Oceanic

OCEANIC's HEALTH AND WELLBEING GUIDE

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Abbreviations

AHA	American Heart Association
AI	Adequate Intake
AMDR	Acceptable Macronutrient Distribution Range
CVD	Cardiovascular Disease
DNA	Deoxyribonucleic Acid
DRVs	Dietary Recommended Values
EAR	Estimated Average
EFSA	European Food Safety Authority
EUFIC	European Food Information Council
FAO	Food and Agriculture Organization
HDL	High-Density Lipoprotein
NHS	National Health Service
RDA	Recommended Dietary Allowance
REE	Resting Energy Expenditure
RNI	Recommended Nutrient Intake
T2D	Type 2 Diabetes
TEE	Total Energy Expenditure
UL	Tolerable Upper Intake Level
USDA	U.S. Department of Agriculture
WHO	World Health Organization

Part I

The Importance of a Well-balanced Diet

It is believed that how one eats will affect not only their job performance but also performance of activities in daily life. Mental alertness and clarity, physical energy and stamina are dependent on the essential micro- and macronutrients obtained from a well-balanced diet. Crews are subjected to many environmental factors that impede or impair their ability to perform their jobs with the same efficiency of a person with a similar occupation on land. In addition, they do not have the same availability of the variety and freshness of food which further challenges their job performance.

'Fuel moves your ship; Food motivates your crew'.

When working and living at sea there are many factors encountered that impede dietary choices. Factors such as cold storage, pantry capacity and shelf life, amongst others, reduce the availability of fresh products. On long journeys when port stops are few and far between, seafarers may have limited access to the variety and quality of foods that create a well-balanced diet and must resort to packaged foods of less plentiful nutrition.

Oceanic provides menus with ingredients that promote a nutritious and well-balanced diet. Each recipe and meal is packed with all the essential nutrients needed for good health, as it contains 3 or more food groups.

The Five Food Groups

The five food groups are Fruits, Vegetables, Grains, Protein, and Dairy. WHO and USDA emphasize the importance of an overall healthy eating pattern with all five groups as key building blocks, plus oils. Oils group is not considered a food group, but they are underlined as a part of a healthy eating pattern as they are a major source of essential fatty acids and vitamin E.

Each food group is vital as of an overall healthy eating pattern and includes a variety of foods that have similar nutritional content. Several food groups are broken down further onto subgroups to emphasize vitamins and minerals content in certain foods; grains group is broken down to wholegrains and refined grains as wholegrains are characterized by their fibre, magnesium, and zinc content.

Purpose of Food Groups

Dietary recommendations are simplified with the use of Food Groups, as Food Groups focus on foods rather than nutrients. A two-cup portion of fruit a day, is much more achievable than 75 milligrams of vitamin C and 25 grams of fibre. In a 2,000 caloric intake, recommended daily food group targets are: 2 cups fruits, 2 ½ cups vegetables, 6 ounces (170g) grains, 5 ½ ounces (156g) protein, 3 cups dairy. Eating the recommended amounts helps individuals to meet their nutritional needs without tracking each nutrient.

The Healthy Eating Plate showed in *Figure 1.*, is a good way to ensure variety and combinations on each meal, throughout the day. However, some meals may contain 3 food groups which still make them a healthy and balanced meal.

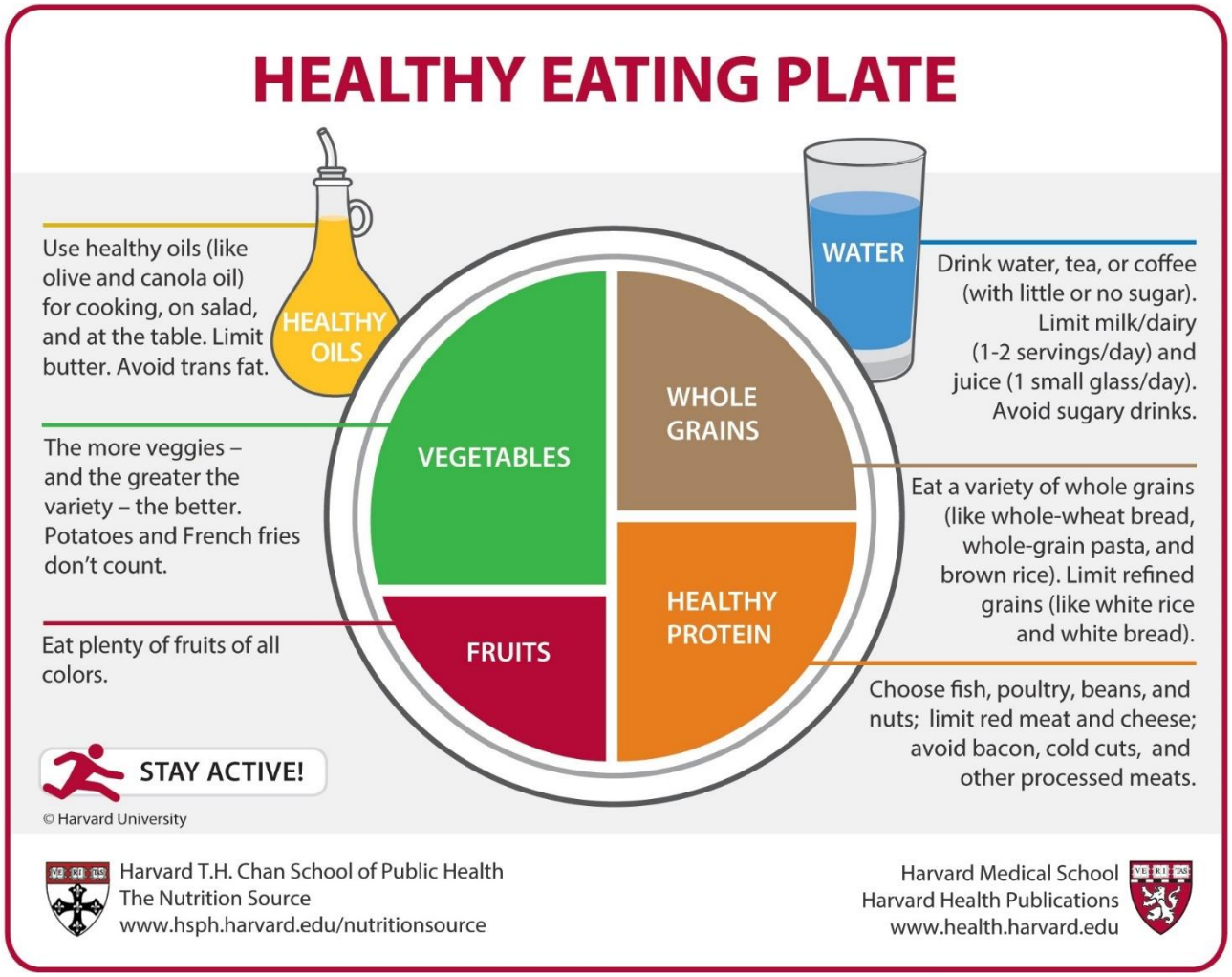


Figure 1. Healthy Eating Plate: an easy-to-follow food guide created by nutrition experts at the Harvard T.H. Chan School of Public Health.

This plate displays how each meal should be to be balanced, according to Food Groups; half the plate vegetables & fruits, a quarter whole grains and a quarter healthy protein. Healthy oils should be added always and water. Specific food groups are explained further below.

GRAINS

This food group is the main supplier of **carbohydrates, fibre, starch, and B-complex vitamins.**

Grains are divided onto 2 subgroups: whole grains and refined grains.
Whole grains have the entire grain kernel (bran, germ, endosperm) and include whole-wheat flour, bulgur, oatmeal, and brown rice.
Refined grains undergo a milling process (without the bran and germ) which removes the fibre, iron, and many B-complex vitamins.

- **Carbohydrate's** primary role is to provide energy to the body cells, particularly the brain which is the only carbohydrate dependent organ in the body. The RDA for carbohydrates is set at 130g per day for adults. The level of intake, however, is typically exceeded to meet energy needs while consuming acceptable intake levels of fat and protein. The median intake of carbohydrates is approximately 180 to 330g per day.

  Examples of the amount of Carbohydrates found in foods that belong in the Grain family:

1 slice of bread	= 1 ounce-equivalent grains = 30g
½ cup portion of cooked brown rice	= 1 ounce-equivalent grains = 30g
40g raw whole grain oats	= 1 ounce-equivalent = 30g

- **Fibre** has different properties that result in different physiological effects. For example, viscous fibre may delay the gastric emptying of ingested foods into the small intestine, resulting in a sensation of fullness, which may contribute to weight control. Additionally, viscous fibre has a beneficial effect on insulin sensitivity and the reduction of blood cholesterol concentration. Functional fibre is known to improve faecal bulk and laxation and ameliorate constipation.

- **B-complex vitamins** are water soluble vitamins that promote energy production as they aid food metabolism and keep the nervous system healthy.

Examples of grains:
- Bread
- Rice
- Potato
- Pasta
- Quinoa
- Breakfast cereals

FRUITS

Any fruit or 100% fruit juice counts as part of the fruit group. Fruits may be fresh, canned, frozen or dried and may be whole, cut-up or pureed. They are the main sources of vitamins and dietary fibre.

A typical portion of fruit is 80g of fresh fruit, 30g of dried fruit and 200ml of fresh juice.
It is recommended to eat whole fruits rather than 100% fruit juice as juices lack starch and fibre and might increase the consumption of sugar intake, resulting in a negative insulin effect and therefore an increased obesity risk.

- **Vitamins** are molecules required by the body in small amounts for a variety of essential processes in the body. They are classified as micronutrients because they are normally required in small amounts; usually a few milligrams (mg) or micrograms (µg or mcg) per day. They have a diverse range of functions in the body; co-factors in enzyme activity, antioxidants (prevent damage from free radical), and pro-hormones (only vitamin D). Most vitamins cannot be synthesised by the body and must be obtained by the diet. The only exception is vitamin D which can be synthesised in the presence of sunlight on the skin.

Vitamins are classified onto 2 groups: fat-soluble and water-soluble.
Fat-soluble vitamins are vitamins A, D, E and K which are absorbed more easily by the body in the presence of dietary fat.
Water-soluble vitamins are vitamins C and B-complex. The excess amounts of them are excreted through urine, except vitamin B12 which can be stored in the liver for several years.

The high absorbance and effectiveness of vitamins is achieved through the presence of different foods that contain minerals or other vitamins that aid their absorption and performance.
Vitamins and minerals or vitamins between them work synergetic ally.

Examples of Synergetic Actions:
- **Vitamin D + calcium + vitamin K:** Vitamin D aids the absorption of calcium of which deficiency might lead to osteopenia or osteoporosis, while vitamin K promotes calcium accumulation in the bones, for e.g., egg + cheese.
- **Vitamin C + iron:** Vitamin C aids the absorption of iron; therefore, anaemia can be avoided, for e.g., lemon or/and broccoli or/and red peppers + lean beef.

To ensure adequate consumption, WHO recommends at least 5 portions of fruit and vegetables per day.

Examples of fruits:
- Apple
- Apricot
- Banana

VEGETABLES

Vegetables are very rich in **dietary fibre, water, and minerals.**
A typical portion of vegetables is 80g or 1 cup raw vegetables and ½ cup cooked vegetables.

- **Minerals** work synergistically between each other or with vitamins to enhance or to inhibit each other's action. That means that if variety is not ensured, then deficiencies because of low absorption might occur; common deficiencies include iron deficiency. Vitamin C acts as an enhancing factor whereas calcium inhibits iron absorption. Therefore, if vitamin C rich foods are not present in an individual's diet, the actual absorption of iron from the body will be insufficient to meet requirements and related diseases such as anaemia might occur. (WHO and FAO, 2004)

- **Chromium** is the mineral thought to influence how the hormone insulin acts in the body. This means chromium may affect the amount of energy obtained from the food. Chromium can be beneficial when glucose levels are higher than normal (diabetes). Seafarers have a high prevalence of diabetes usually related to their greater tendency to overweight and obesity compared with the general population, as suggested by literature (Nittari G. et al., 2019)

- **Magnesium** is found in a wide variety of foods. Vegetables, especially green leafy vegetables such as spinach, are very good sources of magnesium that for seafarers is beneficial as it plays a key role in the normal production of the hormones that are important for the bone health (parathyroid glands).

- **Potassium** is found in higher quantities in fruits, such as bananas, and vegetables, such as broccoli, parsnips, and brussels sprouts. Potassium is vital for seafarers as it helps control the balance of fluids in the body and ensures the proper work of the heart muscle. CVD has a high prevalence amongst seafarers as is the leading cause of morbidity and mortality (Sagaro G.G. et al., 2021).

Examples of vegetables:

- Spinach
- Sprouts
- Broccoli
- Lettuce
- Carrot

PROTEIN

This food group is the main supplier of **protein, vitamin B12, iron and zinc**.

- **Protein** is a macronutrient that is vital for the muscle and tissue. Protein of high bioavailability is the high-quality protein which is found in animal products such as meat, fish, eggs, and cheese.

- **Iron** is a vital mineral which helps to maintain healthy blood. As a major component of haemoglobin protein that carries oxygen from lungs to all body parts, reduced iron results in fatigue. Iron is also a major component of myoglobin protein, responsible for supplying oxygen to the muscle tissues.

- **Vitamin B12 (cobalamin)** is a water-soluble vitamin that is required for the development, myelination and function of the central nervous system, the healthy red blood cell formation and DNA synthesis. The RDA for vitamin B12 is 2.4 mcg for adults over 19 years old.

- **Zinc:** Meat, fish, shellfish, and nuts are good sources of zinc that is required to produce new cells and enzymes, processing carbohydrates, fat and protein and wound healing.

Fish and shellfish are the major sources of omega-3 fatty acids (FAs) and a great source of protein. Additionally, they are rich in vitamin D. However, excessive fish amounts need to be consumed to cover vitamin D RDA of 600 IU (15 mcg) per day; 100g sardines provide 193 IU of vitamin D.

There are two types of fish: oily and white fish.

Oily fish has been linked to several health benefits such as lower risk of heart disease, improved mental ability and reduced cancer, alcohol-related dementia, and rheumatoid arthritis risks.

Examples of oily fish:

- Trout
- Salmon
- Sardines
- Pilchards
- Kippers
- Eels
- Whitebait
- Mackerel
- Herring
- Tuna (fresh)*

*Canned tuna is not considered as an omega-3 source as during canning process omega-3 amount is reduced.

AHA recommends at least two servings of fish, especially oily fish, per week.
A serving is 3.5 ounces (100 g) of cooked fish.

***VERY IMPORTANT:** Do not exceed recommended weekly oily fish servings 1-4 per week as oily fish contains low levels of pollutants that can build up in the body.

White fish has lower fat content compared to oily fish, but it is still a great omega-3 source. Therefore, a combination of white and oily fish can be encouraged.

Examples of white fish:

- Cod
- Haddock
- Plaice
- Pollock
- Coley
- Dab
- Flounder
- Red mullet
- Gurnard
- Tilapia

***VERY IMPORTANT:** White fish can be consumed in as many portions as liked, except the following which may contain similar levels of certain pollutants as oily fish: sea bream, sea bass, turbot, halibut, and rock salmon (also known as dogfish, flake, huss, rig or rock eel).

Examples of protein:

- Poultry
- Fish
- Meat
- Eggs
- Legumes (beans, soybeans, chickpeas, lentils, lupins, alfalfa etc.)

DAIRY FOODS

Milk and Dairy products are the main sources of **calcium**, **vitamin D, potassium,** and **protein** of high bioavailability.

- **Calcium** is a mineral with several important functions: helping build strong bones and teeth, regulating muscle contractions including heartbeat and ensuring blood clots normally. Lack of calcium could lead to conditions such as osteomalacia and osteoporosis.

- **Vitamin D** helps the body to absorb and retain calcium and phosphorus that are both vital for building bones.

- **Potassium** is a mineral with several functions: helping with the maintenance of normal fluid levels inside humans' cells, helping muscle contraction and supporting normal blood pressure.

A daily intake of 2-3 dairy products of low fat or fat-free improves bone density and reduces the risk of osteoporosis; dairy contain saturated fat which is unhealthy, hence fat content should be the lowest.

The Dairy Daily Recommendations for all adults are 3 cups.

A cup is:

- 1 cup milk
- 1 cup yogurt
- 40g hard cheese (cheddar, mozzarella, Swiss, parmesan)
- 2 cups cottage cheese

Examples of Dairy Foods:

- Milk
- Yogurt
- Cheese

OILS

Oils are the main source of **unsaturated fatty acids (FAs)** and **vitamin E**.

- **Unsaturated FAs** improve blood cholesterol levels, ease inflammation, stabilize heart rhythms and have many other beneficial properties. They are found in plant-food sources such as vegetable oils, nuts, and seeds.

- **Vitamin E** has antioxidant properties, enhances immune function, and prevents the formation of blood clots in heart arteries.

The portion of oil is 1 teaspoon or tablespoon. For e.g., 1 tablespoon olive oil, 1 teaspoon ghee, 1 teaspoon butter.

Examples of oils:

- Olive oil
- Avocado
- Nuts
- Seeds
- Butter

LIMIT

All foods and beverages high in added sugars, saturated fat and sodium should be limited as high consumption of such products results in obesity and all related disease risks. A replacement of these products results in lower energy intake hence lower chronic disease risk over time.

According to the USDA Food Patterns Equivalent Database, added sugars are defined as the sugars that are added to foods as an ingredient during preparation, processing or at the table. The American 2020-2025 Dietary Guidelines recommend less than 10% of added sugar from daily energy consumption.

A study conducted in 2020 amongst 3,430 Australian adults over 18 years old, indicated that almost half of them consumed a drink high in sugar during the past week, while 13.6% consumed at least one per day. Additionally, fruit juice consumption was higher compared to other drinks and water. Nearly one third of the Australian adults consumed soda regularly. (Miller C. et al., 2020)

Previous studies that calculated the percentage of added sugar, saturated fat and sodium amongst different food items and food categories showed that sugar-sweetened and alcoholic beverages are the higher sources of added sugar (47%) and that mixed dishes (pizza, burgers, soups, sandwiches, tacos, rice, pasta, meat) are the higher sources of saturated fats (35%) and sodium (44%). Other sources of saturated fats were snacks and sweets.

Note: Limit category and Oils, are not food groups. All 5 groups are: grains, protein, fruits, vegetables, and dairy.

Part II

Hydration

Water is the largest single component of the human body and is essential for cellular homeostasis and life.

Adequate water intake is vital as it:

- Regulates body temperature.
- Keeps joints lubricated.
- Prevents infections.
- Delivers nutrients to human cells.
- Keeps proper organs' function.
- Improves sleep quality.
- Improves cognition.
- Improves mood.

It is suggested that the 2/3 of human body weight is water; however, the percentage of our bodies that is made up of water depends upon several factors, such as age, gender, and fat percentage.

Adequate hydration prevents several infections and disorders. Adults need approximately 1.5-2 litres fluids per day. A typical glass is 200-240ml, hence 8-10 glasses are needed daily.

Signs and symptoms of dehydration include pain when urinating, dry mouth or lips or eyes, thirst, dizziness, headache, tiredness, and lack of concentration. However, the main sign of dehydration is urine colour which is indicated in *Figure 2*.

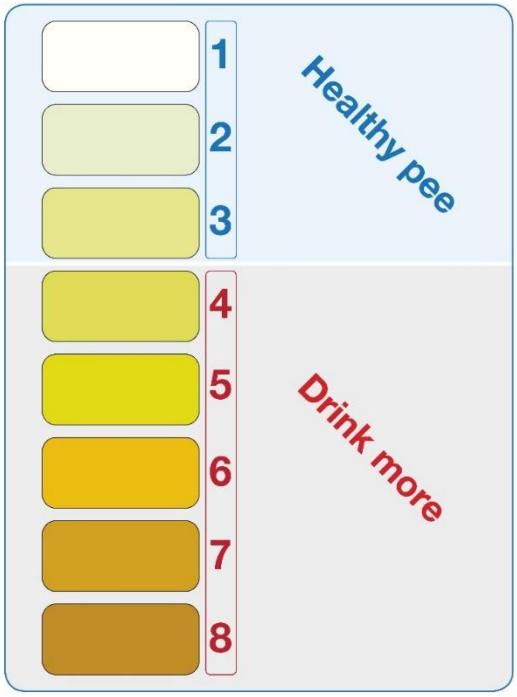


Figure 2. Urine Colour Chart: the darker the colour the more water is needed.

Although water is thought of as the primary fluid to sustain hydration, fluids in different types of beverages and foods contribute significantly to a person's daily fluid needs. The water content of selected foods is indicated in *Table 1*.

Table 1. Water Content of Selected Foods (USDA)

Milk, cantaloupe, strawberries, watermelon, lettuce, cabbage, celery, spinach, pickles, squash (cooked)	90-99%
Fruit juice, yogurt, apples, grapes, oranges, broccoli (cooked), pears, pineapple	80-89%
Bananas, avocados, cottage cheese, ricotta cheese, potato (baked), corn (cooked), shrimp	70-79%
Pasta, legumes, salmon, ice cream, chicken breast	60-69%
Ground beef, hot dogs, feta cheese, tenderloin steak (cooked)	50-59%
Pizza	40-49%
Cheddar cheese, bagels, bread	30-39%
Pepperoni sausage, cake, biscuits	20-29%
Butter, margarine, raisins	10-19%
Walnuts, peanuts (dry roasted), crackers, cereals, pretzels, peanut butter	1-9%
Oils, sugars	0%

Part III

Food Allergies

Food allergies occur when the immune system reacts to certain food proteins. The body produces what is called an allergic, or immunoglobulin E (IgE), antibody to a food. Once a specific food is ingested and binds with the IgE antibody, an allergic reaction ensues.

It is important for the crew members to be able to identify any dishes that may cause food allergies as the symptoms may be mild (hives and lip swelling) to life-threatening (anaphylaxis).

Oceanic menus on **NERIS** indicate all food allergens.

In case of a crew member's food allergy, cooks are well trained and will take the appropriate actions.

Certain food allergens and their main food sources are mentioned in *Table 2*.

Table 2. Food Allergens and Food Sources

ALLERGENS	WHERE TO FIND THEM
	**Gluten:** Breakfast cereals, bread, pasta, pastries, baking mixes, soups, chewing gum, sauces, cakes, biscuits, salad dressings, wheat, barley, spelt, rye, wheat bran, semolina, farina, durum, couscous, flour etc.
	**Egg:** Pastries, sauces, cakes, biscuits, pies, pizza dough, surimi, ice cream, lecithin, marzipan, mayonnaise etc
	**Mustard:** Sauces, pickles, vegetables and pickled products, dehydrated soups, some appetizers, sprouted seeds, processed meat etc.
	**Lupin:** Pastry cases, pies, waffles, products containing crumb, deep-coated vegetables such as onion rings, pasta, lupin flour etc.
	**Sesame:** Benne, benne seed, benniseed, gingelly, gingelly oil, gomasio (sesame salt), halvah, sesame flour, sesame oil, sesame paste, sesame salt, sesame seed, sesamol, sesamum indicum, sesemolina, sim sim, tahini, tahina, tehina, til etc.
	**Sulphur Dioxide:** Processed meats including sausages and burgers, soft drinks, fruit juice concentrates, carbonated drinks, cordials and vegetables juices, dried fruits and vegetables, wine, beer and cider, pickled foods and vinegar, guacamole, dehydrated vegetables such as dried onions, maraschino cherries and glace cherries, coconut milk, salad

	dressings, ready-made mustard, dehydrated, pre-cut or peeled potatoes, frozen raw potato products, fresh or frozen prawns, tofu/bean curd etc.
	**Celery:** Canned soups, stock cubes, salads, pre-prepared sandwiches, crisps, spice mixes, marmite etc.
	**Milk:** Butter, butter fat, butter oil, butter acid, butter ester(s), buttermilk, casein, cheese, cottage cheese, cream, curds, custard, diacetyl, ghee, dry, evaporated, goat's milk and milk from other animals, low-fat, malted, milkfat, non-fat, powder, protein, skimmed, solids, whole), milk protein hydrolysate, pudding, sour cream, tagatose, whey (in all forms), yogurt, baked goods, caramel candies, chocolate, luncheon meat, hot dogs and sausages, which may use the milk protein casein as a binder, margarine, nisin, non-dairy products, as many contain casein, nougat etc.
	**Peanuts:** Arachis oil (another name for peanut oil), artificial nuts, beer nuts, cold-pressed, expelled or extruded peanut oil, goobers, ground nuts, lupin (or lupine), mandelonas (peanuts soaked in almond flavouring), mixed nuts, monkey nuts, nut pieces, peanut butter, peanut flour, candy, chili, egg rolls, enchilada sauce, glazes and marinades, ice creams, marzipan, nougat, pancakes,, sauces such as chili sauce, hot sauce, pesto, gravy, mole sauce and salad dressing, sweets such as pudding, cookies, baked goods, vegetarian food products, especially those advertised as meat substitutes etc.
	**Fish:** Anchovies, bass, catfish, cod, flounder, grouper, haddock, hake, halibut, herring, mahi, perch, pike, pollock, salmon, scrod, sole, snapper, swordfish, tilapia, trout, tuna, fish gelatine, made from the skin and bones of fish, fish oil, fish sticks, barbecue sauce, bouillabaisse, Caesar dressing, caponata, Worcestershire sauce, certain cuisines (especially African, Chinese, Indonesian, Thai and Vietnamese) etc.
	**Soya:** Old-pressed, expelled or extruded soy oil, edamame, miso, natto, shoyu, soy (soy albumin, soy cheese, soy fibre, soy flour, soy grits, soy ice cream, soy milk, soy nuts, soy sprouts, soy yogurt), soya, soybean (curd, granules), soy protein (concentrate, hydrolysed, isolate), soy sauce, tamari, tempeh, textured vegetable protein (TVP), tofu, Asian cuisine (including Chinese, Indian, Indonesian, Thai and Vietnamese), vegetable gum, vegetable starch, vegetable broth etc.

	**Molluscs and Crustaceans:** Barnacle, crab, crawfish (crawdad, crayfish, ecrevisse), krill, lobster (langouste, langoustine, Moreton bay bugs, scampi, tomalley), prawns, shrimp (crevette, scampi), abalone, clams (cherrystone, geoduck, littleneck, pismo, quahog), cockle, cuttlefish, limpet (lapas, opihi), mussels, octopus, oysters, periwinkle, sea cucumber, sea urchin, scallops, snails (escargot), squid (calamari), whelk (Turban shell), bouillabaisse, cuttlefish ink, glucosamine, fish stock, seafood flavouring (e.g., crab or clam extract), surimi etc.
	**Tree nuts:** Almond, artificial nuts, beechnut, black walnut hull extract (flavouring), Brazil nut, butternut, cashew, chestnut, chinquapin nut, coconut, filbert/hazelnut, gianduja (a chocolate-nut mixture), ginkgo nut, hickory nut, litchi/lichee/lychee nut, macadamia nut, marzipan/almond paste, nangai nut, natural nut extract (e.g., almond, walnut—although artificial extracts are generally safe), nut butters (e.g., cashew butter), nut distillates/alcoholic extracts, nut meal, nut meat, nut milk (e.g., almond milk, cashew milk), nut oils (e.g., walnut oil, almond oil), nut paste (e.g., almond paste), nut pieces, pecan, pesto, pili nut, pine nut (also referred to as Indian, pignoli, pigñolia, pignon, piñon and pinyon nut), pistachio, praline, shea nut, walnut, walnut hull extract (flavouring)

(EUFIC 2013, EFSA 2014, USDA 2016)

11 Steps to a Healthier and Well-Balanced Diet

Healthy eating is crucial as it protects against malnutrition and no communicable diseases (NCDs), including diabetes, heart disease, stroke, and cancer amongst seafarers.

The Maritime Labour Convention (MLC) 2006 provides the legal basis for the living conditions on board, including food provisions. Regulation 3.2. sets out that: **"Purpose: To ensure that seafarers have access to good quality food and drinking water provided under regulated hygienic conditions."** In 2022, new MLC amendments were made to ensure free drinking water of good quality is available for all seafarers.

Tips to implement healthy dietary practices:

- ✓ Each main meal should contain at least **food from 3 food groups**.
- ✓ **Limit red meat** to once every 2 or 4 weeks. White meat (chicken, fish, poultry) is preferrable.
- ✓ Consume **fish twice a week** while 1 portion is oily fish (trout, salmon, fresh tuna etc.). White fish (cod, haddock, plaice etc.) can be consumed daily if desired**.**
  ***Tuna canned is not considered as fish portion since omega-3 fats are reduced due to canning process.
- ✓ **Small & frequent meals** – Do not skip snacks between main meals as they are important to maintain your energy levels. Fruits, nuts, and vegetables are available on-board at all times.
- ✓ **5 portions of fruits & vegetables daily** – Have always fresh, frozen, canned, dried or juiced fruits and vegetables in your main meals. Refer to examples below:
  Breakfast: Egg + bread+ cheese **+ banana or lettuce, cucumber, tomato**
  Lunch: Rice + chicken + yogurt **+ spinach**
  Dinner: Pasta + fish **+ broccoli**
- ✓ **Limit added sugars** to less than 10% of total calories per day to reduce risk of obesity and tooth decay.
- ✓ **Limit salt** to less than 5g per day to prevent hypertension and reduce the risk of heart disease and stroke.
- ✓ **Limit saturated fat** found in fatty meat, butter, palm and coconut oil, cream, cheese etc. Prefer unsaturated fat found in fish, avocado, nuts, olive oil etc. Aim to less than 35% of total energy intake from fat.
  *Industrial trans-fat (processed food, fast food, fried food etc.) is not part of a healthy diet.
- ✓ **Hydration is important!**
  Aim to 8-10 glasses of water per day. Vegetables and fruits are also good sources of water.
- ✓ **Prefer legumes when possible!**
  Beans, green lentils etc. should be consumed at least 2-3 times per week as a main or side dish. Refer to examples below:
  Green lentils + salad + bread + cheese
  Chicken + rice + yogurt+ **green beans**
- ✓ **Eat fresh fruits, do not drink them!**
  Choose whole fruits as they have higher fibre content. Fibre helps with constipation as it regulates the intestinal flora and helps in controlling appetite. Juices usually have higher natural sugar content (fructose) as more than one fruit portion is needed to produce a glass of juice.

Part IV

Macronutrients

Energy (calories)

The average energy requirement for males and females over 18 years old is shown in *Table 3.*

Table 3. Energy Requirements for Adults (EFSA 2019)

Age (years)	Gender	AR (kcal/day)
18-29	Males	2,341-3,344
	Females	1,887-2,675
30-39	Males	2,269-3,224
	Females	1,815-2,579
40-49	Males	2,221-3,200
	Females	1,791-2,555
50-59	Males	2,197-3,153
	Females	1,791-2,555
60-69	Males	2,006-2,890
	Females	1,624-2,317
70-79	Males	1,982-2,842
	Females	1,624-2,293

AR, average requirement; kcal/day, kilocalories per day.

Average requirement is the dietary reference for energy in adults according to the EFSA. The requirements are adjusted according to the physical activity of the person; sedentary, moderately active, active, and very active. The more active a person is, the higher the AR.

For a more specific value, a person's TEE can be calculated with the steps shown below, where Body Weight is in kg, Height in cm and Age in years.

Step 1.

Resting Energy Expenditure (REE) calculation:

Males: REE = 66.5 + (13.75 x Body Weight) + (5.003 x Height) – (6.775 x Age)

Females: REE = 655.1 + (9.563 x Body Weight) + (1.850 x Height) – (4.676 x Age)

Step 2.

TEE = REE x activity level (sedentary 1.4, moderately active 1.6, active 1.9, very active 2.5)

Protein

Proteins form the major structural components of all the cells in the body. Proteins also function as enzymes, in membranes, as transport carriers, and as hormones. Amino acids are constituents of protein and act as precursors for nucleic acids, hormones, vitamins, and other important molecules. Hence, an adequate supply of dietary protein is essential to maintain cellular integrity and function, and for health and reproduction.

Oceanic menus provide a great variety of protein rich foods such as fish, meat, poultry and eggs and dairy products.

The RDA of protein for adults over 18 years old, is 0.8g/kg/day. RDA is the recommended minimum amount to be consumed to not get sick. The goal for protein intake for females is approximately 46g/day in a diet of 1,600-2,000kcal while for males is 56g in a diet of 2,000-3,000kcal.

The AMDR for **protein** is **10-35%** of total amount of calories for adults older than 18 years of age, according to the Food and Nutrition Board of the Institutes of Medicine. *Table 4.*, shows the protein content in certain food sources.

Table 4. Protein Content in Foods

Food Source	Protein (g)
85g tuna, salmon, haddock, trout	21
85g cooked turkey or chicken	19
170g Greek yogurt	17
½ cup cottage cheese	14
½ cup cooked beans	8
1 cup of milk	8
¼ cup nuts	7
1 egg	6

g,grams.

*Nuts are best to be considered as healthy fats rather than protein, because they are a greater source of omega-6 fatty acids.

Carbohydrates

The primary role of carbohydrates (i.e., sugars and starches) is to provide energy to all cells in the body, particularly the brain which is the only carbohydrate dependent organ. Additionally, carbohydrate rich foods are the main source of fibre, as previously mentioned.

The AMDR for **carbohydrate** is **45-65%** of the total amount of calories for adults older than 18 years of age. As for **dietary fibre**, an AI of **25g/day** for both male and female adults is recommended.

Fat

Fat is a major source of energy for the body. It also aids in the absorption of fat-soluble vitamins A, D, E, K, and other food components, such as carotenoids.

Neither an AI nor an RDA is set for total fat because there is insufficient data to determine a defined level of fat intake at which risk of inadequacy or prevention of chronic disease occurs. The AMDR for **total fat** is **25-35%** of the total energy intake per day.

Micronutrients

Micronutrients are all vitamins and minerals.
The RNIs and UL per day for all micronutrients are indicated in *Table 5*.

Table 5. RNIs and ULs per day for adult males and females 19-65 years old

Micronutrients	RNIs	UL
Sodium (mg)	1,600	2,000*
Calcium (mg)	700	2,500
Iron (mg)	8.7-14.8**	45
Zinc (mg)	6.2-12.7***	25****
Vitamin B12 (mcg)	1.5	ND*****
Vitamin B6 (mg)	1.2-1.4	25
Vitamin C (mg)	40	2,000
Vitamin D (mcg)	10	100

ND, not defined.
All data shown are from EFSA, Department of Health UK and USDA.
***The EFSA panel considers that 2,000mg sodium is safe and adequate due to the link found between sodium intake and CVD.
**RNI for females 19-50 years old is 14.8mg which is insufficient for females with high menstrual losses.
***Zinc RNIs are altered according to the phytate intake per day, as phytate decreases Zinc absorption.
****EFSA recommends 25mg Zinc as the maximum daily intake unlikely to cause harmful effects.
*****EFSA indicated that there are no clearly defined adverse effects for vitamin B12.

Oceanic menus pay a great attention to the recommended daily intake of vital minerals such as sodium, calcium, iron and zinc and vitamins such as vitamin B6, vitamin B12, vitamin C and vitamin D. All macro- and micro-nutrient contents of each meal are reported on **NERIS**.

Sodium

As suggested from WHO, high salt consumption and insufficient potassium intake (less than 3,500mg/day) contribute to high blood pressure, which in turn increases the risk of heart disease and stroke (WHO, 2015). The U.S. Dietary Guidelines recommend less than 2,300mg/day sodium. A study conducted in 2018 amongst several seafarers, indicated that sodium intake was much higher than recommendations to less than 6,000mg/day. (Zyriax B.C. et al., 2018)

Sodium main sources: breads & rolls, pizza, ready to eat meals, cold cuts and cured meats, soups, savoury snacks

Calcium

Calcium plays a key role in bone health, in neuromuscular function and many enzyme-mediated processes. In the past, deficiency of calcium and vitamin D was of a great concern amongst seafarers as many had low consumption of dairy products. **Oceanic menus** assure adequate calcium rich foods variety to meet recommended intakes as suggested by WHO (FAO/WHO, 2001).

Calcium main sources: Milk, cheese, yogurt, almonds, sardines, green leafy vegetables

Iron

Iron has several vital functions in the body. It serves as a carrier of oxygen to the tissues from the lungs by red blood cell haemoglobin, as a transport medium for electrons within cells and as an integrated part of important enzyme systems in various tissues. In the past years, there was a connection between fatigue and iron and vitamin B12 nutritional deficiencies amongst seafarers.

There are 2 iron forms: Heme and Non-heme iron. Heme iron is found in animal products such as meat, poultry, and seafood. Non-heme iron is found in plant products such as whole grains, nuts, seeds, legumes, and green leafy vegetables.

Iron main sources: meat, seafood, pulses, fortified cereals, green leafy vegetables

Zinc

Zinc is a mineral crucial for human growth and development. It is present in all body tissues and fluids; even senses of taste and smell involve zinc.

Zinc main sources: meat, poultry, shellfish, legumes, whole grains, fortified breakfast cereals

Vitamin B12

Vitamin B12 is essential for the formation of red blood cells and DNA synthesis. An adequate supply of vitamin B12 is essential for the function and development of brain and nerve cells. Vegetarians are of high risk of deficiency as B12 is the only B-complex vitamin that is available only in animal products compared to all other B-complex vitamins. The recommended daily intake of vitamin B12 is 1.5mcg. The absorption of B12 is limited to 1.5-2.0mg per meal because of the limited capacity of the receptors. Additionally, between 1% and 3% of any oral administration of B12 is absorbed by passive diffusion. Thus, if 1000mg B12 is taken orally, the amount absorbed would be 2mg by active absorption plus up to about 30mg by passive diffusion. No upper limit has been recommended for B12 as its toxic level has not been established.

Vitamin B12 main sources: meat, salmon, cod, milk, cheese, eggs, some fortified breakfast cereals

Vitamin B6

Vitamin B6 in coenzyme forms performs a wide variety of functions in the body and is extremely versatile, with involvement in more than 100 enzyme reactions, mostly concerned with protein, carbohydrates, and fats metabolism. Vitamin B6 also plays a role in maintaining homocysteine normal levels, supporting immune function and brain health.

Vitamin B6 main sources: canned chickpeas, beef liver, salmon, tuna, poultry, bananas, oranges, cantaloupe, green leafy vegetables

Vitamin C

Vitamin C is a water-soluble vitamin that humans are unable to synthesize. Therefore, intake from food sources is necessary. When deficiency occurs, humans suffer from the potentially lethal deficiency disease scurvy that used to be very common amongst seafarers. Vitamin C acts as a strong antioxidant, aids the formation of collagen that is beneficial for skin and bones and has antihistamine properties. Additionally, Vitamin C works synergetic ally with iron as it aids iron's absorption.

Vitamin C main sources: citrus fruits, bell peppers, strawberries, tomatoes, white potatoes, broccoli, Brussels sprouts, cabbage, cauliflower

Vitamin D

Vitamin D is required to maintain normal blood levels of calcium and phosphate that are in turn needed for the normal mineralisation of bone, muscle contraction, nerve conduction, and general cellular function in all cells of the body. Its recommended AI is 15mcg/day. Vitamin D main source is sunlight, but little amounts can be obtained by food.

Vitamin D main sources: oily fish (salmon, sardines, herring, mackerel), red meat, liver, egg yolks, fortified foods (some fat spreads and breakfast cereals)

Part V

Common Health Issues amongst seafarers

Recent studies and reviews (2019-present) investigating the seafarers' major health issues:

Overweight and Obesity

- There is a tendency towards metabolic syndrome, overweight/obesity, CVD, fatigue, and stress. (Drylli A. et al., 2019)
- There is a high prevalence of overweight and obesity amongst seafarers:
    - A study published in 2021 and conducted on Burmese, Filipino and European seafarers, indicated that 45.8% were overweight (55.4% Europeans, 40.8% Filipinos) and 9.8% obese. (Neumann F.A. et al., 2021)
    - Another study published in 2019 on Italian flag ships, indicated that in a total of 1,155 seafarers, 40% were overweight and 10% obese. (Nittari G. et al., 2019)

Conclusion: Overweight and obesity still include a primary health concern amongst seafarers, enhancing the need of effective weight management programs amongst seafarers. Health campaigns promoting obesity awareness and certain health complications should be encouraged.

Type 2 Diabetes

- T2D is common amongst seafarers:
    - A study published in 2022 and conducted amongst 624,571 Denmark workers in several facilities, indicated that male seafarers had a higher risk of diabetes compared to other workers. (Herttua K. et al., 2022)
- T2D amongst seafarers is mainly detected using urinary glucose and HbA1c annually or biannually, a haemoglobin that when tested indicates the average blood sugar levels over the past 3 months. However, regular check-ups are vital as of the seafarer's care; annual checks, intermediate checks every 3-6 months, blood glucose self-monitoring by the seafarers. Early diagnosis is crucial to prevent further health complications. (Jensen O.C. et al., 2022)

Conclusion: T2D prevalence is still high amongst seafarers. Early detection and management are crucial. Risk of T2D can be reduced by adopting a healthy diet and regular physical activity.

Cardiovascular Disease

- CVD is the leading cause of morbidity and mortality amongst seafarers since the past years.
- A study published in 2021 and conducted on seafarers for a period of 9 years (2010-2018), indicated that CVD was the sixth leading cause of medical advice requests to the International Radio Medical Centre (C.I.R.M.); a total of 1,377 CVD cases were assisted. Specifically, the cases were for hypertensive diseases and ischaemic heart diseases. (Sagaro G.G. et al., 2021)

- Another study published in 2021 and conducted on 8,125 seafarers for a period of one month using anonymous questionnaires, indicated that there were 20.8% reported hypertension, 8.5% reported diabetes, 32.5% reported current smoking and 44.7% reported overweight and obesity. A total of 40% of the participants had one modifiable CVD risk factor. Although there might be an underestimation due to self-reporting, these values highlight the importance of early strategic actions as to prevent or modify certain CVD risk factors on vessels. (Sagaro G.G. et al., 2021)

Conclusion: CVD remains as one of the main health concerns amongst seafarers. Early detection of the modifiable risk factors may be the prevention of CVD. Additionally, early diagnosis, regular monitoring, and physical training are the keys to reduce CVD risk.

Cancer

- Seafarers are exposed daily to occupational sea hazards.
- A study published in 2020 and conducted on 81,740 male seafarers in the five Nordic countries, indicated that there was a significant overall cancer incidence. (Petersen K.U. et al., 2020)
- Another study published in 2022 and conducted on 75,745 seafarers of the Swedish Seafarers' Register, indicated that there were 4,159 cancer cases in total, while the 3,221 were of males. Overall, male seafarers had an increased risk of total cancer, lung cancer and urinary bladder cancer. (Forshell K. et al., 2022)

Conclusion: Cancer prevalence is decreased in comparison with the previous years. However, longer and more examinations are needed to further assess the seafarers' occupational carcinogens.

Mental Health

- A review published in 2022, stated that several mental health problems affect seafarers: stress (28-65%), depressive symptoms (14-49%) and burn out (10.8%). Depressive symptoms include isolation and loneliness while burn out is referring to the burnout syndrome, a syndrome resulting from chronic stress related to work that has not been successfully managed (exhaustion, increased mental distance from work, negative feelings). (Jonglertmontree W. et al., 2022)
- Another review published in 2022, indicated that poor mental health is mainly identified in seafarers that are of a younger age, single, with poor physical health, exposed to noise, feeling unsafe, have long working hours, irregular working shifts, poor sleep, poor team cohesion, poor management perception, poor social support, lack of autonomy, scheduling uncertainties, long duration at sea and over-commitment. (Brooks S.K. & Greenberg N. et al., 2022)

Conclusion: Mental health has been of a great interest in the recent years as seafaring has been identified as a 'risky occupation' due to the mental triggers that seafarers are exposed to every day.

Oceanic supports seafarers' mental wellbeing through educational material such as the Stay Healthy On-Board Guide and newsletters provided to the vessels on a regular basis.

Physical Inactivity

Physical activity is vital for the health and wellbeing of the seafarers. Regular physical activity lowers the risk of certain health conditions, such as heart disease, diabetes, stroke, high blood pressure, osteoporosis, and several types of cancer. It can also improve sleep, help in stress control, boost mood, help in maintaining an ideal body weight and improving cognitive function.

'Healthy body for a healthy mind'

- Seafarers have multiple challenges (long journeys, away from family, work-related stress etc.) that may affect their physical and mental health. A healthy and well-balanced diet along with regular physical activity will reduce the risk of several health conditions and improve mental wellbeing.
- A study carried out in 2007 on 1,155 seafarers on board vessels in a Norwegian shipping company, indicated that 70% of them did exercise at home twice a week, while only 39% did training on board. Additionally, 20% of the seafarers never did any form of exercise on board while 5% did not exercise even at home. (Geving IH. et al., 2007)

Conclusion: Further studies need to be conducted to identify recent physical activity levels on seafarers. The MLC 2006 refers to considering exercise equipment to be provided to the seafarers at no cost on vessels. Nevertheless, nowadays several vessels offer exercise equipment on board hence exercise should be encouraged.

CDC recommends 30 minutes of exercise per day to maintain good health.

Common Dietary Issues amongst seafarers

Since today, there was limited comprehensive research regarding the seafarers' dietary patterns. The assessment of the food intake and eating habits provides a key factor for the overall health of the seafarers.

- A review published in 2021, including studies that used certain methods to access dietary habits (24hr diet recall, food diaries, questionnaires), composition of menu analysis, food stores and food waste, indicated that seafarers dietary patterns are unhealthy. Specifically, the access to meat, processed meat, eggs, frozen and canned food items, sugary drinks, alcohol, and greasy and salty food was high compared to the fruits & vegetables, dairy products, and cereal consumption. (Baygi F. et al., 2021)
- Another study published in 2021, investigated the eating behaviour of the seafarers on-board and at home. The results revealed that all seafarers reported to consume more fruits and vegetables and less soft drinks while at home, compared to being on-board. (Neumann F.A. et al., 2021)

Conclusions: The dietary habits of the seafarers are of a great interest. However, further investigations are needed without using self-examinations so that under- and overestimations will be limited. On-board working and living conditions are of a great influence on the dietary patterns of the seafarers

Part VI

Example of Recipes included in the menus provided by Oceanic

Baked Fish Fillets (1 portion)

Ingredients:

- 140g white fish fillet
- 5g chopped garlic
- 15g chipped dry onions
- 20g diced half ripe tomatoes
- 2g chopped fresh parsley
- 5g tomato paste
- 30g chopped peeled tomato
- 8g capers
- 10g sliced black olives
- A dash of dry oregano
- A dash of ground white pepper
- A dash of salt
- 400mg granulated sugar
- 8ml syrup lemon juice concentrate

Method:

1. Place the fish fillets with the flesh side up on a well-oiled baking sheet or bake pan.
2. Brush the fish lightly firstly with lemon juice and then with butter or oil and season with salt and pepper.
3. Place the pan in a preheated oven at 175ºC for about 10 to 15 minutes.
4. Check halfway the cooking time whether the fish is drying out. If yes, brush with some more butter or oil.
5. When ready, serve portion with 60ml sauce across the centre of the portion but not covering the entire fillet.

For the sauce:

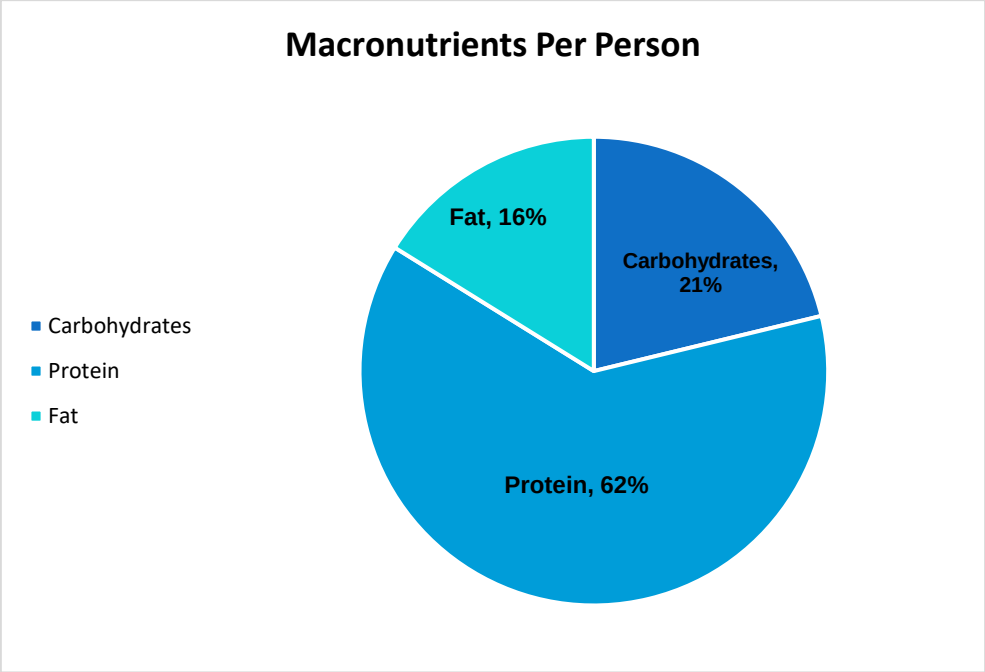
1. Sautee onions and garlic in oil.
2. Add tomato paste and sautee for another 2 minutes.
3. Add the remaining ingredients and boil.

***Note:** Minimum Internal Cooking Temperature for fish: 145˚F (63˚C) for 15 seconds

Approximate nutritional content (per portion):
Calories 172kcal
Protein 27g
Carbohydrates 9g
Fibre 2g
Fat 3g

Nutritional comments: This meal is healthy as it is low in sodium (less than 2,300mg) and high in omega 3 (white fish fillet). It provides food from two food groups (protein, vegetables) and oils, out of all five. When combined with grains such as rice, pasta, or bread, it is a well-balanced meal; for a higher fibre content, wild or brown rice can be used. Ingredients not available on-board may be ordered.

Nutritional Analysis:



The DV values* of this recipe are:

- 19% sodium
- 14% iron
- 9% zinc
- 11% calcium

*DV values are an indication of the proportion of a nutrient in a serving of a specific food as part of a healthy diet.

Oceanic menus on **Neris**, provide all information needed to prepare a meal, nutritional content, allergens identified in the meal and key vitamins included.

Part VII

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