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Recommended daily dietary intakes for peninsular Malaysia

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INTRODUCTION

A dietary standard is a numerical expression, usually as a daily average, of quantities of certain nutrients believed to be needed by an individual assignable to one of the various categories into which a population may be divided for dietary purposes (Young, 1964). Other terms such as "recommended daily dietary allowances", "nutritional requirements", and "suggested daily dietary intakes" have been used to describe such a standard. In this paper, the term "recommended daily dietary intakes" will be used synonymously with "dietary standard".

Dietary standards are necessary yardsticks against which the diets of different segments of a community may be measured for study purposes. They can be used to advantage for planning agricultural food production. In times of social upheaval dietary standards are essential for the planning of food stockpiling and distribution when food rationing has to be instituted. Dietary standards are important to guide the formulation of diet scales for institution or for physicians to advise individual patients concerning dietary needs.

Dietary standards have evolved over a span of several decades. In 1950, when Burgess and Laidin A. Musa reported on the state of health, diet and the economic conditions of groups of people in the lower income levels in Malaya, the dietary standard used for their discussions on the adequacy of nutrient intakes was that recommended by the National Research Council, USA in 1948. In 1956, Millis used the recommendations of the Committee on Calorie Requirements Food and Agriculture Organisation of the United Nations (1950) to determine the energy requirements of the population in Singapore. Thomson in her study on child nutrition in Perak in 1959 used 'modified' (sic) recommended allowances from the Food and Nutrition Board of the National Research Council, USA (1954). In 1962, Recommended Daily Dietary Allowances - Malaya, based on the recommendations of the National Research Council, USA (1958) and the Food and Agriculture Organisation suggestions on Calcium requirements (1962) were worked out by the Institute for Medical Research in Kuala Lumpur. A further revision of these figures was made in 1964.

In 1969, a Technical Subgroup was formed consisting of representatives from the Public Health Institute, World Health Organisation, Institute of Medical Research and the writer from the Faculty of Medicine, University of Malaya, to advise on the dietary aspect of the then proposed applied nutrition pilot project. This Technical Subgroup worked out a new dietary standard for Malaysia based on various World Health Organisation recommendations published since 1964 (Chong, 1969).

New concepts and units have since been introduced and fresh recommendations have been promulgated by the World Health Organisation (WHO, 1970, 1973). In view of this development, a revision of the 1969 recommended dietary allowances is now necessary.

METHOD

Population

The table of recommended daily dietary intakes for residents of Peninsular Malaysia for 1973 (Table 1) itemizes eight distinct population groups viz: adult men, adult non-pregnant, non-lactating women, pregnant women, lactating women, infants, children, adolescent boys, and adolescent girls. These population groups are divided into suitable age subclassifications. For adults, men are assumed to have an average weight of 55 kilograms and women, (non-pregnant, non-lactating) 50 kilograms. This follows previous recommendations of the Institute for Medical Research (IMR, 1962) and the Technical Subgroup (1969).

Engery

The dietary standard for energy intakes have been calculated according to suggestions contained in a joint FAO/WHO report on energy and protein requirements (WHO, 1973). In these calculations, four factors which influence the need for energy by a particular individual are taken into consideration. These factors are body-size (as measured by body-weight), age, sex and physical activity. The factor of climate (as measured by environmental temperature) which was formerly (FAO, 1957) included in the calculations has been dropped as it was felt that it was not possible to quantify the effects of the environment just by temperature alone. Further, if physical activity is restructed by environmental factors, the category of activity should be adjusted rather than involving another factor.

The category of "moderate" physical activity was chosen as a representative category for the population though it must be stressed that individuals may vary widely. This moderate activity category includes most men in light industry, male building workers, many farm workers, fishermen and soldiers not on active service. It also includes women in light industry, housewives without mechanical household appliances, department store sales girls and students of both sexes (WHO, 1973). Other categories are "light activity" which includes office workers, teachers and other sedentary workers; "very active" which includes unskilled labourers, forestry, steel and mine workers, and atheletes, and "exceptionally active" including lumberjacks and heavy construction workers. Using the moderate activity category figures for energy requirements (shown in Table 1) as a reference point (Value = 100) the following conversion factors for the other categories may be used:

	men	women
Light activity	91.3	90.0
Moderate activity	100.0	100.0
Very active	117.3	117.5
Exceptionally active	134.7	137.5

No distinction for activity category is made for children up to the age of 19 years. Distinction into sexes is only made from the age of 10 years.

Units of suggested energy intakes in the dietary standard (Table 1) are given both in kilocalories as well as in Megajoules (MJ) following the International System of Units. One megajoule is equivalent to 239 kilocalories.

Protein

The dietary standard for protein has been obtained by utilising the recommendations of the joint FAO/WHO report on energy and protein requirements (WHO, 1973). In fixing the suggested intakes for protein, the quality of protein consumed is of much importance. The lower the quality, the larger the amount that has to be consumed to meet the needs of the body for protein. The quality of protein according to its essential amino acid composition of a given food can be expressed as a score. A score of 100 denotes an "ideal protein", which is closely approximated by the protein of whole egg. A score of 70 characterizes the quality of protein consumed in Malaysia which is a mixture of mainly vegetable protein with some animal protein. This parallels previous recommendations of the Institute of Medical Research (IMR, 1962) as well as that of the Technical Subgroup (1969) where the comparable Net Protein Utilisation (NPU) index value of 70 was used.

Calcium

Calcium intakes suggested in Table 1 follow the recommendations of a report on calcium requirements by an FAO/WHO expert group (WHO, 1962). Identical suggestions were made by the Institute of Medical Research (IMR 1962) and the Technical Subgroup (1969).

Table 1

SUGGESTED DAILY DIETARY INTAKES (1) - PENINSULAR MALAYSIA - 1973

	Age	Weight	Activity	Energy		Protein Score=70(3)	Ca	Fe (4)	Vit.A (Retinol)	Vit.D (5)	Thiamine	Ribo-flavin	Niacin Equiv	Folic Acid (6)	Vit.B_{12} (7)	Ascorbic Acid
	Years	Kg		Kcal	MJ(2)	g	mg	mg	mcg	mcg	mg	mg	mg	mcg	mcg	mg
ADULTS																
MEN	20 - 39	55	Moderate	2,530	10.6	45	450	9	750	2.5	1.0	1.5	16.7	200	2.0	30
	40 - 49	55	Moderate	2,400	10.0	45	450	9	750	2.5	1.0	1.4	15.8	200	2.0	30
	50 - 59	55	Moderate	2,280	9.5	45	450	9	750	2.5	0.9	1.4	15.0	200	2.0	30
	60 - 69	55	Moderate	2,020	8.5	45	450	9	750	2.5	0.8	1.2	13.3	200	2.0	30
	70+	55	Moderate	1,770	7.4	45	450	9	750	2.5	0.8	1.2	13.0	200	2.0	30
WOMEN	20 - 39	50	Moderate	2,000	8.3	37	450	28	750	2.5	0.8	1.2	13.0	200	2.0	30
	40 - 49	50	Moderate	1,900	7.9	37	450	28	750	2.5	0.8	1.2	13.0	200	2.0	30
	50 - 59	50	Moderate	1,800	7.5	37	450	9	750	2.5	0.8	1.2	13.0	200	2.0	30
	60 - 69	50	Moderate	1,600	6.7	37	450	9	750	2.5	0.8	1.2	13.0	200	2.0	30
	70+	50	Moderate	1,400	5.9	37	450	9	750	2.5	0.8	1.2	13.0	200	2.0	30
PREGNANCY	1st trimester			+ 150	+0.6	-	-	-	-	-	-	-	-	-	-	-
	2nd, 3rd trimester			+ 350	+1.5	+13	+750	-	-	+7.5	+0.2	+0.2	+2.3	+200	+1.0	+20
LACTATION	for 6 months			+ 550	+2.3	+24	+750	-	+450	+7.5	+0.2	+0.3	+3.6	+100	+0.5	+20
INFANTS	0 - 1			112 per kg/day	0.47 per kg/day	2.4 - 1.4 per kg/day	550	10	300	10.0	0.4	0.6	6.6	50	0.3	20
CHILDREN	1 - 3			1,360	5.7	23	450	10	250	10.0	0.5	0.8	9.0	100	0.9	20
	4 - 6			1,830	7.6	29	450	10	300	10.0	0.7	1.1	12.1	100	1.5	20
	7 - 9			2,190	9.2	35	450	10	400	2.5	0.9	1.3	14.5	100	1.5	20
BOYS	10 - 12			2,600	10.9	43	650	10	575	2.5	1.0	1.6	17.2	100	2.0	20
	13 - 15			2,450	10.3	53	650	18	725	2.5	1.0	1.5	16.2	200	2.0	30
	16 - 19			2,580	10.8	54	500	18	750	2.5	1.0	1.5	17.0	200	2.0	30
GIRLS	10 - 12			2,350	9.8	41	650	10	575	2.5	0.9	1.4	15.5	100	2.0	20
	13 - 15			2,200	9.5	45	650	24	725	2.5	0.9	1.3	14.5	200	2.0	30
	16 - 19			2,100	8.8	43	500	28	750	2.5	0.8	1.3	13.9	200	2.0	30

NOTES:

(1) Adapted from:
- a. Recommendations by PHI/WHO/IMR/UM Technical Subgroup, 1969.
- b. WHO: Tech. Rep. Series No. 230, Geneva, 1962.
- c. WHO: Tech. Rep. Series No. 301, Geneva, 1965.
- d. WHO: Tech. Rep. Series No. 362, Geneva, 1967.
- e. WHO: Tech. Rep. Series No. 452, Geneva, 1970.
- f. WHO: Tech. Rep. Series No. 522, Geneva, 1973.

(2) MJ = Megajoules

(3) Score - a term used to describe the quality of proteins on the basis of essential amino acid composition.

(4) Recommended intakes of iron based on absorption of iron under different dietary conditions. For Malaysia, absorption assumed to be 10%.

(5) Adequate exposure to sunlight may partially or totally replace dietary Vitamin D. No values for Vitamin D content of foods available in food composition tables for Malaysia.

(6) No values for Folic Acid content of foods yet available in food composition tables for Malaysia.

(7) No values for Vitamin B_{12} content of foods yet available in food composition tables to Malaysia.

Iron

Recommendations for iron intakes are based on a report of a joint FAO/WHO expert group (WHO, 1970) which related iron intake to the capability of absorption of iron by the human body. Absorption of iron has been found (WHO 1968) to be related to the composition of diets consumed. The diets containing a higher proportion of calories from foods of animal origin tend to promote better absorption. Studies in a rural area in Peninsular Malaysia (Teoh, 1969) showed that during festival days, foods of animal origin contributed 12.5 percent of the calorie intake whilst during non-festival days, this amounted only to 6.6 percent. According to the above report (WHO, 1970), this would allow only a 10 percent absorption of iron consumed. For rating purposes, this absorption rate is assumed and women are also taken to be menopausal by age 50 years.

Vitamin A

In considering the recommended daily dietary intakes for vitamin A, the recommendations of a joint FAO/WHO report (WHO, 1967) were followed. In view of the availability of crystalline vitamin A alcohol (retinol) as a standard, the practice of expressing vitamin A values in terms of international units (IU) was no longer deemed necessary. Thus, recommendations for intakes of vitamin A are given in terms of microgrammes of retinol (Table 1). A complicating feature in the statement of vitamin A intake is the possibility of consuming vitamin A from different sources. Animal sources give mainly retinol and vegetable sources furnish the less efficient provitamin beta-carotene which has to be converted by the human body into retinol a process involving losses. Diets in certain rural areas in Peninsular Malaysia derive more than 80 percent of their vitamin A from beta-carotene (Teoh, 1972). Urban diets of the higher socio-economic groups probably contain less from vegetable sources. Whatever the composition of sources of vitamin A in the diet, enough of the dietary mixture should be consumed to give an equivalent total activity of 750 microgrammes of retinol in the adult. If the diet contains a large proportion of the less efficient pro-vitamin, beta carotene, then a large amount has to be consumed so that ultimately, within the human body and after conversion, an equivalent activity of 750 microgrammes of retinol is available to an adult. The conversion factor given by the FAO/WHO report (WHO 1967) is:

1 microgramme of beta-carotene is equivalent to 0.167 microgramme of retinol.

Vitamin D

Recommendations for the dietary standards for vitamin D are based on the suggestions of a joint FAO/WHO report (WHO, 1970). Adequate exposure to sunlight, may however, partially or totally replace dietary vitamin D.

Thiamine, Riboflavin and Niacin

Values in the recommended daily dietary intakes (Table 1) for thiamine, riboflavin and niacin are based on a joint report of an expert FAO/WHO group (WHO, 1967). Since these vitamins are related to energy metabolism, recommendations for their dietary intakes are related to the suggestions for energy intakes. The following values were used in the compilation of the intake levels:

Thiamine	:	0.4 mg thiamine per 1000 kilocalories
Riboflavin	:	0.6 riboflavin per 1000 kilocalories
Niacin	:	6.6 mg niacin equivalents per 1000 kilocalories

Further, it was felt that previous recommendations (IMR, 1964 and Technical Subgroup, 1969) of certain minima for intakes of these vitamins be retained for the adult groups. These minimum values would operate when the suggested energy intake values for adults are below 2000 kilocalories. The minima (per day) may be stated as:

Thiamine	:	0.8 mg thiamine
Riboflavin	:	1.2 mg riboflavin
Niacin	:	13.0 niacin equivalents

It will be noted that recommendations for niacin are stated in 'niacin equivalents'. This acknowledges the ability of the human body to convert tryptophan into niacin. Thus the equivalent of 1 mg of niacin is 60 mg tryptophan.

Folate, B_{12} and Ascorbic Acid

Dietary standards for Folic acid, vitamin B_{12} and ascorbic acid are based on the recommendations of a joint FAO/WHO report (WHO, 1970).

USE OF DIETARY STANDARD

From the foregoing it is apparent that a table of recommended daily dietary intakes is calculated on the basis of certain assumptions. Fundamentally it represents current knowledge of the amounts of nutrients believed to be required by normal persons in order to maintain good health. It also incorporates within the values cited a "safety margin" in order to cover the "requirements" of about 95 percent (+ 2 standard deviations) of individuals in the population in their needs for particular nutrients). The recommendations are expected to change periodically as new knowledge about requirements of nutrients come to light. Thus the recommended intakes can only be used as a *guide* when applied to individuals or communities.

The recommended, daily dietary intakes are arranged in a table for ease of use. The values for pregnant and lactating women as given as additional amounts of nutrients "required ' which are to be added to the values for the non-pregnant and non-lactating state in the same age group. A dash (—) in these rows denote that no extra intakes are recommended.

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