups by the five countries (Table 28). Thailand has made higher recommendations for selenium than other countries for all age groups. All countries provide RDA/RNI values for the recommendations for all age groups except the provision for infant aged 6-11 months by Thailand where AI amount is used. For infants, the

Table 25. RDAs/RNIs for iodine (µg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*†		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	90‡		67.5 (0-2mths) 105.0 (3-5mths)	63.0 (0-2mths) 96.0 (3-5mths)	90		Breast milk		100†	
6-11 months	120		124.5 (6-8mths) 138.0 (9-11mths)	114.0 (6-8mths) 127.5 (9-11mths)	90		70		130† (6-8mths) 130† (9-11mths)	
Children										
1-3 years old	90		73.2	69.0	90 (1-2yo)		90 (1-3yo)		90 (1-2yo)	
4-6 years old	120		109.8	109.2	90 (3-5yo)		90 (4-5yo)		90 (3-5yo)	
7-9 years old	120		101.6	100.0	120 (6-9yo)		90 (6-8yo)		90 (6-7 yo)	
Adolescent									120 (8-9yo)	
10-12 years old	120		133.6	141.6	120		120 (9-12yo)		120 (10-11yo)	
13-15 years old	150		99.2	93.0	150		130		120 (12-14yo)	
16-18 years old	150		118.4	100.6	150		130		150 (15-19yo)	
Adult										
19-29 years old	150		122.8	105.8	150		150 (19-30yo)		150 (20-29yo)	
30-49 years old	150		121.2 (30-50yo)	104.4 (30-50yo)	150		150 (31-50yo)		150	
50-59 years old	150 (50-64yo)		121.2 (50-59yo)	104.4 (50-59yo)	150		150 (51-60yo)		150 (50-69yo)	
Elderly										
60–69 years old	150 (65-80yo)		116.2 (60-65y)	99.0 (60-65y)	150		150 (61-70yo)			
≥70 years old	150 (80+yo)		116.2 (>65y)	99.0 (>65y)	150		150 (≥71yo)		150	
Pregnancy										
1st trimester	-	+70	-	+100	-	+100	-	+50	-	+70
2nd trimester	-	+70	-	+100	-	+100	-	+50	-	+70
3rd trimester	-	+70	-	+100	-	+100	-	+50	-	+70
Lactation										
13-19 years old	-	-	-	+100	-	-	-	-	-	-
1st 6 months	-	+140	-	+100	-	+100	-	+50	-	+100
2nd 6 months	-	+140	-	+100	-	+100	-	+50	-	+100

mths: months; yo: years old

† Adequate intake

‡ Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding

Pregnancy and lactation recommendations are in addition to the amount recommended for women 19-49 years

Table 26. RDAs/RNIs for zinc (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	1.1[†]		1.1 (bf); 2.8 (ff)		2.0[‡‡]		Breast milk		6.6[‡] (pa); 2.8[§] (ma); 1.1[¶] (ga)	
6-11 months	3		4.1	3.7	4.2	3.7	2.7		8.3[†] (pa); 4.1[††] (ma); 0.8[¶]-2.5[††] (ga) (6-8mths)	
									8.3[†] (pa); 4.1[††] (ma); 0.8[¶]-2.5[††] (ga) (9-11mths)	
Children										
1-3 years old	3		4.2	4.0	4.1 (1-2yo)	4.0 (1-2yo)	4.4 (1-3yo)		8.3 (pa); 4.1 (ma); 2.4 (ga) (1-2yo)	
4-6 years old	5		5.2		5.0 (3-5yo)	4.8 (3-5yo)	5.3 (4-5yo)		9.6 (pa); 4.8 (ma); 2.9 (ga) (3-5yo)	
7-9 years old	5		5.7	5.6	5.1 (6-9yo)	5.0 (6-9yo)	6.3 (6-8yo)		11.2; (pa)5.6 (ma); 3.3 (ga) (6-7yo)	
									12 (pa) 6.0 (ma) 3.3 (ga) (8-9yo)	11.2 (pa) 5.6 (ma) 3.3 (ga) (8-9yo)
Adolescent										
10-12 years old	8		7.0	6.3	6.6	6.1	9.5 (9-12yo)	9.0 (9-12yo)	17.2 (pa) 8.6 (ma) 5.1 (ga) (10-11yo)	14.4 (pa) 7.2 (ma) 4.3 (ga) (10-11yo)
13-15 years old	11	9	9.3	7.7	9.2	7.4	12.5	9.8	18.0 (pa) 9.0 (ma) 6.4 (ga) (12-14yo)	16.0 (pa) 8.0 (ma) 4.8 (ga) (12-14yo)
16-18 years old	11	9	9.9	7.7	9.0	7.2	12.9	9.8	20.0 (pa) 10.0 (ma) 6.0 (ga) (15-19yo)	16.0 (pa) 8.0 (ma) 4.8 (ga) (15-19yo)
Adult										
19-29 years old	11	8	6.6	4.7	6.5	4.6	11.6 (19-30yo)	9.7 (19-30yo)	20.0 (pa) 10.0 (ma) 6.0 (ga) (20-29yo)	16.0 (pa) 8.0 (ma) 4.8 (ga) (20-29yo)
30-49 years old	11	8	6.5 (30-50yo)	4.6 (30-50yo)	6.5	4.6	10.9 (31-50yo)	9.2 (31-50yo)	20.0 (pa) 10.0 (ma) 6.0 (ga)	16.0 (pa) 8.0 (ma) 4.8 (ga)
50-59 years old	11 (50-64yo)	8 (50-64yo)	6.5 (50-59yo)	4.6 (50-59yo)	6.5 (50-59yo)	4.6 (50-59yo)	10.9 (51-60yo)	9.2 (51-60yo)	20.0 (pa) 10.0 (ma) 6.0 (ga) (50-69yo)	16.0 (pa) 8.0 (ma) 4.8 (ga) (50-69yo)

Table 26. RDAs/RNIs for zinc (mg/day) in SEA countries *(continued)*

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Elderly										
60–69 years old	11 (65-80yo)	8 (65-80yo)	6.3 (60-65yo)	4.4	6.5	4.6	10.9 (61-70yo)	8.6 (61-70yo)		
≥70 years old	11 (80+yo)	8 (80+yo)	6.2 (>65yo)	4.3	6.5	4.6	10.3 (≥71yo)	8.6 (≥71yo)	18.0 (pa) 9.0 (ma) 5.4 (ga)	14.0 (pa) 7.0 (ma) 4.2 (ga)
Pregnancy										
1st trimester	-	+2	-	+0.9	-	+5.1	-	+1.6	-	+4.0 (pa) +2.0 (ma) +1.2 (ga)
2nd trimester	-	+4	-	+2.4	-	+5.1	-	+1.6	-	+4.0 (pa) +2.0 (ma) +1.2 (ga)
3rd trimester	-	+4	-	+5.4	-	+5.1	-	+1.6	-	+4.0 (pa) +2.0 (ma) +1.2 (ga)
Lactation										
1st 6 months	-	+5	-	+4.9 (1-3 months) +4.2 (4-6 months)	-	+7.0	-	+2.9	-	+6.0 (pa) +3.0 (ma) +1.8 (ga) (0-3 months) +6.0 (pa) +3.0 (ma) +1.8 (ga) (4-6 months)
2nd 6 months	-	+5	-	+2.6 (7-12 months)	-	+7.0	-	+2.9	-	+6.0 (pa) +3.0 (ma) +1.8 (ga) (7-12 months)

bf: breast fed; ff: formula fed; mths: months; yo: years old; ga; good absorption; ma: moderate absorption; pa: poor absorption

Good absorption: good biological value of zinc = 50% (diets high in animal or fish products); moderate absorption: average biological value of zinc = 30% (diet with moderate animal or fish products: molecular phytate-zinc ratio is 5: 15); poor absorption: low biological value of zinc = 15% (diet with little or no animal or fish products

Pregnancy and lactation recommendations for Malaysia are in addition to the amount recommended for women 30-50 years

†Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding

‡Children on formula milk, complementary foods high in phytates and plant source proteins

§Babies who consume formula and are partially breastfed or supplemented with low phytate and other milk solutions

¶Exclusive breastfed babies

††Not applicable to exclusively breastfed babies

‡‡Adequate intake

Table 27. RDAs/RNIs for sodium (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*†		*Philippines*†‡		*Thailand*†		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	120§		120 (0-6mths)		120		Breast milk		100† (RN); 100 (DG)	
6-11 months	370		370 (7-12mths)		200		175-550		600† (RN); 600 (DG)	
Children										
1-3 years old	800		1000		225 (1-2yo)		225-675 (1-3yo)		<900 (DG) (1-2yo)	
4-6 years old	900		1200 (4-8yo)		300 (3-5yo)		300-900 (4-5yo)		<1100 (DG) (3-5yo)	
7-9 years old	1000				400 (6-9yo)		325-950 (6-8yo)		<1300 (DG) (6-7yo)	
									<1600 (DG) (8-9yo)	
Adolescent										
10-12 years old	1300	1400	1500 (9-13yo)		500		400-1175 (9-12yo)	350-1100 (9-12yo)	<1900 (DG) (10-11yo)	
13-15 years old	1500				500		500-1500	400-1250	<2000 (DG) (12-14yo)	
16-18 years old	1700	1600	1500 (14-18yo)		500		525-1600	425-1275	< 2000 (DG) (15-17yo)	
Adult										
19-29 years old	1500		1500		500		500-1475 (19-30yo)	400-1200 (19-30yo)	600 (RN); <2000 (DG) (18-29yo)	
30-49 years old	1500		1500 (30-50yo)		500		475-1450 (31-50yo)	400-1200 (31-50yo)	600 (RN); <2000 (DG)	
50-59 years old	1300 (50-64yo)	1400 (50-64yo)	1500 (51-59yo)		500		475-1450 (51-60yo)	400-1200 (51-60yo)	600 (RN); <2000 (DG) (50-69yo)	
Elderly										
60–69 years old	1100 (65-80yo)	1200 (65-80yo)	1500		500		475-1450 (61-70yo)	400-1200 (61-70yo)		
≥70 years old	1000 (80+yo)		1200		500		400-1200 (≥71yo)	350-1050 (≥71yo)	600 (RN); <2000 (DG)	
Pregnancy					-	-				
1st trimester	-	+0	-	+0 (14-50yo)			-	+50-200	-	< 2000 (DG) for pregnancy
2nd trimester	-	+0	-	+0 (14-50yo)			-	+50-200	-	
3rd trimester	-	+0	-	+0 (14-50yo)			-	+50-200	-	
Lactation					-	-				
1st 6 months	-	+0	-	+0 (14-50 yo)			-	+125-350	-	< 2000 (DG) for lactation
2nd 6 months	-	+0	-	+0 (14-50 yo)			-	+125-350	-	

RN: recommended needs; DG: dietary goals; mths: months; yo: years old
† Adequate intake
‡ As electrolyte Na+
§ Nutritional needs of infants 0-5 months are to be met by exclusive breastfeeding

Table 28. RDAs/RNIs for selenium (µg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	7†		6		7	6	Breast milk		6	
6-11 months	10		10	9	10	9	20‡		10 (6-8mths) 10 (9-11mths)	
Children										
1-3 years old	18		17	16	17 (1-2yo)	16 (1-2yo)	20 (1-3yo)		17 (1-2yo)	
4-6 years old	21		21		20 (3-5yo)		30 (4-5yo)		20 (3-5yo)	
7-9 years old	22		22	21	20 (6-9yo)	19 (6-9yo)	30 (6-8yo)		22 (6-7yo) 22 (8-9yo)	
Adolescent										
10-12 years old	22	19	21	19	21	23	40 (9-12yo)		32 (10-11yo)	26 (10-11yo)
13-15 years old	30	24	31	24	30	29	55 (13-15yo)		32 (12-14yo)	26 (12-14yo)
16-18 years old	36	26	27	26	37	32	55 (16-18yo)		32 (15-19yo)	26 (15-19yo)
Adult										
19-29 years old	30	24	32	25	38	33	55 (19-30yo)		34 (20-29yo)	26 (20-29yo)
30-49 years old	30	25	32 (30-50yo)	24 (30-50yo)	38	33	55 (31-50yo)		34	26
50-59 years old	30 (50-64yo)	25 (50-64yo)	32 (51-59yo)	24 (51-59yo)	38	33	55 (51-60yo)		34 (50-69yo)	26 (50-69yo)
Elderly										
60–69 years old	29 (65-80yo)	24 (65-80yo)	31 (60-65yo)	23	38	33	55 (61-70yo)			
≥70 years old	29 (80+yo)	24 (80+yo)	30 (>65yo)	23	38	33	55 (≥71yo)		33	25
Pregnancy										
1st trimester	-	+5	-	+0	-	+4	-	+5	-	+0
2nd trimester	-	+5	-	+2	-	+4	-	+5	-	+2
3rd trimester	-	+5	-	+4	-	+4	-	+5	-	+4
Lactation										
1st 6 months	-	+10	-	+9	-	+9	-	+15	-	+9
2nd 6 months	-	+10	-	+16	-	+9	-	+15	-	+16

mths: months; yo: years old
†Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding
‡Adequate intake
Malaysia's recommendation for pregnancy & lactation – in addition to those recommended for age 19-29

amount recommended by Thailand for infants aged 6-11 months (20 µg/day) is double the recommendations by other countries (9-10 µg/day). For children, the recommended amounts increase with age, with most countries (Indonesia, Thailand, and Vietnam) provide no differences for males and females (from 16-30 µg/day), whereas those recommended for Malaysian and Filipino male children aged 1-3 years and 7-9 years are marginally higher than those recommended for their female counterparts of the same age. For adolescents, adults and elderly, the recommendations vary considerably between countries, with amounts recommended generally higher for males, increase with age and lower recommendations for elderly. Different from other countries, Thailand recommends the same amount of selenium intake for individuals aged 13 years up to elderly (55 µg/day for both males and females). The additional amount recommended for pregnancy and lactation also vary considerably among the countries, ranging from +2 to +5 µg/day for pregnancy and +9 to +16 µg/day for lactation, respectively.

Phosphorus

Table 29 shows the recommendations for phosphorus by country. Malaysia, Philippines and Thailand use AI for phosphorus recommendations for infants. There are no large variations in phosphorus recommendations by all five countries for most age groups. In all countries, males and females shared the same recommendations. For infants aged 6-11 months, Vietnam used different age groupings with separate recommendations for infants aged 6-8 months (275 mg/day) and 9-11 months (330 mg/day) respectively, while other four countries have the same recommendations for infants aged 6-11 months (275 mg/day). In all countries, the highest recommendations are provided for adolescents' groups. Vietnam's phosphorus recommendations for adolescents are generally lower (1000 mg/day) as compared to the other four countries (1250 mg/day). Similar intakes are recommended for adults and elderly (700 mg/day). No additional intakes are recommended for pregnant and lactating women in all five countries.

Potassium

There are notable differences observed in the recommendations for potassium intakes (Table 30). While Indonesia and Malaysia provide RDA/RNI recommendations, AI is used for potassium recommendations in Philippines, Thailand and Vietnam. Different from other countries, Thailand provides a potassium intake range for all age groups. In Indonesia, Thailand and Vietnam, the highest recommended potassium requirements are for the males and females in the 16-18 years group. For almost all age groups except infants, the amounts recommended by Indonesia and Malaysia (ranging from 2600 – 5300 mg/day) are double the AI values provided by Philippines, Thailand and Vietnam (ranging from 900 – 4500 mg/day). In addition to recommended AIs, Vietnam also provides dietary goals for potassium intakes for population aged 4 years and above, with the recommended amounts ranging from >1870 to >2720 mg/day for children, >3230 to 3510 mg/day for adolescents, and >3510 mg/day for adults and elderly. These dietary goal values are 5-80% higher than the AI recommendations. Most countries have no additional recommendation for pregnancy with the exception of Thailand, which suggested additional intake of 350-575 mg/day for second and third trimesters. For teenage pregnancy, Malaysia recommended

Table 29. RDAs/RNIs for phosphorus (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	100‡		100† (0-6mths)		90†		Breast milk		100	
6-11 months	275		275† (7-12mths)		275†		275†		275 (6-8mths)	
									330 (9-11mths)	
Children										
1-3 years old	460		460 (1-3yo)		460 (1-2yo)		460 (1-3yo)		460 (1-2yo)	
4-6 years old	500		500 (4-8yo)		500 (3-5yo)		500 (4-5yo)		500 (3-5yo)	
7-9 years old	500				500 (6-9yo)		500 (6-8yo)		500 (6-7yo)	
									500 (8-9yo)	
Adolescent										
10-12 years old	1250		1250 (9-13yo)		1250		1000 (9-12yo)		1250 (10-11yo)	
13-15 years old	1250		1250 (14-18yo)		1250		1000		1250 (12-14yo)	
16-18 years old	1250				1250		1000		1250 (15-19yo)	
Adult										
19-29 years old	700		700		700		700 (19-30yo)		700 (20-29yo)	
30-49 years old	700		700 (30-50yo)		700		700 (31-50yo)		700	
50-59 years old	700 (50-64yo)		700 (51-59yo)		700		700 (51-60yo)		700 (50-69yo)	
Elderly										
60–69 years old	700 (65-80yo)		700		700		700 (61-70yo)			
≥70 years old	700 (80+yo)		700		700		700 (≥71yo)		700	
Pregnancy										
1st trimester	-	+0	-	+0 (14-50yo)	-	+0	-	+0	-	+0
2nd trimester	-	+0	-	+0 (14-50yo)	-	+0	-	+0	-	+0
3rd trimester	-	+0	-	+0 (14-50yo)	-	+0	-	+0	-	+0
Lactation										
1st 6 months	-	+0	-	+0 (14-50yo)	-	+0	-	+0	-	+0
2nd 6 months	-	+0	-	+0 (14-50yo)	-	+0	-	+0	-	+0

mths: months; yo: years old
†Adequate intake
‡Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding

Table 30. RDAs/RNIs for potassium (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*†		*Thailand*‡		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	400‡		400 (0-6mths)		500		Breastmilk		400†	
6-11 months	700		700 (7-12mths)		700		925-1550		700† (6-8mths)	
									700† (9-11mths)	
Children										
1-3 years old	2600		3000		1000 (1-2yo)		1175-1950 (1-3yo)		900† (1-2yo)	
4-6 years old	2700		3800 (4-8y)		1400 (3-5yo)		1525-2550 (4-5yo)		1100†; >1870§ (3-5yo)	
7-9 years old	3200				1600 (6-9yo)		1625-2725 (6-8yo)		1300†; >2210§ (6-7yo)	1200†; >2210§ (6-7yo)
									1600†; >2720§ (8-9yo)	1500†; >2720§ (8-9yo)
Adolescent										
10-12 years old	3900	4400	4500 (9-13yo)		2000		1975-3325 (9-12yo)	1875-3125 (9-12yo)	1900†; >3230§ (10-11yo)	1800†; >3230§ (10-11yo)
13-15 years old	4800				2000		2450-4100 (13-15yo)	2100-3500 (13-15yo)	2400†; >3400§ (12-14yo)	2200†; >3400§ (12-14yo)
16-18 years old	5300	5000	4700 (14-18yo)		2000		2700-4500 (16-18yo)	2150-3600 (16-18yo)	2800†; >3510§ (15-19yo)	2100†; >3510§ (15-19yo)
Adult										
19-29 years old	4700		4700		2000		2524-4200 (19-30yo)	2050-3400 (19-30yo)	2500†; >3510§ (20-29yo)	2000†; >3510§ (20-29yo)
30-49 years old	4700		4700 (30-50yo)		2000 (30-49yo)		2450-4100 (31-50yo)	2050-3400 (31-50yo)	2500†; >3510§ (30-49yo)	2000†; >3510§ (30-49yo)
50-59 years old	4700 (50-64yo)		4700 (51-59yo)		2000		2450-4100 (51-60yo)	2050-3400 (51-60yo)	2500†; >3510§ (50-69yo)	2000†; >3510§ (50-69yo)
Elderly										
60–69 years old	4700 (65-80yo)		4700		2000		2450-4100 (61-70yo)	2050-3400 (61-70yo)		
≥70 years old	4700 (80+yo)		4700		2000		2050-3400 (≥71yo)	1825-3025 (≥71yo)	2500†; >3510§ (≥70)	2000†; >3510§ (≥70)
Pregnancy					-	-				
1st trimester	-	+0	-	+0 (14-50yo)			-	+0	-	2000†; >3510§ for pregnancy
2nd trimester	-	+0	-	+0 (14-50yo)			-	+350-575	-	
3rd trimester	-	+0	-	+0 (14-50yo)			-	+350-575	-	
Lactation					-	-				
1st 6 months	-	+400	-	+400 (14-50yo)			-	+575-975	-	2000†; >3510§ for lactation
2nd 6 months	-	+400	-	+400 (14-50yo)			-	+575-975	-	

mths: months; yo: years old1
† Adequate intake
‡ Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding
§ Dietary goals
Malaysia: Recommendations given in g/day; the values are converted to mg/day for comparison

+400 mg/day. For lactation, both Indonesia and Malaysia suggested additional intake of +400 mg/day while Thailand recommends +575-975 mg/day. Vietnam recommends an AI of 2000mg/day and dietary goal of >3510 mg/day for both pregnant and lactating women, which are no different from non-pregnant/non-lactating adult women.

Magnesium

The RDAs/RNIs for magnesium for the countries are presented in Table 31. Malaysia, Philippines and Thailand use AI for magnesium recommendations for infants. Philippines has made lower magnesium recommendations for magnesium than other countries for all age groups. Generally, in all countries, there are no differences between recommendations for males and females for younger age groups (infants and children). From 10 years onwards, for all countries, the recommendations for males are generally marginally higher than those for females. For infants aged 6-11 months, the amounts recommended by Malaysia (75 mg/day) is higher than other countries (which range from 50-60 mg/day). For children aged 1-9 years, Philippines recommends intakes of 60-90 mg/day while others recommend higher intakes ranging from 60-240 mg/day. For adolescents, adults and elderly, the amounts recommended by Malaysia (240-420 mg/day) are almost double than those provided by Philippines (150-240 mg/day), while recommendations by other three countries range from 160-360 mg/day). Indonesia, Thailand and Vietnam have recommended lower daily magnesium intake for age group of 70 and above compared to the adults. The recommendations for additional magnesium intake during pregnancy range from +30-40 mg/day in Malaysia, Thailand and Vietnam, while no additional intake is recommended by Indonesia and Philippines. Malaysia provides a recommendation of +40 mg/day for teenage pregnancy (14-18 years old), an additional amount that is similar to adult pregnancy. Only Philippines provide for additional magnesium for lactating women (+50 mg/day).

Chromium

All countries except Philippines provide recommendations for chromium intake (Table 32). Malaysia, Thailand and Vietnam use AI for the recommendations. While there are differences in the way countries categorise age groups for each physiological stage, the chromium recommendations by Malaysia, Thailand and Vietnam are similar for all stages, from infants to elderly groups. The amounts recommended increase with age, from 0.2-5.5 µg/day for infants, to 25-35 µg/day for adults. Chromium intake recommendations by Indonesia for all age groups are slightly higher than those provided by other three countries, with the highest recommendation for male adolescents aged 16-18 years old (41 µg/day). For all countries, lower amounts are recommended for adults aged 50 years and above (19-30 µg/day). There are no differences in recommendations according to sex for infants and children groups. For adolescents, adults and elderly groups, the recommendations for male are considerably higher than for female for the four countries. In terms of additional provision for pregnancy, all four countries respectively recommend +5 µg/day, except for Vietnam, which recommends marginally lower additional intake of +4 µg/day. The additional intake recommendation for teenage pregnancy by Malaysia is similar to those recommended for adults, i.e. +5 µg/day. For lactating women, all four countries recommend a same additional

Table 31. RDAs/RNIs for magnesium (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants										
0-5 months	30†		30‡ (0-6mths)		26‡		Breast milk		40	
6-11 months	55		75‡ (7-12mths)		50‡		60‡		50 (6-8mths)	
									60 (9-11mths)	
Children										
1-3 years old	65		80		60 (1-2yo)		60 (1-3yo)		70 (1-2yo)	
4-6 years old	95		130 (4-8)		70 (3-5yo)		80 (4-5yo)		100 (3-5yo)	
7-9 years old	135				90 (6-9yo)		120 (6-8yo)		130 (6-7yo)	
									170 (8-9yo)	160 (8-9yo)
Adolescent										
10-12 years old	160	170	240 (9-13)		150	160	170 (9-12yo)		210 (10-11yo)	
13-15 years old	225	220	410 (14-18)		220	210	240	220	290 (12-14yo)	280 (12-14yo)
16-18 years old	270	230			265	230	290	250	350 (15-19yo)	300 (15-19yo)
Adult										
19-29 years old	360	330	400	310	240	210	310 (19-30yo)	250 (19-30yo)	340 (20-29yo)	270 (20-29yo)
30-49 years old	360	340	420 (30-50yo)	320 (30-50yo)	240	210	320 (31-50yo)	260 (31-50yo)	370	290
50-59 years old	360 (50-64yo)	340 (50-64yo)	420 (51-59yo)		240	210	300 (51-60yo)	260 (51-60yo)	350 (50-69yo)	290 (50-69yo)
Elderly										
60–69 years old	350 (65-80yo)	320 (65-80yo)	420		240	210	300 (61-70yo)	260 (61-70yo)		
≥70 years old	350 (80+yo)	320 (80+yo)	420	320	240	210	280 (≥71yo)	240 (≥71yo)	320	260
Pregnancy										
1st trimester	-	+0	-	+40 (14-50yo)	-	+0	-	+30	-	+40
2nd trimester	-	+0	-	+40 (14-50yo)	-	+0	-	+30	-	+40
3rd trimester	-	+0	-	+40 (14-50yo)	-	+0	-	+30	-	+40
Lactation		+0								
1st 6 months	-	+0	-	+0 (14-50yo)	-	+50	-	+0	-	+0
2nd 6 months	-	+0	-	+0 (14-50yo)	-	+50	-	+0	-	+0

mths: months; yo: years old
†Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding
‡Adequate intake
Malaysia pregnancy – in addition to the value of the same age group

Table 32. RDAs/RNIs for chromium (µg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*‡		*Philippines*†		*Thailand*‡		*Vietnam*‡	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants					-	-				
0-5 months	0.2§		0.2 (0-6mths)				Breast milk		0.2	
6-11 months	6		5.5 (7-12mths)				5.5		5.5	
Children					-	-				
1-3 years old	14		11				11 (1-3yo)		11 (1-2yo)	
4-6 years old	16						15 (4-5yo)		15 (3-5yo)	
7-9 years old	21		15 (4-8)				15 (6-8yo)		15 (6-7yo)	
									25 (8-9yo)	21 (8-9yo)
Adolescent					-	-				
10-12 years old	28	26	25 (9-13)	21 (9-13)			25 (9-12yo)	21(9-12yo)	25 (10-11yo)	21 (10-11yo)
13-15 years old	36	27	35 (14-18)	24 (14-18)			35 (13-15yo)	24 (13-15yo)	25 (12-14yo)	21 (12-14yo)
16-18 years old	41	29					35 (16-18yo)	24 (16-18yo)	35 (15-17yo)	24 (15-17yo)
Adult					-	-				
19-29 years old	36	30	35	25			35 (19-30yo)	25 (19-30yo)	35 (18-29yo)	25 (18-29yo)
30-49 years old	34	29	35 (30-50yo)	25 (30-50yo)			35 (31-50yo)	25 (31-50yo)	35	25
50-59 years old	29 (50-64yo)	24 (50-64yo)	30 (51-59yo)	20 (51-59yo)			30 (51-60yo)	20 (51-60yo)	30 (50-69yo)	20 (50-69yo)
Elderly					-	-				
60–69 years old	24 (65-80yo)	21 (65-80yo)	30	20			30 (61-70yo)	20 (61-70yo)		
≥70 years old	31 (80+yo)	19 (80+yo)	30	20			30 (≥71yo)	20 (≥71yo)	30	20
Pregnancy					-	-				
1st trimester	-	+5	-	+5 (14-50yo)			-	+5	-	+4
2nd trimester	-	+5	-	+5 (14-50yo)			-	+5	-	+4
3rd trimester	-	+5		+5 (14-50yo)			-	+5	-	+4
Lactation			-		-	-				
1st 6 months	-	+20	-	+20 (14-50yo)			-	+20	-	+20
2nd 6 months	-	+20	-	+20 (14-50yo)			-	+20	-	+20

mths: months; yo: years old
†No recommendations for chromium
‡Adequate intake
§Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding

amount of +20 µg/day, which is four times higher than the additional amount recommended during pregnancy.

Copper

Table 33 lists the recommended copper intake values by Indonesia, Malaysia, Thailand and Vietnam. No recommended intake values for copper are provided by Philippines. Thailand uses AI values for copper intake recommendations for all age groups, while Malaysia and Vietnam use AI values only for the recommendations for infant groups. Of the four countries, the majority (Indonesia, Malaysia and Vietnam) shared similar recommendations across all age groups, with the amounts recommended increasing with age (200-220 µg/day for infants, 340-700 µg/day for children, 700-890 µg/day for adolescent, 900 µg/day for adult and elderly). There are also no sex differences in the recommendations of these countries. Compared to the recommendations by the other three countries, the provisions by Thailand are higher for all age groups as, ranging from 400 µg/day for infant, 700-1000 µg/day for children, 1000-1300 for adolescent, and 1300-1600 µg/day for adults and elderly. There are also notable differences in Thailand's recommendations for groups aged 11 years and above in which the recommended intake values provided for males are considerably higher than those provided for females. All four countries recommend additional copper intake for pregnant and lactating women, with Vietnam providing an additional amount of +200 µg/day. Recommendations by Indonesia, Malaysia and Vietnam are rather different. The amount recommended for these three countries for pregnancy is 100-110 µg/day, whereas during lactation, the amount recommended is four times higher, at +400 µg/day.

Manganese

There are no recommendations for manganese intake in the Philippines. Malaysia, Thailand and Vietnam use AI values for manganese intake recommendations for all age groups. Table 34 shows that Indonesia, Malaysia and Vietnam generally provide similar manganese recommendations for most age groups. For infants and children, male and female groups share the same recommendations except for children aged 8-9 years old in Vietnam where higher daily amount of manganese is recommended for males (1.8 mg/day) than females (1.6 mg/day). On the other hand, Thailand has lower manganese intake recommendations for infants aged ≥6 months and children (0.4-1.1 mg/day) as compared to the similar age groups of the other three countries (0.6-1.9 mg/day). For adolescents, adults and elderly, the recommendations for males (1.9-2.3 mg/day) are slightly higher than for females (1.6-1.8 mg/day) in Indonesia, Malaysia and Vietnam. Thailand has the highest manganese recommendation for the 16-18 years group (2.5 mg/day) and remained the same for adults and elderly groups. There are also no differences in Thailand's recommendations according to sex. While there are no additional manganese recommendations for pregnancy and lactation by Thailand, the other three countries respectively recommend +0.2 mg/day for pregnancy and +0.8 mg/day for lactation. The same recommendations are provided for teenage pregnancy in Malaysia (14-18 years group).

Fluoride

Table 35 presents the recommendations for fluoride by country. No recommendations for fluoride intake is provided by Thailand. AI is used for fluoride intake recommendations in Malaysia, Philippines and Vietnam. In

Table 33. RDAs/RNIs for copper (μg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*		*Philippines*		*Thailand*[†,‡]		*Vietnam*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants					-	-				
0-5 months	200[§]		200[‡] (0-6mths)				Breast milk		200[‡] (0-5mths)	
6-11 months	220		220[‡] (7-12mths)				400		220[‡] (6-8mths) 220[‡] (9-11mths)	
Children					-	-				
1-3 years old	340		340				700 (1-3yo)		340 (1-2yo)	
4-6 years old	440		440 (4-8yo)				1000 (4-5yo)		440 (3-5yo)	
7-9 years old	570						1000 (6-8yo)		440 (6-7yo) 700 (8-9yo)	
Adolescent					-	-				
10-12 years old	700		700 (9-13yo)				1000 (9-10yo) 1300 (11-12yo)	1000 (9-10yo) 1100 (11-12yo)	700 (10-11yo)	
13-15 years old	795		890 (14-18yo)				1300	1100	700 (12-14yo)	
16-18 years old	890						1300	1100	890 (15-19yo)	
Adult					-	-				
19-29 years old	900		900				1600 (19-30yo)	1300 (19-30yo)	900 (20-29yo)	
30-49 years old	900		900 (30-50yo)				1600 (31-50yo)	1300 (31-50yo)	900	
50-59 years old	900 (50-64yo)		900 (51-59yo)				1600 (51-60yo)	1300 (51-60yo)	900 (50-69yo)	
Elderly					-	-				
60–69 years old	900 (65-80yo)		900				1600 (61-70yo)	1300 (61-70yo)		
≥70 years old	900 (80+yo)		900				1600 (≥71yo)	1300 (≥71yo)	900	
Pregnancy					-	-				
1st trimester	-	+100	-	+110 (14-18yo) +100 (19-50yo)			-	+200	-	+100
2nd trimester	-	+100	-	+110 (14-18yo) +100 (19-50yo)			-	+200	-	+100
3rd trimester	-	+100	-	+110 (14-18yo) +100 (19-50yo)			-	+200	-	+100
Lactation					-	-				
1st 6 months	-	+400	-	+410 (14-18yo) +400 (19-50yo)			-	+200	-	+400
2nd 6 months	-	+400	-	+410 (14-18yo) +400 (19-50yo)			-	+200	-	+400

mths: months; yo: years old
[†] mg/day Thailand: Recommendations given in mg/day; the values are converted to μg/day for comparison
[‡]Adequate intake
[§]Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding

Table 34. RDAs/RNIs for manganese (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*†		*Philippines*		*Thailand*†		*Vietnam*†	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants					-	-				
0-5 months	0.003‡		0.003 (0-6mths)				Breast milk		0.003	
6-11 months	0.7		0.6 (7-12mths)				0.4		0.6 (6-8mths) 0.6 (9-11mths)	
Children					-	-				
1-3 years old	1.2		1.2				0.6 (1-3yo)		1.2 (1-2yo)	
4-6 years old	1.5		1.5 (4-8yo)				0.8 (4-5yo)		1.5 (3-5yo)	
7-9 years old	1.7						1.1 (6-8yo)		1.5 (6-7yo)	
									1.9 (8-9yo)	1.6 (8-9yo)
Adolescent					-	-				
10-12 years old	1.9	1.6	1.9 (9-13yo)	1.6 (9-13yo)			1.6 (9-12yo)		1.9 (10-11yo)	1.6 (10-11yo)
13-15 years old	2.2	1.6	2.2 (14-18yo)	1.6 (14-18yo)			2.2 (13-15yo)		1.9 (12-14yo)	1.6 (12-14yo)
16-18 years old	2.3	1.8					2.5 (16-18yo)		2.2 (15-19yo)	1.6 (15-19yo)
Adult					-	-				
19-29 years old	2.3	1.8	2.3	1.8			2.5 (19-30yo)		2.3 (20-29yo)	1.8 (20-29yo)
30-49 years old	2.3	1.8	2.3 (30-50yo)	1.8 (30-50yo)			2.5 (31-50yo)		2.3	1.8
50-59 years old	2.3 (50-64yo)	1.8 (50-64yo)	2.3 (51-59yo)	1.8 (51-59yo)			2.5 (51-60yo)		2.3 (50-69yo)	1.8 (50-69yo)
Elderly					-	-				
60–69 years old	2.3 (65-80yo)	1.8 (65-80yo)	2.3	1.8			2.5 (61-70yo)			
≥70 years old	2.3 (80+yo)	1.8 (80+yo)	2.3	1.8			2.5 (≥71yo)		2.3	1.8
Pregnancy					-	-				
1st trimester	-	+0.2	-	+0.4 (14-18yo) +0.2 (19-50yo)			-	+0	-	+0.2
2nd trimester	-	+0.2	-	+0.4 (14-18yo) +0.2 (19-50yo)			-	+0	-	+0.2
3rd trimester	-	+0.2	-	+0.4 (14-18yo) +0.2 (19-50yo)			-	+0	-	+0.2
Lactation					-	-				
1st 6 months	-	+0.8	-	+1.0 (14-18yo) +0.8 (19-50yo)			-	+0	-	+0.8
2nd 6 months	-	+0.8	-	+1.0 (14-18yo) +0.8 (19-50yo)			-	+0	-	+0.8

mths: months; yo: years old
† Adequate intake
‡ Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding

Table 35. RDAs/RNIs for fluoride (mg/day) in SEA countries

Age group	*Indonesia*		*Malaysia*‡		*Philippines*‡		*Thailand*†		*Vietnam*‡	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants							-	-		
0-5 months	0.01§		0.01 (0-6mths)		0.01				0.01	
6-11 months	0.5		0.5 (7-12mths)		0.5	0.4			0.5 (6-8mths) 0.5 (6-8mths)	
Children							-	-		
1-3 years old	0.7		0.7 (1-3yo)		0.6 (1-2yo)				0.7 (1-2yo)	
4-6 years old	1.0		1.0 (4-8yo)		0.9 (3-5yo)				1 (3-5yo)	
7-9 years old	1.4				1.2 (6-9yo)	1.1 (6-9yo)			1 (6-7yo) 2 (8-9yo)	
Adolescent							-	-		
10-12 years old	1.8	1.9	2.0 (9-13yo)		1.7	1.8			2 (10-11yo)	
13-15 years old	2.5	2.4	3.0 (14-18yo)		2.4	2.3			2 (12-14yo)	
16-18 years old	4.0	3.0			3.0	2.6			3 (15-19yo)	
Adult							-	-		
19-29 years old	4.0	3.0	4.0	3.0	3.0	2.6			4 (20-29yo)	3 (20-29yo)
30-49 years old	4.0	3.0	4.0 (30-50yo)	3.0 (30-50yo)	3.0	2.6			4	3
50-59 years old	4.0 (50-64yo)	3.0 (50-64yo)	4.0 (51-59yo)	3.0 (51-59yo)	3.0	2.6			4 (50-69yo)	3 (50-69yo)
Elderly							-	-		
60–69 years old	4.0 (65-80yo)	3.0 (65-80yo)	4.0	3.0	3.0	2.6				
≥70 years old	4.0 (80+yo)	3.0 (80+yo)	4.0	3.0	3.0	2.6			4	3
Pregnancy							-	-		
1st trimester	-	+0	-	+0 (14-50yo)	-	+0			-	+0
2nd trimester	-	+0	-	+0 (14-50yo)	-	+0			-	+0
3rd trimester	-	+0	-	+0 (14-50yo)	-	+0			-	+0
Lactation			-				-	-		
1st 6 months	-	+0	-	+0 (14-50yo)	-	+0			-	+0
2nd 6 months	-	+0	-	+0 (14-50yo)	-	+0			-	+0

mths: months; yo: years old
†No recommendations for fluoride
‡Adequate intake
§Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding

general, there are no great variations in fluoride recommendation of Indonesia, Malaysia and Vietnam for infants (0.01-0.5 mg/day), children (0.7-2.0 mg/day), adults and elderly (3-4 mg/day) groups. Philippines fluoride's recommendations for children (0.6-1.2 mg/day), adults and elderly (2.6-3.0 mg/day) groups are generally lower as compared to the other countries. Considerable differences in recommendations for adolescents are observed among the countries. Recommendations for male are slightly higher than those for female adolescents for Indonesia and Philippines while male and female adolescents in Malaysia and Vietnam share the same recommendations. None of the four countries recommend additional fluoride intake during pregnancy and lactation.

Chloride

Of the five countries studied, only Malaysia has no provision for chloride intake recommendations. Notable differences are observed for the chloride recommendations in the other four countries and the way the recommendations are presented (Table 36). While Thailand provides a chloride-adequate intake range for each age group, Vietnam uses AI and/or dietary goals for chloride intake recommendations for different age groups. For infants aged 6-11 months, Vietnam has the highest chloride recommendations with the recommended adequate intake values triple that of Philippines and double that of Indonesia and Thailand. For children, adolescents, adults and elderly, Indonesia has recommendations that are 2-3 times higher than those provided by Philippines and Thailand. On the other hand, Vietnam sets dietary goals of <1300-<2300 mg/day for children and <2800-<2900 mg/day for adolescents. Both adequate intake amount of 900 mg/day and a dietary goal of <2900 mg/day are provided for adults and elderly in Vietnam. Only Thailand has provided additional chloride intake recommendations for pregnancy and lactation, the intakes recommended range from +100 to +200 mg/day for pregnancy and +175 to +350 mg/day for lactation.

Molybdenum

Only Malaysia and Thailand provide RDA/RNI values for molybdenum; whereas AI is used for the recommendations for infants in Malaysia (Table 37). In both countries, there are no differences in recommendations according to sex for all age groups. The recommended intake values by Thailand are higher than those provided by Malaysia for infants, adolescents, adult and elderly groups. For infants age 6-11 months, the recommended intake value by Thailand (10 µg/day) is triple that of Malaysia (3 µg/day). Thailand has slightly lower molybdenum intake recommendations for children aged 1-5 years old (15-20 µg/day) as compared to the similar age groups of Malaysia (17-22 µg/day). The recommendations by both countries increase with age, with the highest recommendations for adolescents aged 16-18 and remained the same for adults and elderly groups. This highest recommended values are higher in Thailand (55 µg/day) than in Malaysia (45 µg/day). Only Malaysia listed additional molybdenum intake for pregnancy and lactation, i.e. +5 µg/day throughout pregnancy and lactating period for adults and +7 µg/day throughout pregnancy and lactating period for teenagers aged 14-18 years old.

DISCUSSION

Establishment of recommended nutrient intakes in SEA countries

The nutrition scene in the SEA has indeed changed dramatically over the

Table 36. RDAs/RNIs for chloride (mg/day) in SEA countries

Age group	Indonesia		Malaysia†		Philippines‡		Thailand‡		Vietnam	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Infants			-	-						
0-5 months	180§				180		Breast milk		150‡	
6-11 months	570				300		275-550		900‡ (6-8mths), 900‡ (9-11mths)	
Children			-	-						
1-3 years old	1200				350 (1-2yo)		350-700 (1-3yo)		<1300¶ (1-2yo)	
4-6 years old	1300				500 (3-5yo)		450-900 (4-5yo)		<1600¶ (3-5yo)	
7-9 years old	1500				600 (6-9yo)		500-975 (6-8yo)		<1900¶ (6-7yo) <2300¶ (8-9yo)	
Adolescent			-	-						
10-12 years old	1900	2100			750		600-1200 (9-12yo)	550-1125 (9-12yo)	<2800¶ (10-11yo)	
13-15 years old	2300	2300			750		750-1500 (13-15yo)	625-1250 (13-15yo)	<2900¶ (12-14yo)	
16-18 years old	1500	2400			750		825-1650 (16-18yo)	650-1300 (16-18yo)	<2900¶ (15-19yo)	
Adult			-	-						
19-29 years old	2250				750		750-1500 (19-30yo)	600-1225 (19-30yo)	900‡; <2900¶ (20-29yo)	
30-49 years old	2250				750		725-1475 (31-50yo)	600-1225 (31-50yo)	900‡; <2900¶	
50-59 years old	2100 (50-64yo)				750 (50-59yo)		725-1475 (51-60yo)	600-1225 (51-60yo)	900‡; <2900¶ (50-69yo)	
Elderly			-	-						
60–69 years old	1900 (65-80yo)				750		725-1475 (61-70yo)	600-1225 (61-70yo)		
≥70 years old	1600 (80+yo)				750		600-1225 (≥71yo)	600-1075 (≥71yo)	900‡; <2900¶	
Pregnancy			-	-	-	-			-	-
1st trimester	-	+0					-	+0		
2nd trimester	-	+0					-	+100-200		
3rd trimester	-	+0					-	+100-200		
Lactation			-	-	-	-			-	-
1st 6 months	-	+0					-	+175-350		
2nd 6 months	-	+0					-	+175-350		

mths: months; yo: years old
†No recommendations for chloride
‡Adequate intake
§Fulfilment of the nutritional needs of infants 0-5 months comes from exclusive breastfeeding
¶Dietary goals

Table 37. RDAs/RNIs for molybdenum (µg/day) in SEA countries

Age group	*Indonesia*†		*Malaysia*‡		*Philippines*†		*Thailand*‡		*Vietnam*†	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Infants	-	-			-	-			-	-
0-5 months			2 (0-6mths)				Breast milk			
6-11 months			3 (7-12mths)				10			
Children	-	-			-	-			-	-
1-3 years old			17 (1-3yo)				15 (1-3yo)			
4-6 years old			22 (4-8yo)				20 (4-5yo)			
7-9 years old							25 (6-8yo)			
Adolescent	-	-			-	-			-	-
10-12 years old			34 (9-13yo)				35 (9-12yo)			
13-15 years old			43 (14-18yo)				50 (13-15yo)			
16-18 years old							55 (16-18yo)			
Adult	-	-			-	-			-	-
19-29 years old			45				55 (19-30yo)			
30-49 years old			45 (30-50yo)				55 (31-50yo)			
50-59 years old			45 (51-59yo)				55 (51-60yo)			
Elderly	-	-			-	-			-	-
60–69 years old			45				55 (61-70yo)			
≥70 years old			45				55 (≥71yo)			
Pregnancy	-	-			-	-			-	-
1st trimester			-	+7 (14-18yo) +5 (19-50yo)			-	+0		
2nd trimester			-	+7 (14-18yo) +5 (19-50yo)			-	+0		
3rd trimester			-	+7 (14-18yo) +5 (19-50yo)			-	+0		
Lactation	-	-			-	-			-	-
1st 6 months			-	+7 (14-18yo) +5 (19-50yo)			-	+0		
2nd 6 months			-	+7 (14-18yo) +5 (19-50yo)			-	+0		

mths: months; yo: years old
†No recommendations for molybdenum
‡Adequate intake

decades. Countries in the region have made substantial economic growth and seen improvements in food and nutrition security over the past decades. However, this progress has not brought equitable or uniform outcomes among different groups within the countries. Individuals and families in these countries are still facing economic, physical, social and cultural barriers to consuming nutritious diets and accessing adequate health and nutrition services (ASEAN/UNICEF/WHO, 2016; ASEAN, 2022). While the prevalence of undernutrition, vitamin and mineral deficiencies are declining gradually, there is a significant rise in overweight and obesity across many age groups, as well as the associated increase in NCDs (WHO, 2022). This double burden of malnutrition that is increasingly existing side by side across countries in the region has highlighted to the countries the importance of developing appropriate recommendations for energy and nutrient intake to the population. These have become vital tools for various food and nutrition activities of countries in the region, including assessing adequacy or potentially excessive intakes of energy and nutrients.

The availability of the recommended intake documents in the five SEA countries studied demonstrate that these countries recognise the need for such recommendations. The development of such documents in these countries have started decades ago, with the earliest dating from 1941 (Philippines) with close to eight decades of history. The recommended intake documents of these countries have all undergone revision periodically (every 5 to 10 years) as the countries recognise the continuous changes in scientific knowledge and the need to keep them updated in the light of the most up-to-date scientific evidence. Thus, the five current documents used in this review are all relatively recent, with most published in or after 2016.

Comparing recommended energy and nutrient intakes

Examining the recommended intake documents of the five countries it can be observed that there are several similarities in their essential attributes. Firstly, these documents have been published by nutrition and health authorities in the respective country through an extensive review process. Four out of five countries share a similar format of publication i.e. as a multi-chapter monograph with similar chapters providing detailed information for each nutrient). The exception is Indonesia's document, which was published as a government gazette with less background information. It is also noted that these official recommended intake documents serve similar uses by multi-stakeholders in the respective country. These documents also show similarities in concepts and definitions used to establish recommendations on nutrient intakes (e.g. RNI, RDA, AI, EAR, UL).

While all five countries' recommended energy and nutrient intakes values covered all ages in the entire life cycle, the age groups adopted differ among countries, especially for the children, adolescents and elderly groups. This is due to differences in defining population groups among these countries. However, the derivation of the age groupings is not clearly described in the publication of most of these countries; only Philippines describes the rationale for each of the age groups defined. In the meantime, the reference weight and height for adults adopted by these countries are largely different as countries make use of the average height data obtained from the national nutrition surveys in deriving the reference weight used. On the other

hand, in terms of the reference weight used for children and adolescents, most countries referred to the WHO child growth standard and WHO growth reference.

The nutrients covered in the documents of the five countries are strikingly similar. All countries provide recommendations for macronutrient energy, protein, carbohydrate and fats. Out of the 14 vitamins included in this review, 11 of them (vitamin B1, vitamin B2, vitamin B3, vitamin B6, vitamin B9, vitamin B12, vitamin C, vitamin A, vitamin D, vitamin E and vitamin K) are in all countries' recommendations. For minerals, nine (calcium, iron, iodine, zinc, selenium, phosphorus, sodium, potassium, magnesium) out of the 15 included in this review are covered by all five countries. Nutrients that are included in the recommendation by four out of five countries include vitamin B5, chromium, copper, manganese, fluoride and chloride. Only two vitamins (biotin and choline) are covered by three countries whereas the mineral molybdenum is covered by two countries. Among the five countries in this review, only Indonesia and Philippines provide recommended intake values for water.

Approaches and references for recommended nutrients

The approaches and references used as the basis for the development of the recommended intake levels also show remarkable similarities where most countries referred to/adopted recommendations from similar international research organisations e.g. WHO/FAO, IOM and EFSA. However, it is observed that the final recommendations of the intake levels for the nutrients are different among the five countries, some with notable differences i.e. energy, protein, vitamin C, vitamin E, calcium, selenium, potassium. These could be due to adjustment to suit local situations, physiological requirements, the differences in the final references adopted, reference weight and height used as well as the protein quality in the diet of the respective population. The differences between the final recommendations could also be due to the varying age groups defined after the infancy period, especially the different sub-age groups used for children and adolescents, where the available data on requirements were extrapolated for different ages.

In addition, it is noted that different parameters (i.e. RNI, RDA, AI) have been used by the countries for nutrient recommendations. For majority of the nutrients, countries use mostly RNI/RDA, i.e. intakes that meet the nutrient requirement of almost all apparently healthy individuals. However, for some nutrients or certain age groups, AI is used. For example, Indonesia's document Regulation of the Minister of Health Concerning the Nutritional Adequacy Values for Indonesian Population provides RDA values for all the nutrients covered in the decree and indicates that the nutritional needs of infants 0-5 months for all nutrients are to be met by exclusive breastfeeding. In Malaysia RNI 2017, RNI is used for all nutrients except vitamin B5, sodium, chromium, manganese and fluoride where AI is used. AI is also used for calcium, magnesium, copper and molybdenum intake recommended for infants (0-12 months).

In Philippines' DRIs 2015, while RNI is used for most of the nutrients, AI is used for vitamin D, vitamin E, sodium, potassium, fluoride and chloride, as well as for recommended intake of certain nutrients for infants aged 0-5 months (vitamin A, vitamin B1, vitamin B2, vitamin B3, calcium, iron, zinc) and infants aged 0-11 months (vitamin B6,

vitamin B9, vitamin B12, vitamin C, phosphorus and magnesium).

In the DRIs for Thai 2020, AI is used for recommended intake of vitamin K, vitamin B5, biotin, choline, calcium, iodine, sodium, potassium, chromium, copper, manganese, chloride and molybdenum, and for all nutrients recommended for infants except vitamin A, vitamin B9, vitamin C, vitamin E, iron and zinc where RDA is used for the recommended amounts for infants. Thai DRI indicates that in all aged groups, AI for nutrients is expected to be higher than RDA (MOPH Thailand, 2020).

Vietnam's 2015 nutritional requirements recommendation uses RDA for most of the nutrients. AI is used for vitamin E, vitamin K, biotin, choline, potassium, chromium, manganese, fluoride and chloride. The recommended intake levels of certain nutrients for infants (0-12 months) are also provided in AI, i.e. vitamin A, vitamin B1, vitamin B2, vitamin B6, vitamin B12, vitamin C, iodine, sodium and copper. AI is also used for protein recommended for infants aged 0-5 months.

Data for establishing national nutrient intake recommendations

As observed in this review, most of the nutrient recommendations in the countries in the review are based on RNI or RDA. The definition of RNI/RDA by most countries, as indicated in Table 1, is that, these are set at EAR plus 2 standard deviations (SD), which meets the nutrient requirement of almost all apparently healthy individuals (97-98%) in an age- and sex-specific population group. Allen, Carriquiry & Murphy (2020) and Yaktine, King & Allen (2020) have pointed out that since these covers almost all individuals, these are not appropriate indicators to assess the prevalence of inadequate nutrient intakes of population groups as they tend to give rise to overestimates of inadequacy. It was further suggested that in order to accurately evaluate the adequacy and safety of population level nutrient intakes, average requirement (AR) and UL for the population are to be used. It was also pointed out that many countries, regions, and organisations cannot afford the cost or time to revise their current recommendations or develop new values for ARs and ULs. We have also pointed out that countries in this review do not have the resources to establish such reference intake levels.

The review has indicated that the five countries had intended that the recommended energy and nutrient intakes to be developed using evidence-based approaches. However, these countries have been faced with the same concern of limited local research data available on nutrient requirements and the relations between diet and health in SEA population. Thus, for the five countries in this review, the general principle for developing national recommendations for energy and nutrients and the recommended intakes were mainly based on recommendations of several internationally renowned research organisations.

The earlier review by Tee (1998) has also reported that nutrient recommendations for most countries were not based on sufficient experimental data. There were no resources and expertise to carry out extensive experimental studies to establish nutrient requirements for various population groups. It was therefore necessary for these countries to make use of data from other countries as well as from international recommendations and adapt them to local situations.

This situation has also been pointed out in the FAO/WHO review of the recommended vitamin and minerals intake values of 55 countries (FAO/WHO, 2011). The report was made available for discussions at the 33rd Session of

the Codex Committee on Nutrition and Foods for Special Dietary Uses in 2011 for the agenda on establishing Nutrient Reference Values for nutrition labelling purposes. In reviewing the information obtained for 28 vitamins and minerals from these countries, it was reported that only a few national sets of recommended nutrient intake values were based on a country's primary analysis of scientific data. It was pointed out that many intake values for the same nutrient had the same basis and same value. The report pointed out that some countries wholly or partially select or adapt their national recommended nutrient intake values from other well-documented reference sources. The most commonly used reference source by countries was the FAO/WHO (2004) recommended nutrient intake as well as several publications of IOM and EFSA. A few SEA countries could have established their own requirements data for a few nutrients through local research. However, it was acknowledged that establishing own national recommended intake values is expensive and tedious undertakings and would require scientific expertise.

Harmonisation of recommended nutrient intakes

Having a set of harmonised recommended nutrient intake has been deemed to be beneficial to SEA countries as it provides a common framework that can help countries in reviewing respective recommendations, and better extrapolate or modify existing recommendations to meet their populations' specific requirements. Harmonised recommended nutrient intakes will also form a common basis for countries in SEA to facilitate public health improvement, public understanding of health and diet issues, consumer education as well as facilitating trade in the region (Tee & Florentino, 2005; Pavlovic *et al.*, 2007; Barba & Cabrera, 2008). In this regard, some initiatives have been made.

The ILSI SEA Region organised a series of six workshops and a working group meeting between 1997 and 2003 among nutrition scientists working in the area of recommended nutrient intakes. The meetings aimed to facilitate countries and government agencies to update national nutrient recommendations based on the latest science and the utilisation of national data. Participants to these meetings included country representatives from Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam, as well as other international and regional nutrition experts and regulators. The series of meetings culminated in the publication of a harmonised set of RDAs which can be used as references by the Southeast Asian countries (Tee & Florentino 2005). The monograph, covering 14 selected core nutrients jointly prepared by several SEA countries representatives, was to serve as a reference for countries in formulating and revising respective national RDAs. Nevertheless, it can be noted that the monograph by ILSI on harmonised RDAs for SEA countries was also based heavily on the FAO/WHO Expert Consultation on RNIs for vitamins and minerals (WHO/FAO, 2004) and several IOM reports.

There have been other efforts on harmonisation of recommended nutrient intake values. King & Garza (2007) co-chairs of the Working Group on International Harmonization of Approaches for Developing Nutrient-Based Dietary Standards explained that the working group was organized to convened to harmonise concepts and approaches (rather than deriving specific recommendations) for developing recommended nutrient intake values. This Working Group was organised by the United Nations University's Food and

Nutrition Programme, in collaboration with the FAO, WHO, and UNICEF. The reasons given for this proposed harmonization include providing a common basis for the use of nutrient intake values across countries, regions, and across the globe which will enable the establishment of public health objectives, food and nutrition policies including for addressing regulatory and trade issues. The Working Group also felt that the harmonisation will enable developing countries which often have limited resources to develop nutrient intake values for their populations and other activities. This is an issue we highlighted above. The Group recommended the development of nutrient intake values (NIVs) framework which is conceptually similar to DRI and dietary reference value (DRV).

A follow-up workshop to explore achieving global harmonization of methodological approaches to establishing recommended nutrient intake values was organised in 2017 by the FNB of the National Academies of Sciences, Engineering, and Medicine (NASEM), in partnership with the Department of Nutrition for Health and Development of the WHO and the Nutrition Division of the FAO (Pray & Yatkine, 2018). The goal of the workshop is to deliberate on ways to provide a uniform and consistent basis for setting nutrient intake recommendations across countries while accommodating culturally and context-specific food choices and dietary patterns.

Yaktine *et al.* (2020) reiterated the importance of defining, on a global scale, the methodological derivation of the core Nutrient Reference Values (NRVs), which can benefit countries globally regardless of their economic status. The report provided details of the NASEM workshop in 2017 and discussed approaches and made recommendations for the derivation of NRVs. The authors opined that awareness of the advantages of harmonization of the NRV process along with improvements in access for all countries to data needed to derive NRVs could transform the way many countries approach the challenge of developing NRVs.

Recognising the need for reference values that can be applied globally to assess intakes across populations, Allen *et al.* (2020) demonstrated an approach to harmonise published NRVs values, and a set of proposed harmonised ARs and ULs values (termed H-ARs and H-ULs) and the justification for the proposed values were documented in detail. The proposed H-ARs for 25 nutrients, and H-ULs for 19 nutrients may be used to assess intakes of populations for many applications in global and regional contexts. The H-ARs and H-ULs can be readily modified to meet regional or local needs, if the user prefers. It was pointed out that in the past, many countries have not had the resources or expertise to develop or publish the ARs and ULs that are needed. The authors proposed that the process presented may be able to assist countries such as these or other organisations to decide whether to accept, adapt, or revise these proposed recommendations rather than start a new, expensive, time-consuming process to derive new requirement and toxicity values. The authors suggested for an international group such as WHO/FAO to review the values proposed and modify as needed.

CONCLUSION

Moving forward, it is clear that relevant organisations and researchers in the region involved in this work would continue to update recommended nutrient intake values for their population. There would certainly be interest to obtain more appropriate recommended nutrient intake values

for more effective applications in food and nutrition programmes. Recognising the general similarities in the dietary pattern of population in the region, there could be closer collaboration among researchers in the region. Establishing a platform for the periodic sharing of experiences and views would be most beneficial. Consideration could be given to the above-summarised work by NASEM on establishing a harmonised approach to establishing recommended nutrient intake values.

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Authors' contributions

Tee ES, contributed to the conception of the study design, hypothesis generation, data management, data analysis, data interpretation, discussion, and initiating manuscript write-up; Florentino RF, Chongviriyaphan N, Hardinsyah R, Appukutty M and Mai TT, contributed to the data verification, data interpretation, discussion and literature review for each country respectively. All authors approved the final draft.

Conflict of interest

The authors declare that they have no conflicts of interest.

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