

Medical Services

Nutrition Standards and Education

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Military Dietary Reference Intakes (MDRIs)

What: The MDRI Nutritional Standards are identical to recommended nutrient intakes set out by the Food and Nutrition Board, unless known differences in military populations require adjustment of particular nutrients. The MDRIs are intended for use by personnel involved in menu development, menu evaluation, nutrition education, nutrition research, and food research and development.

Where: The nutrition standards apply to the services' hospital food service programs, the services' food service programs, and the DOD Combat Feeding Program. Compliance with this regulation is required for **all food service operations**, whether government sources or contractors.

How: Nutritional standards should be met through a diverse diet including a variety of food groups. The MDRIs will be met when averaged over a 5- to 10-day period - they do not need to be met exactly every day.

Menu design will incorporate principles of the [Dietary Guidelines for Americans](#) (U.S. Departments of Agriculture and Health and Human Services) and the [Food Guide Pyramid](#) (U.S. Department of Agriculture). The nutrient composition of menus can be assessed with the [United States Department of Agriculture Nutrient Database](#).

Exceptions: The MDRIs do not reflect the needs of pregnant or lactating women or individuals requiring medical nutrition therapy in cases of illness, injury or trauma. Qualified medical professionals should assess these nutritional needs.

Certain conditions have special nutrition requirements not covered in this regulation (for example, when military members operate in protective clothing for prolonged periods of time). These conditions require consultation with TSG of the appropriate service(s).

Military Dietary Reference Intakes per day (MRDI)			
Nutrient		Men	Women
Energy (General, routine)	kcal/d	3250	2300
Protein	g/d	91 (63 - 119)	72 (50 - 93)
Vitamin A	µg RE/d ¹	1000	800
Vitamin D	µg/d ²	5	5
Vitamin E	mg/d ³	15	15
Vitamin K	µg/d	80	65
Vitamin C	mg/d	90	75
Thiamin (B ₁)	mg/d	1.2	1.1

Riboflavin (B ₂)	mg/d	1.3	1.1
Niacin	mg NE/d ⁴	16	14
Vitamin B ₆	mg/d	1.3	1.3
Folate	µg DFE/d ⁵	400	400
Vitamin B ₁₂	µg/d	2.4	2.4
Calcium	mg/d	1000	1000
Phosphorus	mg/d	700	700
Magnesium	mg/d	420	320
Iron	mg/d	10	15
Zinc	mg/d	15	12
Sodium	mg/d	5000 (4550-5525)	3600 (3220-3910)
Iodine	µg/d	150	150
Selenium	µg/d	55	55
Fluoride	mg/d	4.0	3.1
Potassium	mg/d	3200	2500

1. The unit of measure is microgram retinol equivalent (µg RE). µg RE=1 µg retinol or 6µg β-carotene. 1 µg RE=10 International Units (IU) vitamin A if from β- carotene. 1µg RE=3.33 IU vitamin A if from retinol.

2. As cholecalciferol. 1µg cholecalciferol=40 IU vitamin D.

3. The unit of measure is milligram α-tocopherol that includes RRR-α-tocopherol, the only form of α-tocopherol that is found in food and the 2R- stereoisomeric forms that are found in fortified foods and dietary supplements. This does not include the 2S-stereoisomeric forms that are also found in fortified foods and dietary supplements.

4. The unit of measure is niacin equivalent (NE). 1 mg NE=1 mg niacin or 60 mg dietary tryptophan.

The unit of measure is dietary folate equivalent (DFE). 1µg DFE=1 µg food folate, 0.5 µg synthetic folic acid taken on an empty stomach, or 0.6 µg synthetic folic acid taken with meals. Women capable of becoming pregnant should consume 400 µg of synthetic folic acid daily from fortified foods or supplements or a combination of both, in addition to food folate.

Personnel aged 17-18

Personnel aged 17 to 18 years old have higher calcium, phosphorus, magnesium (for women) and iron (for men) needs than the MRDIs indicate. Special attention should be given when serving meals to groups with high proportions of personnel 19 and under.

Nutrient	Recommended daily intake
Calcium	1300 mg/d
Phosphorus	1250 mg/d
Magnesium (women)	360 mg/d
Iron (men)	12 mg/d

Energy

The basic MDRIs are calculated based on the average or 50th percentile individual and general/moderate activity, operating in a temperate climate - these are the average values for average conditions and the starting point for all further calculations

MAN	WOMAN
174 lbs (79 kg)	136 lbs (62 kg)
69 inches (175 cm)	64 inches (163 cm)
3250 kcal/day	2300 kcal/day
41 kcal/kg body weight	37 kcal/kg body weight

Larger individuals will require more calories, smaller individuals will require less. The relative kcal/kg of body weight figure can be used to scale the energy requirements up and down based on individual size.

Weight Control

In support of military weight control programs, each military dining facility will offer reduced calorie menus. The menus should reflect the Food Guide Pyramid recommendations and should not contain more than 30% calories from fat.

Average personnel	High energy needs (e.g. initial entry trainees)
1500-1600 calories/day	1800 - 2100 calories/day
500 calories/meal	600-700 calories/meal

Physical Activity

Energy requirements go up and down with levels of physical activity. Military personnel doing heavy work or taking part in intense, vigorous physical trainings can have energy requirements greater than 125% of the routine MRDIs.

Activity	Male (kcal/day)	Female (kcal/day)
Light	3000	2200
Moderate	3250	2300
Heavy	3950	2700
Exceptionally heavy	4600	3150

Environmental Factors

Cold Environments

Personnel in cold environments have higher energy requirements. These increased energy requirements only apply to troops exposed to outdoor temperatures.

Mildly cold temperatures can increase requirements by up to 5-10%. Extreme cold temperatures such as those requiring the Extreme/Extended Cold Weather Clothing System, can increase requirements by up to 30%.

Using heavy gear (for example, snowshoes and skis) for cold temperature maneuvering for extended periods (2+ hours) also substantially increase energy requirements

Estimated calorie requirements for cold temperatures are listed here for average individual size and moderate activity level. Exact requirements will vary according to activity level, individual size and clothing.

Temperature	Man (kcal/day)	Woman (kcal/day)
Mild cold (32 - 57 °F)	3410 - 3575	2415 - 2530
Extreme cold (-60 and +40 °F)	Up to 4225 (54 kcal/kg body weight)	Up to 3000 (48 kcal/kg body weight)
Extreme cold maneuvering	Up to 4875 (62 kcal/kg body weight)	Up to 3450 (56 kcal/kg body weight)

Hot Environments

For temperature ranges of 68 to 86 °F (20 - 30 °C), no adjustment to energy requirements are necessary. For temperatures in the 86 to 104 °F (30 - 40 °C) range, energy requirements may increase from 2.5 - 10%.

Heat-acclimated individuals are not likely to experience increased energy requirements. Additionally, due to the tendency and need to rest more in hot environments, 24 hour energy requirements are likely to remain the same.

Estimated hot environment energy requirements for average-sized individual:

Activity (Hot Environment)	Male (kcal/day)	Female (kcal/day)
Light	3075 - 3300	2255 - 2420
Moderate	3330 - 3575	2360 - 2530
Heavy	4050 - 4345	2765 - 2970
Exceptionally heavy	4715 - 5060	3230 - 3465

Altitude

Energy requirements for high-altitude operations (over 10 000 feet or 3050 meters) are substantially increased. Extremely strenuous cold-weather, high-altitude operations may reach energy requirements of 6000-7000 calories/day.

High altitudes can cause moderate to severe loss of appetite among personnel. Combined with the increased energy requirements, maintaining lean body mass requires conscious effort and may require a disciplined food and water intake program.

Estimated energy requirements for average sized individuals at high altitude:

High Altitude	Man (kcal/day)	Woman (kcal/day)
Moderate Activity	3950- 4345 (50-55 kcal/kg body weight)	3100 - 3410 (50-55 kcal/kg body weight)
Strenuous cold weather activity.	Up to 4740 (60 kcal/kg body weight)	Up to 3720 (60 kcal/kg body weight)

Macronutrients

Carbohydrates

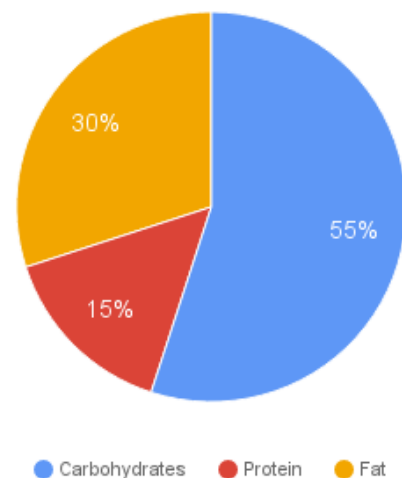
Approximately 50 - 55% of total calories consumed should come from carbohydrate sources.

Protein

The recommended protein levels are between 0.8 - 1.5 g of protein per kg of bodyweight. The recommended range is 63 - 119 g/day for men and 50 - 93 g/day for women.

The MRDI for protein is easily met when 10-15% of total calories come from protein with adequate energy intake.

Military personnel undergoing strenuous training or activity should aim for the higher end of the recommended range.



Fat

30% or less of total calories should come from fat, with 10% or less coming from saturated fat. Cholesterol levels are recommended to be kept under 300 mg/day.

For operational and restricted rations, higher percentages of total calories may come from fat to increase calorie density and minimize ration weight.

Beverages

Avoiding dehydration is essential to maintaining optimum performance. In average conditions, cool water is the beverage of choice. **Flavored waters** can increase voluntary water consumption among personnel.

Fluid requirements increase with altitude, activity levels and temperature as sweat is produced. Drinking schedules may fail to match water losses and must be mitigated with management of other factors that affect heat gain and sweat losses.

Recommended fluid intake levels:

Temperate climate, light-moderate activity	2 - 4 quarts/day
Warm environments, moderate-heavy activity	4 - 6 quarts/day
High altitudes	4 - 6 quarts/day

Personnel wearing protective clothing can produce 1 - 2 quarts of sweat per hour. This must be factored into the drinking schedule to maintain hydration levels.

Supplements

Sodium/Salt: Increased sweating with **heat or physical work** increases sodium/salt loss. The need for extra salt depends on the severity of sweat loss. When sodium replacement is required, it should be provided through food, beverages, and as added salt to foods. **The use of salt tablets is not recommended.**

Carbohydrate: During the first days of exposure to **high altitude**, a daily supplement of 2 to 3 quarts beverage that contains 50 to 100 g carbohydrate/quart to minimize hypohydration and altitude sickness is recommended. After the first few days, the beverage supplement may increase to 100 to 125 g carbohydrate/quart.

Carbohydrate-electrolyte beverages:

The following conditions justify the use of carbohydrate-electrolyte beverages:

- Continuous physical activity for longer than 3 hours
- Poor nutritional intake
- Calorie deficits of over 1000 kcal/day
- High sweat loss with electrolytes not adequately replaced by diet

Criteria for carbohydrate-electrolyte beverages:

Ingredient	Amount per 8 oz serving	Amount per liter
Sodium	55 - 160 mg	220 - 640 mg
Potassium	20 - 55 mg	80 - 220 mg
Carbohydrate (5 - 12% conc.)	11 - 19 g	44 - 76 g

Several commercial beverages and beverage mixes meet these criteria. Beverages with higher concentrations of carbohydrate may be diluted with water to meet correct concentrations.

Operational, Restricted and Survival Rations

Operational and restricted rations are designed for military personnel in a wide variety of operations, in widely varied settings, for limited time periods. They provide the entire diet for military personnel during sustained operations. The Nutritional Standards for Operational Rations (NSOR) are based on the MRDIs.

Operational rations are designed to be nutritionally adequate and, when averaged, meet the NSORs. Operational rations include individual rations such as Meal, Ready to eat (MRE), group feeding rations such as T-ration, Unitized Group Rations, and rations designed for special environments such as Meal, Cold Weather.

Bread, milk and fresh fruit should be supplemented to group and individual operational rations whenever feasible. The MRE ration should not be used as the sole ration for periods of more than 21 days.

Restricted rations are nutritionally incomplete rations used in certain operational scenarios, such as long-range patrol and reconnaissance, when troops are required to subsist for short periods (up to 10 days) carrying minimal weight, such as the Food Packet, Long Range Patrol ration.

The sodium recommendations in restricted rations may not be enough for personnel in hot environments and can be supplemented with electrolyte beverages.

Survival rations do not meet the NSORs and are designed for short term survival applications. Survival rations include the Food Packet, Survival, Abandon Ship ration and the Food Packet, Survival, Aircraft/Life raft ration.

Detailed nutritional information for all the ration types are found in [Operational Rations of the Department of Defense](#).

Nutritional Standards for Operational and Restricted Rations (NSOR)			
Nutrient		Operational Rations	Restricted Rations
Energy (General, routine)	kcal	3600	1500
Protein	g	91	50
Carbohydrate	g	494	200
Calories from fat	kcal	Less than 1260	Less than 525
Vitamin A	µg RE ¹	1000	500
Vitamin D	µg ²	5	3
Vitamin E	mg ³	15	8

Vitamin K	µg	80	40
Vitamin C	mg	90	45
Thiamin (B ₁)	mg	1.2	0.6
Riboflavin (B ₂)	mg	1.3	0.7
Niacin	mg NE ⁴	16	8
Vitamin B ₆	mg	1.3	0.7
Folate	µg DFE ⁵	400	200
Vitamin B ₁₂	µg	2.4	1.2
Calcium	mg	1000	500
Phosphorus	mg	700	350
Magnesium	mg	420	210
Iron	mg	15	8
Zinc	mg	15	8
Sodium	mg	5000 - 7000	2500-3500
Iodine	µg	150	75
Selenium	µg	55	28
Fluoride	mg	4.0	2.0
Potassium	mg	3200	2000

¹ The unit of measure is microgram retinol equivalent (µg RE). 1 µg RE=1 µg retinol or 6 µg β-carotene. 1 µg RE=10 International Units (IU) vitamin A if from β-carotene. 1 µg RE=3.33 IU vitamin A if from retinol.

²As cholecalciferol. 1µg cholecalciferol=40 IU vitamin D.

³ The unit of measure is milligram α-tocopherol that includes RRR-α-tocopherol, the only form of α-tocopherol that is found in food and the 2R-stereoisomeric forms that are found in fortified foods and dietary supplements. This does not include the 2S-stereoisomeric forms that are also found in fortified foods and dietary supplements.

⁴ The unit of measure is niacin equivalent (NE). 1 mg NE=1 mg niacin or 60 mg dietary tryptophan.

⁵ The unit of measure is dietary folate equivalent (DFE). 1 µg DFE=1 µg food folate, 0.5 µg synthetic folic acid taken on an empty stomach, or 0.6 µg synthetic folic acid taken with meals.

Nutritional Education

Policy

- All military members across all services are to be provided with the nutritional knowledge to maximize performance, good health and morale, incorporating information from the [Dietary Guidelines for Americans](#) and the [Food Guide Pyramid](#)
- A variety of healthy food and beverages will be provided by all military food establishments to support the message and maintain healthy eating habits.
- In support of military weight control programs, the services will provide comprehensive weight management programs to train soldiers for effective weight management.

Personnel

- Registered dietitians (RDs) and other qualified personnel develop nutrition education curriculum for military treatment facilities, the DOD work site, and military food service occupational specialty curriculum.
- RDs are trained and proficient in
 - practical application of nutrition science and
 - techniques of nutrition education.
- Other personnel (for example, health care providers, food service technicians, and military educators), when given appropriate training, may also provide nutrition education.
- This **does not** include nutrition counseling (assessment of the nutritional status of patients with a condition, illness or injury that appropriately requires medical nutrition therapy as part of the treatment), which is a component of medical nutrition therapy.

Responsibilities

The Surgeon General, United States Army (USA) exercises responsibility for Nutritional Standards and Education and will—

- (1) Establish nutritional standards for meals served to military personnel, for both normal operating and combat situations - MRDIs (see page
- (2) Establish nutritional standards for operational rations and restricted rations (see page
- (3) Adjust nutritional standards as additional scientific information on nutrient needs becomes available, or as new recommendations are adopted by nutrition policy agencies.
- (4) Evaluate and approve current and proposed operational rations, and recommend adjustments and other actions where necessary.
- (5) Collaborate with the Services in the development of their nutrition education programs.
- (6) Maintain, through the U.S. Army Medical Research and Materiel Command, a military nutrition research capability to support further development and evaluation of nutritional requirements for operational and extreme operational conditions.
- (7) Conduct periodic assessments of military personnel on nutrient and fluid consumption patterns.

The Surgeons General of the Army, Navy, and Air Force will—

- (1) Review requests and make appropriate recommendations for deviations from established nutritional standards.
- (2) Develop and implement programs in line with the U.S. dietary recommendations, in support of a healthy and fit force, to—
 - (a) Influence food preferences to ensure mission needs are met without sacrificing morale.
 - (b) Educate commanders, soldiers and families, and food service staffs about mission specific nutrient requirements and strategies that will ensure eating habits will not adversely affect mission accomplishment.
 - (c) Discourage the use of unproven nutritional remedies, body building drugs, fad diets and supplements.
 - (d) Meet scientifically based weight control and physical fitness principles.
- (3) Provide qualified representatives to—
 - (a) Advise the Services' health promotion, food service, weight control and physical fitness program proponents on matters that affect the nutritional aspects of these programs.
 - (b) Advise commanders and local food service organizations on matters that affect the nutritional aspects of the installation/shipboard health promotion, food service, weight control, and physical fitness programs.
 - (c) Advise joint forums that focus on matters that affect nutrition standards, nutrition education and nutritional aspects of the Services' health promotion, food service, weight control and physical fitness programs.
- (4) Provide nutrition information and education to health care providers.
- (5) Establish and implement mechanisms to ensure hospital menus meet nutritional standards.
- (6) Establish policy to ensure that adjustments to planned hospital menus will meet nutritional standards.
- (7) Ensure healthy foods are incorporated into menu planning, meal preparation, and serving strategies in hospital menus

- (8) Ensure that contract statements of work for food service operations clearly describe the contractor's requirement to comply with applicable nutritional standards.
- (9) Assist in providing food service personnel with knowledge and skills necessary for menu planning and food preparation that will maximize the nutritional value of foods.

The Deputy Chief of Staff for Logistics (DCSLOG), USA, will—

- (1) Evaluate planned menus for compliance with the principles of Food Guide Pyramid and Dietary Guidelines for Americans.
- (2) Establish policy to ensure that adjustments to planned menus will meet nutritional standards.
- (3) Ensure healthy foods are incorporated into menu planning, meal preparation, and serving strategies.
- (4) Ensure curriculum for the military food service occupational specialty incorporates principles of healthful menu planning, selection of healthy ingredients and assessment of menus for nutritional adequacy.
- (5) Ensure that contract statements of work for food service operations clearly describe the contractor's requirement to comply with applicable nutritional standards.
- (6) Provide qualified representatives to advise joint forums that focus on matters that affect the nutritional quality of the military feeding programs, nutrition standards and nutrition education.

**The Commander, Naval Supply Systems Command, United States Navy (USN), and
The Commander, Air Force Services Agency and
The Deputy Chief of Staff for Installations and Logistics (DCSI&L), United States Marine Corps (USMC) will—**

- (1) Establish and implement mechanisms to ensure menus meet nutritional standards.
- (2) Establish policy to ensure that adjustments to planned menus will meet nutritional standards.
- (3) Ensure the incorporation of healthy foods in food programs.
- (4) Ensure that healthy foods are appealing and convenient.
- (5) Facilitate access to healthy foods at reasonable prices whenever possible.
- (6) Provide food service personnel with knowledge and skills necessary for menu planning and food preparation that will maximize the nutritional value of foods.
- (7) Ensure that contract statements of work for food service operations clearly describe the contractor's requirement to comply with applicable nutritional standards.
- (8) Provide qualified representatives to advise joint forums that focus on matters that affect the nutritional quality of the military feeding programs, nutrition standards and nutrition education.