

THE OMANI GUIDE TO HEALTHY EATING



Eat your way to a healthier day

The Omani Guide to Healthy Eating

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Ministry of Health
Oman**

May 2009

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Preface:

The vision of the Ministry of Health of Oman is to provide optimum health services for all those who need it in Oman. Since the late 1980's many success stories were witnessed, some were documented, but challenges remain to be tackled. The most important health issues that face public health authorities are those related to the epidemiological transition and pose a double burden of disease. On one side of the spectrum we continue to fight malnutrition and micronutrients deficiencies in our community, and on the other obesity and chronic diseases are on the rise. Continued and extensive efforts to manage these is the primary goal of the Ministry of Health at this stage.

Medical interventions showed limited impact on the diseases that are called "Diseases of the Lifestyle" for good reason. Life on the fast lane for young Omanis means that uninformed food choices dominates the Omani tables and lesser activity is being carried out as more time is spent in offices and in front of the TV screens. Public Health, and preventive interventions are increasingly becoming an important cornerstone of health services in Oman and over the world. To respond to this universal challenge the World Health Organization developed "Global Strategy on Diet, Physical Activity and Health"; which Oman adopted, and the technical grounds of which is based on the development of the Food Based Dietary Guidelines as well as the Physical Activity Guidelines.

In a process that took more than four years and many experts, the Department of Nutrition developed the Omani Food Based Dietary Guidelines that consists of 10 messages and a visual presentation to guide Omani lifestyle choices. Physical Activity Guide was integrated as one of the messages after extensive discussion by experts.

The "Omani Guide to Healthy Eating" contains the fruit of the Department of Nutrition efforts in this project, as well as the rationale and explanation for each message. It is targeted to Educators and Field Health Workers as a reference for the developing training materials and to assist in counseling and education activities.

This effort was possible thanks to the contribution of many individuals and Organizations. I would like to specifically express my gratitude for the World Health Organization (WHO) country office in Oman, and the WHO Eastern Mediterranean Office for their continuous support in the Ministry of Health programs. Thanks are also due to the Sultan Qaboos University and Dr. Buthaina Al Rasasi for their contribution in this project. To the WHO experts Dr. Arine Valstar, Dr. Hester H Vorster, and Ms Rana Haddad for their technical expertise provided throughout the progress of this work.

Finally, I would like acknowledge the Department of Nutrition for the diligence, efficiency and professionalism with which this project was handled and for their perseverance for this mission see the light.

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May 10, 2009*

About this booklet

This booklet was written for people who educate others about eating for good health. These will include, amongst others:

- Primary and high school health and classroom teachers, technical colleges and institutions, hospitality and culinary schools and colleges as well as university lectures
- Community educators including health educators, community health support group members, community welfare and social workers, fitness leaders and community nurses
- Health professionals including general practitioners, nutritionists, dietitians and nurses.

This booklet provides the background information needed to understand the rationale used in developing the guide so that the graphic illustration (The Omani Healthy Plate) can be adapted to include the foods appropriate for different target groups. It explains the application of each guideline on an individual and population level while providing specific recommendations for specific population groups such as older adults, pregnant and lactating women, etc.

The Omani Healthy Plate is the visual representation of The Omani Guide to Healthy Eating, a tool which can be used by health and education professional and the food industry to promote good nutrition in their work. It aims to encourage the consumption of a variety of foods from each of the six food groups every day in proportions that are consistent with the Omani Guide to Healthy Eating. It offers graphical information about the quantity and kinds of foods to choose each day that is consistent with the messages that support healthy eating.



Introduction

Change in lifestyle over the last three decades in Oman influenced by globalization and open trade policies resulted in a dramatic change in the Omani diet. High fat and processed foods found their way into the Omani meals and snacking on junk food emerged as one of the most common dietary habits among children. This change led to an increase in the prevalence of obesity and chronic diseases in Oman; a pattern that is seen in neighboring countries as well.

The food based dietary guidelines are developed to provide dietary advice and when followed can help prevent obesity and chronic diseases. The guidelines are based on stature; dietary habits and takes stock of the culture, preferences and behaviors of the Omanis. A few countries in the world developed their own guidelines including the United States; Australia and several European countries. Among the most common quoted guidelines are the American Food Guide pyramid; however the differences in the population needs and requirements makes it necessary to develop country specific guidelines.

Realizing the important discrepancies between the Omani population and others where guidelines are available, and following the World Health Organization recommendation to develop national guidelines, the Omani FBDG's were developed through a process that took several years and many experts in the fields of nutrition and communication.

This guidelines are targeted to the general population in Oman above the age of 2 years with a focus on adequate nutrition; prevention of obesity and chronic diseases including Diabetes, Hypertension, as well as Hyper-lipidemia through diet and physical activity. Patients with special dietary requirements and complicated cases are advised to consult professional dietitians. Emerging issues were taken into consideration in the development of these guidelines; most importantly issues of Trans fats; Ω -3 and Ω -6 fatty acids.

Calculating nutritional requirements

Nutritional needs of energy, protein, fats, vitamins and minerals of a person depend on his age, sex, weight, height, and physical activity. We have calculated the requirements of an average Omani person in each population group.

A person needs to consume foods that will satisfy his needs of nutrients on the average in order to stay healthy and lead a high quality of life. Variations from day to day could occur, but on average the food should provide the recommended amounts of nutrients.

There may be many nutrients that are not known to us; and it is known that a healthy diet protects from illness and improves immunity and physical as well as mental abilities probably because of the presence of unknown components and their combination. The guidelines therefore are expressed in foods, not nutrients.

The table below shows the nutritional requirements of Omanis according to their population group. Individuals, as well as scientists can refer to these; however a more practical approach is to consult the table on the number of servings corresponding to those requirements.

Population category	Age-group (years)	Energy (kcal)	Protein (g)	Carbohydrates (g)	Fiber (g)	Vitamin A (µg RE)	Vitamin D (µg)	Iron (mg)	Folate (µg)	Zinc (mg)	Calcium (mg)
Young children	1-3	1000	20-25	137.5-187.5	8-20	350-500	2.5-5.0	5.5	150-200	10	250-400
Children	4-8	1400	28-35	192.5-262.5	11-28	490-700	3.5-7	7.7	210-280	14	350-560
Adolescent											
Males	9-13	2000	40-50	275-375	16-40	700-1000	5-10	11.0	300-400	20	500-800
	14-18	3000	60-75	412.5-562.5	24-60	1050-1500	7.5-15	16.5	450-600	30	750-1200
Females	9-13	1900	38-47.5	261.3-356.3	15-38	665-950	4.8-9.5	10.5	285-380	19	475-760
	14-18	2400	48-60	330-450	19-48	840-1200	6-12	13.2	360-480	24	600-960
Adults											
Males	19-30	2100	42-52.5	288.8-393.8	17-42	735-1050	5.3-10.5	11.6	315-420	21	525-840
	31-50	2400	48-60	330-450	19-48	840-1200	6-12	13.2	360-480	24	600-960
	51-70	2200	44-55	302.5-412.5	18-44	770-1100	5.5-11	12.1	330-440	22	550-880
	>70	1800	36-45	247.5-337.5	14.5-36	630-900	4.5-9	9.9	270-360	18	450-720
Females	19-30	2000	40-50	275-375	16-40	700-1000	5-10	11	300-400	20	500-800
	31-50	2000	40-50	275-375	16-40	700-1000	5-10	11	300-400	20	500-800
	51-70	1800	36-45	247.5-337.5	14.5-36	630-900	4.5-9	9.9	270-360	18	450-720
	>70	1600	32-40	220-300	13-32	560-800	4-8	8.8	240-320	16	400-640
Pregnant	All	2100-2700	42-67.5	290-500	17-52	735-1300	5.3-13.5	11-15	315-540	21-27	525-1100
Lactating	All	2400-2900	48-72.5	330-540	19-58	840-1450	6-15	13-16	360-580	24-29	600-1160

Table 1 Recommended nutrient intakes for protein; carbohydrates; and vitamins of public health importance for various population groups of Oman



Population category	Age-group (years)	Energy (kcal)	Vitamin E (mg α TE)	Vitamin K (µg)	Vitamin C (mg)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin B6 (mg)	Vitamin B12 (µg)	Fluoride (mg)	Iodine (µg)	Sodium (g)
Young children	1-3	1000	3.5-5.0	20-40	25-30	0.5-0.8	0.6-0.9	6-10	0.5-1	0.5-1	0.5-1	75	2.5
Children	4-8	1400	4.9-7.0	28-56	35-42	0.7-1.12	0.8-1.3	8.4-14	0.7-1.4	0.7-1.4	0.7-1.4	105	3.5
Adolescent													
Males	9-13	2000	7.0-10.0	40-80	50-60	1-1.6	1.2-1.8	12-20	1-2	1-2	1-2	150	5.0
	14-18	3000	10.5-15.0	60-120	75-90	1.5-2.4	1.8-2.7	18-30	1.5-3	1.5-3	1.5-3	225	7.5
Females	9-13	1900	6.7-9.5	38-76	47.5-57	0.9-1.6	1.1-1.7	11.4-19	0.9-1.9	0.9-1.9	0.9-1.9	142	4.8
	14-18	2400	8.4-12.0	48-96	60-72	1.2-1.9	1.4-2.1	14.4-24	1.2-2.4	1.2-2.4	1.2-2.4	180	6.0
Adults													
Males	19-30	2100	7.3-10.5	42-84	52.5-63	1.1-1.7	1.3-1.9	12.6-21	1.1-2.1	1.1-2.1	1.1-2.1	158	5.3
	31-50	2400	8.4-12.0	48-96	60-72	1.2-1.9	1.4-2.2	14.4-24	1.2-2.4	1.2-2.4	1.2-2.4	180	6.0
	51-70	2200	7.7-11.0	44-88	55-66	1.1-1.8	1.3-2.0	13.2-22	1.1-2.2	1.1-2.2	1.1-2.2	165	5.5
	>70	1800	6.3-9.0	36-72	45-54	0.9-1.5	1.1-1.6	10.8-18	0.9-1.8	0.9-1.8	0.9-1.8	135	4.5
Females	19-30	2000	7.0-10.0	40-80	50-60	1-1.6	1.2-1.8	12-20	1-2	1-2	1-2	150	5.0
	31-50	2000	7.0-10.0	40-80	50-60	1-1.6	1.2-1.8	12-20	1-2	1-2	1-2	150	5.0
	51-70	1800	6.3-9.0	36-72	45-54	0.9-1.44	1.1-1.6	10.8-18	0.9-1.8	0.9-1.8	0.9-1.8	135	4.5
	>70	1600	5.6-8.0	32-64	40-48	0.8-1.3	0.9-1.4	9.6-16	0.8-1.6	0.8-1.6	0.8-1.6	120	4.0
Pregnant	All	2100-2700	7.3-13.5	42-108	52.5-81	1.0-2.2	1.3-2.4	12.6-27	1.0-2.7	1.0-2.7	1.0-2.7	157-202	5.3-6.7
Lactating	All	2400-2900	8.4-14.5	48-116	60-87	1.2-2.3	1.4-2.6	14.4-29	1.5-2.9	1.5-2.9	1.5-2.9	180-217	5.9-7.2

Table 2 Recommended nutrient intakes for protein; carbohydrates; and vitamins of public health importance for various population groups of Oman

DEFINITION OF FOOD GROUPS:

Foods are classified into groups according to their nutritional content, and they are helpful in defining what to consume and the amounts that will satisfy nutritional needs for various population groups.

The Omani food groups are composed of all food items consumed by Omanis, and these were categorized into groups according to their content of energy and nutrients. The list, which composed of 217 food items, was looked at in view of the literature available and each food item was assigned to a group.

The Omani dietary guidelines are composed of 6 food groups and these are: Whole grains and potatoes, Fruits, Vegetables, Meats and alternatives, Legumes, Milk and dairy products.

Group Name	Classifications	Foods: Example
Grains such as cereals, grains, pastas and potatoes	High fiber	Whole wheat, brown rice
	Low fiber	White flour, white rice
Vegetables	Vitamin C - rich	Sweet peppers (capsicum), tomato paste, cauliflower, beetroot, radish
	Vitamin A - rich	Lettuce, cabbage, carrots, zucchini (courgette), green peas
	Iron/Folic Acid - rich	Spinach, parsley, mulukhiya
	Others	Onions, okra, cucumber, aubergine (eggplant), garlic
Fruits	Vitamin C - rich	Citrus fruits, pineapple, guava, cherries, berries
	Vitamin A - rich	Mango, papaya, apricot, plums
	Potassium - rich	Raisins, dried figs, dates, banana, melons
	Others	Coconut, grapes, apples, pears, figs, dates, dried fruits, fresh fruit juice, canned pineapples
Meat and alternatives	Red meat	Beef, lamb and camel
	Poultry	Chicken and other poultry
	Fish	All fish
	Nuts and seeds	All nuts and seeds
	Eggs	All eggs
	Processed, high fat products	Canned meats, sausages, shawarma, kebab, chicken nuggets, fingers

Legumes (pulses)	Lentils	All types of lentils
	Dry beans and peas	All types of beans, also canned dried peas
Group Name	Classifications	Foods: Example
Milk and dairy products	Milk	Long-life, fresh, pasteurized, powdered milk
	Yoghurt	All yogurts, laban and kushk
	Cheese	All cheeses
	Others	Labneh
Fats and oils	Saturated	Ghee, butter, evaporated milk, cream
	Unsaturated such as mono-, poly- and omega-3 fatty acids	Vegetable oils and fish
	Trans fats	Snack foods, pastries, cookies, fried foods

Table 3: Food groups for the Omani Food Based Dietary Guidelines

DEFINITION OF FOOD SERVINGS:

The food servings are the most universally accepted method of quantifying food items and groups; they are used to facilitate food groups recommendations.

Food servings are based on the amount of foods from a food group typically reported in surveys as consumed on one eating occasion; amount of food that provide a comparable amount of key nutrients from that food group, for example: the amount of cheese that provides the same amount of calcium as 1 cup fluid milk; amount of foods recognized by most consumers (e.g. household measures) or that can be easily multiplied or divided to describe a quantity of food actually consumed (portion); amount traditionally used in previous food guides to describe servings.

The American serving sizes are the standard amounts that are used in most available nutrition applications.

Estimation of food servings is a useful tool for approximation of food consumption for individuals and to assess disease risk in surveys. Methods of classifying foods and assigning guideline serving size had been well established and the defined food servings are used almost universally. A complete database is available electronically at the following web link: <http://www.ars.usda.gov/Services/docs.htm?docid=8503>.

For the estimation of food servings of local dishes the methods available in the literature for converting food recipes into food groups and servings are being employed and updated software is available on request from the Ministry of Health.

General rules to understand the serving size quantities are as follows for each food group:

1. Grains 1oz eq=1/2 cup cooked rice, pasta or cooked cereal=30g 1 oz dry pasta or rice; 1 slice bread; 1 small muffin; 1 serving ready to eat cereal
2. Fruits and vegetables : 1 cup = 1 cup raw or cooked fruit or vegetable, 1/2 cup fruit or vegetable juice, 2 cups leafy salad greens.
3. Meats and alternatives= 30g lean meat, poultry or fish; 1 egg: 15g oz nuts or seeds.
4. Legumes: Half cup cooked lentils, beans or peas (1/4 cup cooked dry beans or tofu)
5. Milk and dairy: 1 cup equivalent=1 cup milk or yogurt, 45g natural cheese such as cheddar or 60g oz of processed cheese.

Summary recommendations for various age groups:

a) Children and adolescents:

Group	1-5 years	6-14 years	14-18 years	14-18 years
	M/F	M/F	Males	Females
Grains				
Whole	0.5 c	1.0 c	1.5 c	1.0 c
Refined	2.0 c	3.0 c	4.5 c	4.0 c
Fruits	2.0 c	3.0 c	5.0 c	4.0 c
Vegetables	1.5 c	2.5 c	4.5 c	4.0 c
Meats	60 g	100 g	130 g	100 g
Legumes	0.5 c	1.0 c	1.0 c	1.0 c
Milk; Dairy	0.3 c	0.5 c	1.0 c	0.5 c

Table 4 Recommended amounts of food groups for Omani children and adolescents based on energy and nutrient requirements for Omanis and food pattern and preferences.

b) Adults and Elderly:

Group	19-70	19-70	>70	Pregnant	Lactating
	Males	Females	M/F	Females	Females
Grains					
Whole	1.0 c	1.0 c	1.0 c	1.0 c	1.3 c
Refined	3.5 c	2.5 c	2.5 c	4.0 c	5.0 c
Fruits	4.0 c	3.5 c	3.0 c	4.5 c	5.5 c
Vegetables	3.0 c	3.0 c	2.5 c	4.0 c	4.5 c
Meats	100 g	80 g	75 g	105 g	126 g
Legumes	1.0 g	0.5 c	1.0 c	1.0 c	1.0 c
Milk; Dairy	0.5 c	0.5 c	0.5 c	0.5 c	1.0 c

Table 5 Recommended amounts of food groups for Omani adult males and females and elderly based on energy and nutrient requirements for Omanis and food pattern and preferences.

(Footnotes)

- 1 c= cups (servings).
- 1 cup grains = 1 slice of bread; ½ cup cooked cereal rice or pasta or 1 cup ready to eat cereal flakes.
Fruits and vegetables: 1 cup = 1 cup raw fruits or vegetables or ½ cup chopped, cooked or canned fruit or vegetable, ¾ cup of fruit or vegetables juice.
Milk and dairy: 1 cup equivalent=1.5 oz (42.5g) natural cheese (e.g cheddar); or 2 oz (56.7g) processed cheese (e.g. American).
- 2 Food groups are shown in cups (c) for grains, fruits, vegetables, legumes and dairy, in grams for meats and fats.
- 3 serving (1 ounce eq or 28.35g) grains = 1 slice of bread; ½ cup cooked cereal rice or pasta or 1 cup ready to eat cereal flakes.
- 4 Fruits and vegetables: 1 cup = 1 cup raw fruits or vegetables or ½ cup chopped, cooked or canned fruit or vegetable, ¾ cup of fruit or vegetables juice.
Milk and dairy: 1 cup equivalent=1.5 oz (42.5g) natural cheese (e.g cheddar); or 2 oz (56.7g) processed cheese (e.g. American).

Nutrients of concern

This section discusses the nutrients that should be taken into consideration when planning a diet for a healthy individual. Some are usually high in the regular diet such as fats, and others may be low. To make a good choice, the person should look at the content of these in his/her daily menu and read the labels on pre-packaged food items.

Fats: Adequate amounts of dietary fat is essential for health; where it is responsible for meeting energy requirements and satisfying the requirements of essential fatty acids and fat soluble vitamins. The type of fat is of major importance in the diet; olive; corn and canola oils (Poly unsaturated fats) lower the risk of coronary heart diseases whereas palm oil (saturated fats) and Ghee (Trans; hydrogenated fats) increase the risk of chronic diseases. Omanis consume high amounts of saturated and possibly Trans fats from Ghee, cooking oils, and processed foods and snacks.

Fiber: Dietary fiber can help reduce the risk of many chronic diseases. Important sources of dietary fiber in the Omani diet are the legumes; fruits; vegetables and whole grains such as whole wheat bread, harees grains (whole wheat), etc.

Iron: This nutrient has several vital functions in the body. It serves as a carrier of Oxygen to the tissues from the lungs by red blood cell hemoglobin, a transport medium for electrons within cells and as an integrated part of important enzyme systems in various tissues. Iron deficiency results in reduced physical working capacity in human populations with long standing iron deficiency and it was shown that this improved after iron supplementation. Early iron deficiency among infants may result in non-reversible brain cells damage, and negatively influences the normal defense system against infections. Attention, memory and learning in infants and small children are also influenced by iron deficiency. Iron deficiency among pregnant women may also have adverse effects on birth outcome (1).

To satisfy the requirements of iron; the diet should contain adequate amounts of heme iron (meat; poultry; fish) and non-heme iron (green leafy vegetables, legumes). Fortified products are also important sources of iron such as fortified flour, and cereals. The Omani diet provides only 28% of the requirements before fortification. When using the fortified flour at the level of 30 ppm the diet satisfies 64% of the requirements of the average Recommended Nutrients Intake.

Folate: Folate status of pregnant women was shown to be an important factor in birth outcome; pre-conception folate intake is a major factor in preventing neural tube defects. Increasing folate intake also lowers elevated homocysteine concentration in the blood which may reduce the risk of cardiovascular diseases and stroke.

Dietary folate is available in fortified and whole wheat flour; legumes; and vegetables. Before fortification only 35% of the folate requirements were satisfied by the diet, which went up to 93% after fortification of folic acid. At least 59% of the dietary folate is supplied by wheat flour in the Omani diet.

Vitamin D and calcium: Vitamin D is required to maintain normal blood levels of calcium and phosphate which are needed for bone health, muscle contraction, nerve conduction, and general cellular function in all cells of the body. Its deficiency can result in rickets in children and if coupled with calcium deficiency osteoporosis in adults. Vitamin D is synthesized in the skin by the sun; therefore adequate exposure on a daily basis to the sun; and enough consumption of calcium.

The main source of calcium in the Omani diet is milk and the Omani diet currently supplies on average 1.6 µg whereas the requirements are 4.5-9.0 µg per day. There is no information on the status of exposure to sun in Oman, which is a major factor in vitamin D nutrition. It is recommended that strategies to improve vitamin D status should also focus on adequate exposure to sun. Highlighting the duration of exposure. As it is recommended to limit sun exposure to 15-20 minutes daily with avoidance of exposure between 11am and 3pm.

Zinc: Zinc plays an important role in the immune system, the clinical deficiency of which manifests in growth retardation, delayed sexual and bone maturation, skin lesions, diarrhea, alopecia, impaired appetite, increased susceptibility to infection mediated via defects in the immune system and the appearance of behavioral changes. The Omani diet contributes only 54% of the minimum recommendation of 10.8 mg per day of dietary zinc. Dietary protein improves zinc absorption whereas the presence of phytates inhibits it. It is recommended to promote zinc rich foods, which are lean red meat, whole grain cereals, pulses, and legumes.

Sodium: High sodium intake and salted foods is associated with hypertension; cardiovascular diseases and stomach cancer. The intake of sodium is estimated to be twice the requirements, of which table salt contributes 87% of the supply. Other sources of sodium in the Omani diet are salted fish, canned tomato paste, sausages and eggs.

Guideline 1: Vary your diet making it healthy and balanced

Nutrition surveys in Oman show that some Omanis are obese and others are malnourished, whereas micronutrients deficiencies such as iron, vitamin A and iodine are prevalent. This indicates that Omanis may be consuming high energy foods that lack essential nutrients, and a small percentage are consuming a diet that is low in energy and nutrients.

A balanced diet should supply the body with the energy necessary for growth, survival and daily activity, but it should also supply the necessary vitamins and minerals. The Omani daily diet therefore need to be modified to include foods and snacks that are high in nutrients and low in calories. The type of fat is of high importance. Processed snacks that contain Trans fats and high salt content are possible risk factors for hyperlipidemia and cardiovascular diseases.

A variable diet is one that satisfies the nutrients requirements of a person while maintaining the energy content at the recommended levels. In order to meet these requirements the diet should consist of: Cereals; meats; fruits; vegetables; legumes; milk and dairy and fats and oils in quantities that are specified in (Table 6). Different foods provide different levels of nutrients; and to satisfy the requirements of all nutrients a variety of foods between and within groups should be consumed regularly. Moreover, foods contain hundreds of naturally occurring substances such as carotenoids; flavonoids and isoflavones. Some of these had been associated with prevention of disease; and many others may be unknown. Consuming a variety of foods from within and between each group ensures that the diet contains those substances.

- Ensure that your diet contains enough quantities of grains; fruits; vegetables; legumes; meats and alternatives; milk and dairy and water daily.
- Consume sufficient amounts of fruits and vegetables; and ensure to include all subgroups in your daily diets.
- Consume fortified foods such as iron fortified flour; vitamin A fortified oil and iodine fortified salt.
- Choose your fats wisely and consume foods with low content of saturated and Trans fats.

Table 6 Recommended quantities of food groups and sub groups according to energy requirement and Omani population groups based on calculated energy and nutrient requirements of Omanis and local food pattern.

Calories	1000	1400	1600	1800	2000	2200	2400	2600	3000
Food Group ²	Child 1-3	Child 4-8	F: >70	M: 70, F: 51-70	M/F: 9-13, F: 19-50	M:19-30	M: 51-70 M: 31-50 F: 14-18	Pregnant women	M: 14-18; F: lactating
Grains ³ (c)									
Whole	0.4	0.6	0.7	0.8	0.9	0.9	1.0	1.1	1.3
Refined	1.6	2.3	2.6	2.9	3.2	3.5	3.9	4.2	4.9
Fruits (c) ⁴									
Vitamin A	0.4	0.6	0.6	0.7	0.7	0.8	0.9	1.0	1.2
Vitamin C	0.4	0.6	0.7	0.8	0.8	0.8	0.9	1.0	1.2
Potassium	0.3	0.4	0.5	0.6	0.6	0.6	0.7	0.8	0.9
Other fruits	0.7	1.0	1.1	1.2	1.4	1.5	1.7	1.8	2.1
Vegetables (C)									
Vitamin A	0.3	0.5	0.6	0.7	0.7	0.8	0.8	0.9	1.1
Vitamin C	0.4	0.6	0.7	0.8	0.8	0.9	1.0	1.1	1.3
Iron rich	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2
Other vegetables	0.6	0.9	1.0	1.1	1.3	1.3	1.6	1.6	1.8
Meats and Alternatives (g)	35	84	70	77	91	91	91	105	126
Legumes(pulses) (c)	0.3	0.5	0.6	0.7	0.7	0.7	0.8	0.9	1.1
Milk and dairy (c)	0.2	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.8
Fats (g)	29	40	47	52	59	63	70	77	81

² Food groups are shown in cups (c) for grains, fruits, vegetables, legumes and dairy, in grams for meats and fats.

- 1 serving (1 ounce eq or 28.35g) grains = 1 slice of bread; ½ cup cooked cereal rice or pasta or 1 cup ready to eat cereal flakes.
- Fruits and vegetables: 1 cup = 1 cup raw fruits or vegetables or ½ cup chopped, cooked or canned fruit or vegetable, ¾ cup of fruit or vegetables juice.
- Milk and dairy: 1 cup equivalent=1.5 oz (42.5g) natural cheese (e.g cheddar); or 2 oz (56.7g) processed cheese (e.g. American).

Guideline 2: Choose whole grains and cereals, and consume potatoes, with their skin

This group is the main source of carbohydrates in the diet, which should constitute between 55-75% of total. Free sugars should not exceed 10% of the total calories in the diet. This means that for an average diet of 2000; a person should consume 8 servings of this food group (Table 3).

Whole grains have many beneficial effects as they are positively associated with Insulin Sensitivity, better weight control management, prevention of heart diseases and cancer. Some studies suggest a preventive role of whole grains against cancer. They are also a major source of dietary fiber that is known to promote satiety; regulate bowel movement and reduce the risk of obesity; cancer and cardiovascular diseases. In addition whole grains are a good source of B vitamins and minerals and folate.

It is advised to consume at least a third of daily consumption of cereals from whole grain bread and foods that contain whole grains such as Harees, barley soup, etc. Therefore for a an average diet of 2000 calories 2-3 servings of whole grains daily is advised.

- Grains are important sources of many nutrients, including dietary fiber, several B vitamins (thiamin, riboflavin, niacin, and folate), and minerals (iron, magnesium, and selenium).
- Dietary fiber from whole grains, as part of an overall healthy diet, helps to delay gastric emptying, promote satiety, and improve blood lipids levels.
- Dietary fiber helps in lowering glucose concentrations and enhances Insulin sensitivity among Diabetics.
- Fiber-containing foods such as whole grains help provide a feeling of fullness with fewer calories.
- Whole grains are good sources of dietary fiber; most refined (processed) grains contain little fiber.
- B vitamins (thiamin, riboflavin, niacin, and folate) play a key role in metabolism – they help the body release energy from protein, fat, and carbohydrates. B vitamins are also essential for a healthy nervous system. Many refined grains are enriched with these B vitamins.
- Whole grains are sources of magnesium and selenium. Magnesium is a mineral used in building bones and releasing energy from muscles. Selenium protects cells from oxidation. It is also important for a healthy immune system.
- Potassium may help maintain healthy blood pressure sweet potatoes and white potatoes are good sources of these.

Table 7A Food items of the Grains group consumed or available in Oman.

Group	Examples	1-5 years	6-14 years	14-18 years	14-18 years
		M/F	M/F	Males	Females
Grains					
Whole	(cup)	0.5	1	1.5	1
	Whole wheat,	0.5	1	1.5	1
	Brown rice	0.25	0.5	0.75	0.5
	Brown pasta	0.25	0.5	0.75	0.5
	Harees, Jareesh, Barley	0.25	0.5	0.75	0.5
	Brown bread (slice)	0.5	1	1.5	1
	Whole breakfast cereals	0.5	1	1.5	1
	Potato with skin (small)	0.5	1	1.5	1
Refined		2	3	4.5	4
	White rice	1	1.5	2.25	2
	White flour	2	3	4.5	4
	White bread	2	3	4.5	4
	Pealed potato (small)	2	3	4.5	4
	Breakfast cereals	2	3	4.5	4

Table 7B Food items of the Grains group consumed or available in Oman.

Group	Examples	19-70	19-70	>70	Pregnant	Lactating
		Males	Females	M/F	Females	Females
Grains						
Whole	(cup)	1	1	1	1	1.3
	Brown rice	0.5	0.5	0.5	0.5	0.75
	Brown pasta	0.5	0.5	0.5	0.5	0.75
	Harees, Jareesh, Barley	0.5	0.5	0.5	0.5	0.75
	Brown bread (slice)	1	1	1	1	1.3
	Whole breakfast cereals	1	1	1	1	1.3
	Potato with (small)	1	1	1	1	1.3
Refined		3.5	2.5	2.5	4	5
	white rice	1.75	1.25	1.25	2	2.5
	White flour	3.5	2.5	2.5	4	5
	White bread	3.5	2.5	2.5	4	5
	Pealed potato (small)	3.5	2.5	2.5	4	5
	Breakfast cereals	3.5	2.5	2.5	4	5

Guideline 3: Consume 3-5 servings of vegetables daily

All kinds of vegetables are important sources of vitamins and minerals; and the nutrients value are different. For example green leafy vegetables are good source of vitamin A and dietary fiber; whereas yellow vegetables such as carrots are good sources of vitamin A. The antioxidant content of vegetables is a major factor in the prevention of chronic diseases. The recommended intake of vegetables is about 3 servings (3 uncooked cups; or 1.5 cooked, chopped or canned cups) daily. It is important to distribute the intake of vegetables among the 4 subgroups: vitamin A vegetables; vitamin C vegetables; iron rich vegetables and others on a daily basis. Table 5 shows the food items in the Omani diet of each vegetables sub group.

- Eating a diet rich in fruits and vegetables as part of an overall healthy diet may reduce risk for stroke and perhaps other cardiovascular diseases, type 2 Diabetes and coronary heart disease. It also may reduce the risk of developing kidney stone and may decrease bone loss.
- Eating a diet rich in fruits and vegetables as part of an overall healthy diet may protect against certain cancers, such as mouth, stomach, and colon-rectum cancer.
- Eating foods such as vegetables that are low in calories per cup instead of some other higher-calorie food may be useful in helping to lower calorie intake.
- Most vegetables are naturally low in fat and calories. None have cholesterol. (Sauces or seasonings may add fat, calories, or cholesterol.)
- Vegetables are important sources of many nutrients, including potassium, dietary fiber, folate (folic acid), vitamin A, vitamin E, and vitamin C.
- Diets rich in potassium may help to maintain healthy blood pressure. Vegetable sources of potassium include white beans, tomato products (paste, sauce, and juice), beet greens, soybeans, lima beans, winter squash, spinach, lentils, kidney beans, and split peas.
- Vitamin A keeps eyes and skin healthy and helps to protect against infections.
- Vitamin E helps protect vitamin A and essential fatty acids from cell oxidation.
- Vitamin C helps heal cuts and wounds and keeps teeth and gums healthy. Vitamin C aids in iron absorption.

Currently the average Omani diet includes 2 servings mostly from tomatoes (mainly prepackaged); and onions. It is important to increase the number of servings to an average of 4; giving special attention to including a variety of fresh vegetables; such as vitamin A vegetables (carrots; cabbage and zucchini); vitamin C vegetables (sweet peppers; tomato; cauliflower); and iron rich vegetables (green leafy vegetables) as well as others such as onions Okra; eggplant; and cucumber.

Table 8A Food items consumed in Oman or available in the Omani market from the vegetable food group and it's subgroups.

Group	1-5 years	6-14 years	14-18 years	14-18 years
	M/F	M/F	Males	Females
Vegetables (Cup)	1.5	2.5	4.5	4
Classifications				
Vitamin C - rich	Sweet peppers (capsicum), tomato paste, cauliflower, beetroot, radish			
Vitamin A - rich	Lettuce, Cabbage, carrots, zucchini (courgette), Green peas			
Iron/Folic Acid – rich	Spinach, parsley, mulukhiya			
Others	Onions, okra, cucumber, aubergine (eggplant), garlic			

Table 8B Food items consumed in Oman or available in the Omani market from the vegetable food group and it's subgroups.

Group	19-70	19-70	>70	Pregnant	Lactating
	Males	Females	M/F	Females	Females
Vegetables (Cup)	3	3	2.5	4	4.5
Classifications					
Vitamin C - rich	Sweet peppers (capsicum), tomato paste, cauliflower, beetroot, radish				
Vitamin A - rich	Lettuce, Cabbage, carrots, zucchini (courgette), Green peas				
Iron/Folic Acid – rich	Spinach, parsley, mulukhiya				
Others	Onions, okra, cucumber, aubergine (eggplant), garlic				

Guideline 4: Consume 2-4 servings of fruits daily

Similar to vegetables, fruits are important sources of vitamins and minerals. Vitamin A which is important for epithelial function; immunity and as an antioxidant can be found in Mango; Papaya as well as apricot and plums. These are local agricultural produce in Oman. Vitamin C; an enhancer of iron absorption is available in citrus fruits such as oranges and lemons. Bananas; and melons are rich in potassium that had been shown to reduce the risk of hypertension. Each subgroup contains a variety of other constituents including dietary fiber and antioxidants that promote adequate nutritional status and prevent chronic diseases.

- Eating a diet rich in fruits as part of an overall healthy diet may reduce risk for stroke and perhaps other cardiovascular diseases. It also may reduce the risk of type 2 Diabetes.
- Eating a diet rich in fruits as part of an overall healthy diet may protect against certain cancers, such as mouth, stomach, and colon-rectum cancer.
- Diets rich in foods containing fiber, such as fruits and vegetables, may reduce the risk of coronary heart disease.
- Eating foods such as fruits that are low in calories per cup instead of some other higher-calorie food may be useful in helping to lower calorie intake.
- Most fruits are naturally low in fat, sodium, and calories. None have cholesterol.
- Fruits are important sources of many nutrients, including potassium, dietary fiber, vitamin C, and folate (folic acid).
- Diets rich in potassium may help to maintain healthy blood pressure. Fruit sources of potassium include bananas, prunes and prune juice, dried peaches and apricots, cantaloupe, honeydew melon, and orange juice.
- Dietary fiber from fruits, as part of an overall healthy diet, helps reduce blood cholesterol levels and may lower risk of heart disease
- Whole or cut-up fruits are sources of dietary fiber; fruit juices contain little or no fiber.
- Vitamin C is important for growth and repair of all body tissues, helps heal cuts and wounds, and keeps teeth and gums healthy.

The Omani diet contains about 2 servings of fruits; mostly from melon dates; and mango. In order to satisfy the nutrients requirements at least 3 servings for an average diet of 2000 calories. A piece of fruits such as Banana; apples; and oranges or a ½ cup of chopped fruits such as melons constitute a serving.

Table 9A Food items consumed in Oman or available in the Omani market from the fruit group and it's subgroups.

Group	1-5 years	6-14 years	14-18 years	14-18 years
	M/F	M/F	Males	Females
Fruits (Cup)	2	3	5	4
Classifications				
Vitamin C - rich	Citrus fruits, pineapple, guava, cherries, berries			
Vitamin A - rich	Mango, papaya, apricot, plums			
Potassium - rich	Raisins, Dried figs, Dates, Banana, Dried, melons			
Others	Coconut, grapes, apples, pears, figs, dates, dried fruits, fresh fruit juice, canned pineapples			

Table 9B Food items consumed in Oman or available in the Omani market from the fruit group and it's subgroups.

Group	19-70	19-70	>70	Pregnant	Lactating
	Males	Females	M/F	Females	Females
Fruits (Cup)	4	3.5	3	4.5	5.5
Classifications					
Vitamin C - rich	Citrus fruits, pineapple, guava, cherries, berries				
Vitamin A - rich	Mango, papaya, apricot, plums				
Potassium - rich	Raisins, Dried figs, Dates, Banana, Dried, melons				
Others	Coconut, grapes, apples, pears, figs, dates, dried fruits, fresh fruit juice, canned pineapples				

Guideline 5: Consume fish, poultry, eggs or lean meat

Meats; poultry and fish are major sources of proteins, dietary fiber and minerals. In addition fish is a major source of ω -3 fatty acids which had been shown to be an important factor in the prevention of hyperlipidemia; cardiovascular diseases and promotes brain development in infants. The consumption of chicken is currently 2 times the consumption of meat; and about 5 times the consumption of fish. Processed meats also constitute an important portion of the meat group intake, which means that the levels of trans fats are double the upper recommended levels and the levels of ω -3 fatty acids consumption constitute 20% of the recommended target.

Meat, poultry, fish, eggs, and nuts supply many nutrients. These include protein, B vitamins (niacin, thiamin, riboflavin, and B6), vitamin E, iron, zinc, and magnesium.

- Proteins function as building blocks for bones, muscles, cartilage, skin, and blood. They are also building blocks for enzymes, hormones, and vitamins. Proteins are one of three nutrients that provide calories (the others are fat and carbohydrates).
- B vitamins found in this food group serve a variety of functions in the body. They help the body release energy, play a vital role in the function of the nervous system, aid in the formation of red blood cells, and help build tissues.
- Vitamin E is an anti-oxidant that helps protect vitamin A and essential fatty acids from cell oxidation.
- Iron is used to carry oxygen in the blood. Many teenage girls and women in their child-bearing years have iron-deficiency anemia. They should eat foods high in heme-iron (meats) or eat other non-heme iron containing foods along with a food rich in vitamin C, which can improve absorption of non-heme iron.
- Magnesium is used in building bones and in releasing energy from muscles.
- Zinc is necessary for biochemical reactions and helps the immune system function properly.
- Diets that are high in saturated fats raise “bad” cholesterol levels in the blood. The “bad” cholesterol is called LDL (low-density lipoprotein) cholesterol. High LDL cholesterol, in turn, increases the risk for coronary heart disease. Some food choices in this group are high in saturated fat. These include fatty cuts of beef, lamb; regular (75% to 85% lean) ground beef; regular sausages, and hot dogs, some luncheon meats such as regular bologna and salami; processed meats and some poultry such as duck. To help keep blood cholesterol levels healthy, limit the amount of these foods you eat.
- Diets that are high in cholesterol can raise LDL cholesterol levels in the blood. Cholesterol is only found in foods from animal sources. Some foods from this group are high in cholesterol. These include egg yolks (egg whites are cholesterol-free) and organ meats such as liver and giblets. To help keep blood cholesterol levels healthy, limit the amount of these foods you eat.

- A high intake of fats makes it difficult to avoid consuming more calories than are needed.

Make sure to include fish, nuts, and seeds?

- Many people do not make varied choices from this food group, selecting meat or poultry everyday as their main dishes. Varying choices and including fish, nuts, and seeds in meals can boost intake of monounsaturated fatty acids (MUFAs) and polyunsaturated fatty acids (PUFAs). Most fat in the diet should come from MUFAs and PUFAs. Some of the PUFAs are essential for health—the body cannot create them from other fats.
- Some fish (such as salmon, trout, and herring) are high in a type of PUFA called “omega-3 fatty acids.” The omega-3 fatty acids in fish are commonly called “EPA” and “DHA.” There is some limited evidence that suggests eating fish rich in EPA and DHA may reduce the risk for mortality from cardiovascular disease. (EPA is eicosapentaenoic acid and DHA is docosahexaenoic acid.)
- Some nuts and seeds (flax, walnuts) are excellent sources of essential fatty acids, and some (sunflower seeds, almonds, hazelnuts) are good sources of vitamin E.
- It is advised to consume at least 5 portions of fish a week (1 serving= 30 g); to increase the levels of ω -3 fatty acids from fish.

Salted and dried fish:

- Increased consumption of salted, smoked and dried fish is associated with the risk of stomach, and other types of cancers.
- These types of fish do not include the ω -3 fatty acids available from fatty fish.
- The salt content of Omani salted fish could increase the risk of hypertension.
- It is advised to limit the intake of salted, smoked and dried fish to lesser than one time a week.

Table 10A Food items consumed or available in the Omani market from the meats food group.

Group	1-5 years*	6-14 years	14-18 years	14-18 years
	M/F	M/F	Males	Females
Meat alternatives (g)	60	100	130	100
Classifications				
Red meat	Beef, lamb and camel			
Chicken and other poultry	Chicken and other poultry			
All fish	All fish			
All nuts and seeds	All nuts and seeds			
Eggs	All eggs			
Processed products	Canned meats, sausages, shawarma, kebab, chicken nuggets, fingers			

*Note: Foods to be introduced to infants 0-2 years should follow the National Infant & Young Child Feeding Policy (Refer to Complimentary Foods booklet, Ministry of Health - Oman)

Table 10B Food items consumed or available in the Omani market from the meats food group.

Group	19-70	19-70	>70	Pregnant	Lactating
	Males	Females	M/F	Females	Females
Meat alternatives (g)	100	80	75	105	126
Classifications					
Red meat	Beef, lamb and camel				
Chicken and other poultry	Chicken and other poultry				
All fish	All fish				
All nuts and seeds	All nuts and seeds				
Eggs	All eggs				
Processed products	Canned meats, sausages, shawarma, kebab, chicken nuggets, fingers				

Guideline 6: Consume one serving of legumes daily

These are good sources of important nutrients such as magnesium, potassium, iron, folate, fiber and protein and are a source of essential fatty acids as well. Legumes are rich in Flavonoids, Isoflavones and phytosterols.

Currently the consumption of legumes such as lentils; beans and chickpeas is about 11 g per day. For a diet of 2000 kcal; it is advised to consume one small coffee cup of legumes a day, which is about 80 g.

- Plant foods from the legume family include dry beans, peas, lentils and soybeans.
- Plant foods can reduce the risk of several types of cancer.
- Legumes are excellent sources of protein, low-glycemic index carbohydrates, essential micronutrients and fiber.
- Studies showed that intake of vegetables, legumes and fruit are associated with reduced risk of mortality from cardiovascular diseases among Diabetic population.
- Substituting legumes for foods that are high in saturated fats or refined carbohydrates is likely to lower the risk of cardiovascular disease and type 2 diabetes mellitus.
- Legumes are rich in flavonoids and higher intakes of flavonoid-rich foods were associated with reductions in cardiovascular disease risk and reduced risk of chronic diseases in some studies.
- Legumes are rich in Phytosterols, a chemical that resembles cholesterol structurally.
- Phytosterols inhibit the intestinal absorption of cholesterol and serum LDL cholesterol.
- Some epidemiological studies have found that higher intakes of plant foods containing phytosterols are associated with decreased cancer risk
- The results of a few clinical trials suggest that phytosterol supplementation at relatively low doses can improve urinary tract symptoms related to benign prostatic hyperplasia, but further research is needed to confirm these findings.

Table 11A Food items consumed or available in the Omani market from the legumes food group.

Group	1-5 years	6-14 years	14-18 years	14-18 years
	M/F	M/F	Males	Females
(Legumes (pulses) (g	0.5	1	1	1
Classifications				
Lentils	All types of lentils			
Dry beans	All types of chickpeas, beans, also canned			
peas	peas			

Table 11B Food items consumed or available in the Omani market from the legumes food group.

Group	19-70	19-70	>70	Pregnant	Lactating
	Males	Females	M/F	Females	Females
(Legumes (pulses) (Cup	1	0.5	1	1	1
Classifications					
Lentils	All types of lentils				
Dry beans	All types of chickpeas, beans, also canned				
peas	peas				

Guideline 7: Consume Milk or Dairy products Daily

Milk and dairy products are important sources of calcium which is vital for bone health, as well as protein. The fat content of whole milk and cheeses should be taken into consideration when consuming from this food group. Wisely choosing low fat variety; and limiting the contribution of cheeses in this group is helpful in controlling the amounts of fat. The recommended amount of the milk group for a 2000 kcal diet is about 0.5 servings where 1 cup equivalent=1.5 oz (45g) natural cheese (e.g cheddar); or 2 oz (60g) processed cheese (e.g. American).

- Diets rich in milk and milk products help build and maintain bone mass throughout the lifecycle. This may reduce the risk of osteoporosis.
- The intake of milk products is especially important to bone health during childhood and adolescence, when bone mass is being built.
- Diets that include milk products tend to have a higher overall nutritional quality.
- Calcium is used for building bones and teeth and in maintaining bone mass. Milk products are the primary source of calcium in our diet.
- Diets rich in potassium may help to maintain healthy blood pressure. Milk products, especially yogurt and fluid milk, provide potassium.
- Vitamin D functions in the body to maintain proper levels of calcium and phosphorous, thereby helping to build and maintain bones. Milk that is fortified with vitamin D is a good source of this nutrient. Other sources include vitamin D-fortified yogurt and vitamin D-fortified ready-to-eat breakfast cereals.
- Milk products that are consumed in their low-fat or fat-free forms provide little or no solid fat.

Make fat-free or low-fat choices from the milk group:

Choosing foods from the milk group that are high in saturated fats and cholesterol can have health implications. Diets high in saturated fats raise “bad” cholesterol levels in the blood. The “bad” cholesterol is called LDL (low-density lipoprotein) cholesterol. High LDL cholesterol, in turn, increases the risk for coronary heart disease. Many cheeses, whole milk, and products made from them are high in saturated fat. To help keep blood cholesterol levels healthy, limit the amount of these foods you eat. In addition, a high intake of fats makes it difficult to avoid consuming more calories than are needed.

Table 12A Food items consumed or available in the Omani market from the milk and dairy food group.

Group	1-5 years	6-14 years	14-18 years	14-18 years
	M/F	M/F	Males	Females
(Milk and dairy products (Cup	0.3	0.5	1	0.5
Classifications				
Milk	Long-life, fresh, pasteurized, powdered milk			
Yoghurt	All yogurts, laban and kushk			
Cheese	All cheeses			
Others	Labneh			

Table 12B Food items consumed or available in the Omani market from the milk and dairy food group.

Group	19-70	19-70	>70	Pregnant	Lactating
	Males	Females	M/F	Females	Females
(Milk and dairy products (Cup	0.5	0.5	0.5	0.5	1
Classifications					
Milk	Long-life, fresh, pasteurized, powdered milk				
Yoghurt	All yogurts, laban and kushk				
Cheese	All cheeses				
Others	Labneh				

Guideline 8: Limit Your Fat Intake And Choose Your Snacks Wisely

Dietary fat is important for the health and functioning of the human body; but the amount of fat as well as the type of fat could influence the health status.

High intakes of saturated fat, trans fats and cholesterol increases the risk of bad blood lipids which in turn increases the risk of coronary heart disease. On the other hand low intake of fats could increase the risk of inadequate fat soluble vitamins such as vitamin E, and A and essential fatty acids and could contribute to unfavorable changes in high density lipoprotein (HDL) blood cholesterol and triglycerides. Refer to Box 1 below.

What are saturated fatty acids?

Saturated fatty acids have all the hydrogen the carbon atoms can hold. Saturated fats are usually solid at room temperature, and they're more stable — that is, they don't combine readily with oxygen. **Saturated fats and trans fats are the main dietary factors in raising blood cholesterol.** The main sources of saturated fat in the typical American diet are foods from animals and some plants.

What are trans fats?

Trans fats are unsaturated, but they can raise total and LDL (“bad”) cholesterol and lower HDL (“good”) cholesterol. Trans fats result from adding hydrogen to vegetable oils used in commercial baked goods and for cooking in most restaurants and fast-food chains.

- Cookies, crackers and other commercial baked goods made with partially hydrogenated vegetable oils may be high in trans fat.
- French fries, donuts and other commercial fried foods are major sources of Trans fat in the diet.

Box 1

Fats That Raise Cholesterol	Sources	Examples
Dietary cholesterol	Foods from animals	Meats, egg yolks, dairy products, organ meats (heart, etc.), fish and poultry
Saturated fats	Foods from animals certain plant oils	Whole milk, cream, ice cream, whole-milk cheeses, butter, lard and meats palm, palm kernel and coconut oils, cocoa butter
Trans fats	Partially hydrogenated vegetable oils	Cookies, crackers, cakes, French fries, fried onion rings, donuts

What are hydrogenated fats?

During food processing, fats may undergo a chemical process called hydrogenation. “Hydrogenate” means to add hydrogen or, in the case of fatty acids, to saturate. The process changes a liquid oil, naturally high in unsaturated fatty acids, to a more solid and more saturated form. The greater the degree of hydrogenation, the more saturated the fat becomes. Many commercial products contain hydrogenated or partially hydrogenated vegetable oils. Recent studies suggest that these fats may raise blood cholesterol. The fatty acid content of most margarines and spreads is printed on the package or label. Liquid and soft tub margarines contain little saturated fat or trans fat.

What are polyunsaturated and monounsaturated fatty acids?

Polyunsaturated and monounsaturated fatty acids are two types of unsaturated fatty acids. Unsaturated fats have at least one unsaturated bond — that is, at least one place that hydrogen can be added to the molecule. They’re often found in liquid oils of vegetable origin.

- Polyunsaturated oils are liquid at room temperature and in the refrigerator. They easily combine with oxygen in the air to become rancid.
- Monounsaturated oils are liquid at room temperature but start to solidify at refrigerator temperatures. See the Box 2 below for sources.

Box 2

Fats That Lower Cholesterol	Examples
Polyunsaturated fats	Safflower, sesame, soy, corn and sunflower-seed oils, nuts and seeds
Monounsaturated fats	Olive, canola and peanut oils, avocados

Polyunsaturated fats tend to help your body get rid of newly formed cholesterol. Thus, they keep the blood cholesterol level down and reduce cholesterol deposits in artery walls. Recent research has shown that monounsaturated fats may also help reduce blood cholesterol as long as the diet is very low in saturated fat.

Both types of unsaturated fats may help lower your blood cholesterol level when used in place of saturated fats in your diet. But you should be moderate in eating all types of fat, because fats contain more than twice the calories of either protein or carbohydrate.

Polyunsaturated or monounsaturated oils — and margarines and spreads made from them — should be used in limited amounts in place of fats with a high saturated fat content,

such as butter, lard or hydrogenated shortenings. Choose fats and oils that contain less than 2 grams of saturated fat per tablespoon.

Fat supply energy and essential fatty acids and serve as a carrier for the absorption of fat soluble vitamins A, D, E, K and carotenoids. They serve as building blocks and has a key regulatory role in many biological functions. The recommendations for fat intake focus not only on the total fat intake which should not exceed 30% of total calories; but also the type of fat. Trans fats; which is the hydrogenated forms of fat that are consumed as hydrogenated vegetable fats and ghee are associated with coronary heart diseases even at low concentrations therefore it is recommended to reduce their intake to less than 0.1%. This type of fat is commonly found in fast food; French fries; cookies and doughnuts, etc.

The table below shows the recommended intake of fats for different population groups in Oman. Currently the intake of fat contributes more than 40% of the caloric intake of Omanis; which has serious impact on the health and well being.

Fats in the Omani diet are supplied mostly by the snacks and fast foods especially for younger and school aged children. The habit of adding ghee or butter on the table still persists in some communities and should be discouraged; in addition fast foods and fried food intake should be replaced with healthier choices.

Salt preserved foods and high salt intake may increase the risk of stomach cancer, therefore salt and salted foods should be consumed in moderation.

Most fatty foods are also high in salt, or sugar. High salt intake is a risk factor for hypertension, and sugar can predispose tooth decay.

Table 13 Food items consumed or available in the Omani market from the fats and oils, and foods high in salt, sugar and fat.

Group Name	Classifications	Foods: Example
Fats and oils	Saturated	Ghee, butter, evaporated milk, cream
	Unsaturated such as mono-, poly- and omega-3 fatty acids	Vegetable oils and fish
	Trans fats	Snack foods, pastries, cookies, fried foods
Foods high in salt, sugar and fat	Salt & salty food	Chips, salty and high fat snacks
	Sugar & sugary foods	Sugar, honey, ice-cream, puddings, halwa, candy, etc.
	All foods high in fat	Cookies, biscuits, crisps, chocolate, etc.

Guideline 9: Follow the five keys to safer food

A healthy diet should be nutritious and safe. Contamination of food with bacteriological, chemical and/or physical hazards leads to illness that varies from stomach upset and diarrhea to the nervous system. Millions of people suffer everyday from foodborne illnesses that can be prevented by simple hygiene practices and making the right choices when choosing, preparing, cooking and storing food.

The five keys to safe food are:

1. **KEEP CLEAN**

- Wash your hands before handling food and often during food preparation, after going to the toilet.
- Wash and sanitize all surfaces and equipment used for food preparation.
- Protect kitchen areas and food from insects, pests and other animals.

While most organisms do not cause disease, dangerous microorganisms are widely found in soil, water, animals and people. These microorganisms are carried on hands, wiping clothes and utensils, especially cutting boards and the slightest contact can transfer them to food and cause foodborne diseases.



Hands should be washed:

- Before handling food and often during food preparation.
- Before eating.
- After going to the toilet.
- After handling raw meat or poultry.
- After changing baby's diaper.
- After blowing your nose,
- After handling rubbish
- After handling chemicals (including detergents)
- After touching pet animals
- After smoking.

How to clean plates and utensils:

- Clean while preparing food, paying special attention to eating drinking, and cooking utensils that touch raw food or the mouth.
- Sanitize cutting boards and utensils after they have been in contact with raw meat or

- sea food.
- Clean and dry the cleaning equipment as microorganisms grow fast on damp places.

After meals:

- Scrape excess food into a rubbish bin
- Wash the dishes in hot water with detergent using a clean cloth or brush to remove left-over food and grease
- Rinse in clean hot water
- Sanitize utensils with boiling water or with a sanitizing solution
- And leave dishes and cooking utensils to air dry or wipe with a clean dry cloth.

Cleaning: is the process of physically removing dirt and crumbs of food. Sanitizing: is the process of disinfecting or killing germs. To make a sanitizing solution: 5 ml of household bleach in 750 ml of water. Use for utensils, surfaces and wiping clothes.

How to protect food preparation areas from pets:

Pets are rats, mice, birds, cockroaches, flies and other insects. Pet animals (dogs, cats, birds, etc) carry microorganisms and pests (fleas, ticks, etc) on their feet, fur and feathers.

- Keep food covered in closed containers
- Keep rubbish containers covered and remove the rubbish regularly
- Keep food preparation areas in good condition (repair wall cracks or holes).
- Use baits or insecticides to kill pests (taking care not to contaminate food)
- Keep domestic animals away from food preparation areas

2. SEPARATE RAW AND COOKED FOODS



- Separate raw meat, poultry and seafood from other foods.
- Use separate equipment and utensils such as knives and cutting boards for handling raw foods
- Store food in containers to avoid contact between raw and prepared foods.

How to keep raw and prepared food separate:

- While shopping, keep raw meat, poultry and seafood separate from other foods.
- In the refrigerator, store raw meat, seafood and poultry below cooked or ready to eat foods to avoid cross contamination.

- Store food in containers with lids to avoid contact between raw and prepared foods.
- Wash plates used for raw food. Use a clean plate for cooked foods.
- Separation must occur during all phases of food preparation including slaughtering process.

3. COOK THOROUGHLY

- Cook food thoroughly, especially meat, poultry, eggs and seafood.
- Bring foods like soups and stews to boiling to make sure they have reached 70°C. For meat and poultry, make sure that juices are clear, not pink, ideally use a thermometer.
- Reheat cooked food thoroughly.

Cooking safely in the microwave oven:

- Microwave ovens can cook unevenly and leave cold spots where dangerous bacteria can survive. Make sure that food cooked in a microwave oven is at safe temperature throughout.
- Some plastic containers release toxic chemicals upon heating and should not be used in the microwave oven to heat food.

Proper cooking can kill almost all dangerous organisms. Studies have shown that cooking food to a temperature of 70°C can help ensure it is safe for consumption. Foods that require special attention include minced meats, large joints of meat and whole poultry

How to cook food thoroughly:

Food must reach a temperature of 70°C in order to ensure it is safe to eat. A temperature of 70°C kills even high concentrations of microorganisms within 30 seconds. Use a thermometer to check that food reach 70 c.

*To use a thermometer:
Place the thermometer in the center of the thickest part of the meat.
Make sure the thermometer is not touching a bone or side of the container.
Make sure the thermometer is cleaned and sanitized between each use to avoid cross contamination between raw and cooked food*



If a thermometer is not available:

- Cook poultry until the juices are clear and the inside is not longer pink.
- Cook eggs and sea food until piping hot throughout.

Bring liquid base foods such as soups and stews to a boil and continue to boil for at least 1 minute.

4. KEEP FOOD AT SAFE TEMPERATURES

- Do not leave cooked food at room temperature more than 2 hours
- Refrigerate promptly all cooked and perishable food (preferably below 5°C).
- Keep cooked food piping hot (more than 60°C) prior to serving.
- Do not store food too long even in the refrigerator.
- Do not thaw frozen food at room temperature.

Microorganisms can multiply very quickly if food is stored at room temperature. By holding at temperature below 5°C or above 60°C the growth of microorganisms is slowed down or stopped. Some dangerous microorganisms still grow below 5°C.

Thawing food safely in the microwave:

Microwave oven can be used to thaw food, but can leave warm spots where microorganisms can grow. Food thawed in the microwave oven should be cooked promptly.

What are safe temperatures for food?

- The danger zone is the temperature range of 5°C to 60°C in which microorganisms multiply very fast.
- Refrigeration slows bacterial growth. However, even when food is stored in the refrigerator or freezer microorganisms can grow.



How to keep food at safe temperatures:

- Promptly cool and store leftovers.
- Prepare food in small amounts to reduce the amount of leftovers.
- Leftover of foods should not be stored in the refrigerator more than 3 days and should not be reheated more than once.
- Thaw food in the refrigerator or other cool location.
- Left-over food can be cooled quickly by: putting the food into open trays; slicing large pieces of meat into smaller pieces; slicing food in a cool, clean container or stirring regularly for soups.

5. USE SAFE WATER AND RAW MATERIALS

- Use safe water or treat it to make it safe.
- Select fresh and wholesome foods
- Choose foods processed for safety, such as pasteurized milk
- Wash fruits and vegetables, especially if eaten raw.
- Do not use food beyond its expiry date.



Raw materials, including water and ice, may be contaminated with dangerous microorganisms and chemicals. Toxic chemicals may be formed in damaged and mouldy foods. Care in the selection of raw materials and simple measures such as washing and peeling may reduce risk

What is safe water?

Untreated water from rivers and canals contain parasites and pathogens which can cause diarrhea, typhoid or dysentery. Untreated water from rivers and canals is not safe! Rainwater collected in clean tanks is safe as long as the tanks are protected from contamination from birds or other animals.

Safe water is needed to:

- Wash fruits and vegetables.
- Add to food
- Make up drinks
- Make ice
- Clean cooking and eating utensils
- Wash hands

How to select safe raw materials?

When buying or using food:

- Select fresh and wholesome food
- Avoid food that is damaged or rotting.
- Choose foods processed for safety such as pasteurized milk or irradiated meat;
- Wash fruits and vegetables with safe water especially if eaten raw.
- Cut away damaged or bruised areas of fruits or vegetables
- Do not use food after it's expiry date
- Throw away smashed, swollen or oxidized cans
- Choose ready to eat, cooked or perishable foods that are stored correctly (either hot or cold, but not in danger zone).
- Pay attention to the expiry date on food items and throw away food when the date has passed.

Guideline 10: Be active, exercise regularly and drink plenty of water

Exercise can help reduce the risk of important chronic diseases such as Obesity, cardiovascular disease, Diabetes, cancer, Hypertension, Depression, and Osteoporosis. It may help reduce the risk for colorectal, and breast cancer.

Exercising regularly can help maintain a healthy body weight and high quality of life.

Aerobic activity:

To promote and maintain health, all healthy adults aged 18-65 yrs need moderate intensity aerobic physical activity for a minimum of 30 minutes on five days each week or vigorous intensity aerobic activity for 20 minutes on three days each week. Combination of moderate and vigorous activity can be used to meet those recommendations.

Moderate intensity aerobic activity which is equivalent to brisk walking and accelerates the heart rate can be accumulated from bouts of 10 minutes. Vigorous activity such as jogging causes rapid breathing and substantially increases heart rate.

This recommendation does not include daily routine activities of light intensity such as cooking, casual walking, or shopping that last less than 10 minutes in duration.

Muscle Strengthening Activity:

To promote and maintain good health, and physical independence, adults will benefit from performing activities that maintain or increase muscle strength and endurance for a minimum of two days each week. It is recommended to perform 8-10 exercises on 2 or more non-consecutive days each week using the major muscle groups. These include weight-training, stair climbing, and similar resistance exercise.

Performing physical activity beyond the recommended above have additional benefits, and contribute to increase in reduction of fat mass, increase in muscle mass, and weight loss.

Muscular Strength and Endurance:

There are substantial health benefits to the activities that increase muscular strength and endurance in non-elderly population. It is recommended that 8-10 exercises be performed on two or more non consecutive days each week using the major muscles. A resistance (weight) should be used that results in substantial fatigue after 8-12 repetitions of each exercise.

Light < 3.0 METS	MODERATE 3.0 – 6.0 METS	Vigorous > 6.0 METS
<p>Walking Walking slowly around home. Store or Office – 2.0*</p>	<p>Walking - 3.3* Walking at very brisk pace (4 mph) – 5.0*</p>	<p>Walking – Jogging & running Walking at very very brisk pace (4.5 mph) = 6.3* Walking/hiking at moderate pace and grade with no. of light pack (<10 lb) = 7.0* Hiking at steep grades and pack 10 – 42 lb -7.5 = 9.0 Jogging at 5 mph = 8.0* Jogging at 6 mph = 10.0* Running at 7 mph = 11.5*</p>
<p>Household & Occupation</p> <p>-Sitting – using computer work at desk using light hand tools = 1.5 -Standing performing light work such as making bed, washing dishes, ironing, preparing food or store clerk = 2.0 – 2.5</p>	<p>Cleaning – heavy, washing windows, car, clean garage = 3.0 Sweeping floors or carpet, vacuuming, mopping = 3.0 – 3.5</p> <p>Carpentry – general = 3.5 Carrying and stacking wood – 5.5 Mowing lawn – walk power mower = 5.5</p>	<p>Shoveling sand, coal, etc. = 7.0</p> <p>Carrying heavy loads such as bricks = 7.5</p> <p>Heavy farming such as bailing hay = 8.0 Shoveling, digging ditches = 8.5</p>
<p>Leisure time sports</p> <p>-Arts & Crafts, playing cards = 1.5 -Billiards = 2.5</p> <p>Boating – Power = 2.5 Croquet = 2.5 Darts = 2.5 Fishing – sitting = 2.5 Playing most musical instruments = 2.0 – 2.5</p>	<p>Badminton – recreational = 4.5 Basketball – shooting around = 4.5</p> <p>Bicycling – on flat tight effort (10 – 12 mph) 6.0 Dancing – ballroom slow = 3.0 Ballroom fast = 4.5 Fishing from river bank & walking = 4.0 Golf – walking, pulling clubs = 4.3 Sailing boat, wind surfing = 3.0 Swimming leisurely = 6.0 Table Tennis = 4.0 Tennis doubles = 5.0 Volleyball – noncompetitive = 3.0 – 4.0</p>	<p>Basketball game = 8.0 Bicycling – on flat; moderate effort (12-14 mph) = 8.0 Fast (14 – 16 mph) = 10 Skiing cross country – slow (2.5 mph) = 7.0 Fast (5.0 – 7.9 mph) = 9.0 Soccer – casual = 7.0; competitive = 10.0</p> <p>Swimming – moderate/hard = 8 – 11 + Tennis singles = 8.0 Volleyball – competitive at gym or beach = 8.0</p>

Ainsworth, et al.2000(1). * On flat, hard surface, + MET values can vary substantially from person to person during swimming as a result of different strokes and skill levels.

Guidelines for older adults:

Of particular importance to older adults, physical activity is associated with decreased risk of falls and injuries from falls, it prevents or mitigates functional limitations, and is effective therapy for many chronic diseases.

- Guidelines for the adult population apply to the elderly populations who with no clinically significant chronic conditions or functional limitations that affect movement ability, fitness, or physical activity.
- To promote and maintain health, older adults need moderate intensity aerobic physical activity for a minimum of 30 minutes on five days each week or vigorous intensity aerobic activity for a minimum of 20 minutes on three days each week. A combination of moderate and vigorous activity levels could be performed to achieve this recommendation.
- To promote and maintain health and physical independence older adults will benefit from performing activities that maintain or increase muscular strength and endurance for a minimum of two days each week. It is recommended that 8-10 exercises be performed on two or more consecutive days per week using the major muscle groups.
- Older adults should exceed the minimum recommended amounts of physical activity if they have no conditions that prevent vigorous physical activity, and they wish to improve their personal fitness, improve management of existing diseases where increased physical activity could have therapeutic benefits, and/or further reduce the risk of premature chronic health conditions and mortality.
- To maintain the flexibility necessary for regular physical activity and daily life, older adults should perform activities that maintain or increase flexibility on at least two days each week for at least 10 minutes daily.
- To reduce the risk of injury from falls, community dwelling older adults with substantial risk of falls should perform exercises that maintain or improve balance.
- Older adults should engage in regular physical activity according to their abilities and conditions.
- Older adults should have a plan for obtaining sufficient physical activity that addresses each recommended type. They should be encouraged to self-monitor their physical activity on a regular basis and to re-evaluate plans as their abilities improve or as their health status changes.

References:

1. World Health Organization, Food and Agriculture Organization. Vitamin and mineral requirements in human nutrition, second edition; report of a joint FAO/WHO consultation. Bangkok, Thailand, 21-30 September 1998. World Health Organization and Food and Agriculture Organization of the United Nations 2004.
2. Task force for the development and implementation of Omani Food Based Dietary Guidelines. Food Based Dietary Guidelines; technical background and description. Non published report 2007. Department of Nutrition, Ministry of Health, Oman.
3. Judi F. Adams, Alta Engstrom. Helping Consumers Achieve Recommended Intakes of Whole Grain Foods. *Journal of the American college of Nutrition* 2000; 19 (3): 339S-344S.
4. Linda E Cleveland, Alanna J. Moshfegh, Ann M. Alberston, and Joseoh D. Goldman. Dietary Intake of Whole Grain. *Journal of the American College of Nutrition* 2000; 19 (3); 331S-338S.
5. Judith Hallfrisch, Kay M. Behall. Mechanisms of the Effects of Grains on Insulin and Glucose Responses. *Journal of the American College of Nutrition* 2000; 19 (3); 320S-325S.
6. Linda S. Kantor, Jayachandran N. Veriyam, Jane E. Allshouse, Judith J. Putnam and Biing-Hwan Lin. Choose a variety of Grains Daily, Especially Whole Grains: A challenge for consumers. *J. Nutr* 2001; 131: 473S-486S.
7. United States Department of Agriculture. http://www.mypyramid.gov/pyramid/grains_why.html. Accessed 22/04/2008.
8. United States Department of Agriculture. http://www.mypyramid.gov/pyramid/vegetables_why.html. Accessed 22/04/2008.
9. United States Department of Agriculture. http://www.mypyramid.gov/pyramid/meat_why.html. Accessed 22/04/2008.
10. Linus Pauling Institute, Oregon State University. <http://lpi.oregonstate.edu/infocenter/phytochemicals/soyiso/index.html>. Accessed 29/04/2008.
11. Ute Nothling, Matthias B. Schulze, Cornelia Weikert et al. Intake of vegetables, legumes and fruit and risk for all-cause, cardiovascular and cancer mortality in European diabetic population. *J. Nutr.*, Apr 2008; 138: 775 - 781.
12. Fats and oils in human nutrition; report of a joint expert consultation. FAO food and nutrition paper 57. Food and Agriculture Organization and the World Health Organization Rome 19-26 October 1993.
13. American Heart Association. <http://www.americanheart.org/presenter.jhtml?identifier=4582>. Accessed 30/04/2008.
14. Five keys to Safer food Manual. World Health Organization, Department of Food Safety, Zoonoses and foodborne diseases. World Health Organization, Geneva 2006.
15. USDA food safety and inspection service; website http://www.fsis.usda.gov/Fact_Sheets/Basics_for_Handling_Food_Safely/index.asp; accessed on April 15th 2008.

16. Iowa State University food safety program: <http://www.extension.iastate.edu/foodsafety/consumers/index.cfm?articleID=152&parent=1>; accessed on April 15th 2008.
17. Christie Y. Jeon, Frank B. Hu, R. Peter Lokken, and Rob M. Van Dam. Physical activity of moderate intensity and risk of type 2 Diabetes. *Diabetes Care* 2007; 30: 744-752.
18. Christine M. Friedenrich and Marla R. Orenstein. Physical activity and cancer prevention: Etiologic evidence and biological mechanisms. *J. Nutr.* 2002; 132: 3456S-3464S.
19. Louis J. Ignarro, Maria Luisa Balestrieri, and Claudio Napoli. Nutrition, physical activity and cardiovascular disease: AN update. *Cardiovascular Research* 2007; 73: 326-340.
20. Timothy J Key, Arthur Schatzkin, Walter C. Willet, Naomi E. Allen, Elizabeth A Spencer and Ruth C Travis. Diet, Nutrition and the prevention of cancer. *Public Health Nutrition* 2004; 7(IA) 187-200.
21. William L. Haskell, I-Min Lee, Russell R. Pate, Keneth E. Powell, Steven N Blair, Barry A Franklin et al. Physical Activity and Public Health: Updated Recommendation for Adults from the American College of Sports Medicine and the American Heart Association. *Med Sci Sports Exerc.* 2007; 39(8):1423-1434.
22. James O Hill and Holly R. Wyatt. Role of physical activity in preventing and treating obesity. *J Appl Physiol* 2005; 99: 765-770.
23. Darren E.R. Warburton, Crystal Whitney Nicol and Shannon S.D. Bredin. Health benefits of physical activity: The evidence. *CMAJ* 2006; 174(6):801-809.
24. Miriam E. Nilson, W. Jack Rejeski, Steven N. Blair, Pamela W. Duncan, James O. Judge, et al. Physical activity and public health in older adults: Recommendations from the American college of sports medicine and the American Heart Association. *Med Sci Sports Exerc* Vol 2007 39(8) 1435-1445.

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