



وزارة الصحة
Ministry of Health

Dietary Guidelines for Saudis

The healthy Food Palm

General Directorate of Nutrition

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Idea , Design and Supervision ,
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In the name of God the most merciful, the most compassionate



In its pursuit of healthcare excellence the Ministry of Health is committed to provide the highest quality of health care services to its citizens and residents of our beloved country.

The provision of quality health care is one of the highest priorities of our country and receives the keen interest and generous support of the Custodian of the Two Holy Mosques, King Abdullah.

This support has clearly impacted upon the delivery and improvement of healthcare services in all areas encompassing preventive, therapeutic, nutritional and rehabilitation measures.

The healthcare services pay particular attention to providing information on healthy lifestyles which help in the prevention of chronic diseases that are related to diet and dietary habits.

The Ministry of Health is very proud to announce the launch of the Saudi Dietary Guidelines (**The Healthy Food Palm**), which has been based and prepared scientifically and technically by the General Directorate of Nutrition. The aim of these guidelines is to promote awareness to the citizens and various communities within the Kingdom and highlight the relationship between good health, nutrition and physical activities thus improving the general wellbeing of individuals.

I would like to extend my heartfelt thanks and appreciation to all concerned in the compilation and implementation of the Saudi Dietary Guidelines, particularly to the General Directorate of Nutrition, scientists and specialists from the various academic and medical institutes and supportive bodies.

Dr. Abdullah Al-Rabeeah

MD, FRCSC, FFPH
Minister of Health
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The Second Preface



The development and expansion in Kingdom of Saudi Arabia is moving very quickly according to well studies plans to involve all health institutes in the Kingdom of Saudi Arabia. The Ministry of Health is seeking ways for the activations of the logo of the Ministry (Patient First) through the context of its plans and strategies, and by the continued supports of the our Government Rulers -God bless them, and the directives of His Excellency Minister of Health.

As part of that numerous efforts to preserve the health of citizens, a Saudi Dietary Guidelines under the logo of **(The Healthy Food Palm)** was designed aiming to educate citizens, about what to eat and how much to eat (quality and quantity of food items) that suit his daily servings needs from different food groups, beside that, all age groups should practice physical activities, which prevent from diet related diseases among members of the community such as obesity, diabetes mellitus, hypertension, nutritional anemia and vitamins decencies.. ect.

The Dietary Guidelines also aiming to make use of the food items enriched with nutrients important to the body such as proteins, vitamins, minerals, and fibers according to the recommended dietary allowance, and to avoid unhealthy food items such as fast food, soft drinks, food items rich with salt, sugar and saturated fat and modification of dietary habits.

We hope The Healthy Food Palm to be a good dietary healthy guide for individuals and a suitable way for nutritional awareness and educations for all the different establishments.

God Bless All

Deputy Health Minister of Health Affairs
Dr . Mansour bin Nasser Hawasi

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Meats and Legumes group

Sugars and Oils

Milk and dairy products group

Vegetables group

Cereals Group

Bread and

Fruits group

Oils and sugars
The least amount of oils and sugars / day.

Meats and Legumes
serving = 2-3 serving / day.
One exchange serving = 60 to 90 grams of red meat, chicken or fish, or ½ cup cooked legumes.

Milk and dairy products
Serving = 2-4 serving / day.
One serving = one cup of milk or Laban (240 ml) or 30 g cheese.

Fruits
serving = 2-4 serving / day.
One serving = Medium size of fruit such as apples or oranges or bananas, or kiwi, or half a cup of juice (120 ml) or half a cup of dry fruits.

Vegetables
serving = 3-5 serving / day.
One serving = cup Vegetables or cup of juice or ½ cup cooked vegetable.

Cereals and bread
serving = 6-11 serving / day.
One exchange serving = slice of bread (25 grams) or a half cup of cooked cereal or breakfast cereal or 4-6 medium size biscuits.

Water
Drinking water per day
At Least 6 Cups (240 ml).

Physical activity: of 30-60 minutes a day depending on health status



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Foreword

Measuring the nations progress in field of reinforcement of health aspects for their communities by the scales of offering distinctive and excellent educational health and awareness aspects which aims basically to eliminate diet-related diseases.

As a result of the high proportion of diet-related diseases in Saudi society, which necessitated us to develop and design accurate guide of healthy diets for what we are eating daily (daily dietary intake) in term of quality and quantity, it was started with me as an idea years ago. It was finally became a design than can be develop, which has been named (The Healthy Food Palm) which in accordance with our social and local environment and Saudi heritage and culture. This guide depends on our righteous Islamic habits and to be offered by a creative and modern scientific method to be adopted by the Saudi citizen aiming to improve health status, to eliminate malnutrition diseases and diet-related diseases.

In conclusion, I express sincere thanks to His Excellency the Minister of Health, for his encouragement and sponsorship of this work, I would also like to thank the Deputy Minister of Health, and Assistant Deputy Minister for the Hospital Affairs and Undersecretary of Health Minister for Medical Services for their continuous support in order to create this health messages. I would like to thank those participated in studying, execution and designing this healthy diet guide (The Healthy Food Palm), especially the Scientific Committee, the Technical Committee and staff of the General Directorate of Nutrition.



Mushary Hamad Al- Dkheel
Director of General Directorate of Nutrition
Chief of the Scientific Committee

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Abbreviations:

AI	Adequate Intake
AMDR	Acceptable Macronutrient Distribution Range
BMI	Body mass index
BMD	Bone mineral density
CAD	Coronary artery diseases
CVD	Cardiovascular diseases
EAR	Estimated Average Requirement
EER	Estimated Energy Requirement
HDL	High Density Lipoprotein
gm	gram
IU	International Unit
LDL	low density cholesterol
KACST	King Abdul Aziz City for Science and Technology
kcal	kilocalorie
KFH &RC	King Faisal Hospital & Research Centre
kg	kilogram
KSA	Kingdom of Saudi Arabia
m	Metre
mg	milligram
MOH	Ministry of Health
N/A	Not Applicable
ND	Not Determinable
NE	Niacin Equivalent
PA	Physical Activity
PAL	Physical Activity Level
PBM	Peak bone mass
RAE	Retinol Activity Equivalent
RDA	Recommended Dietary Allowance
RE	Retinol Equivalent
UL	Tolerable Upper Intake Level
µg	microgram
UK	United Kingdom
USA	United State of America



Definitions:

Adequate Intake: The adequate intake (AI) is the recommended average daily nutrient intake level based on observed or experimentally determined approximations or estimates of nutrient intake by a group (or groups) of apparently healthy people who are assumed to maintain an adequate nutritional state. The adequate intake is expected to meet or exceed the needs of most individuals in a specific life-stage and gender group.

Calorie balance. The balance between calories consumed in foods and beverages and calories expended through physical activity and metabolic processes.

Dietary Fiber: Non-digestible carbohydrates and lignin those are intrinsic and intact in plants. Dietary fiber includes plant non-starch polysaccharides (e.g. cellulose, pectin, gums, hemicelluloses, β -glucans, and fibers contained in oat and wheat bran), plant carbohydrates that are not recovered by alcohol precipitation (e.g. inulin, fructans) and some resistant starch.

Eating pattern. The combination of foods and beverages that constitute an individual's complete dietary intake at one time.

Estimated Average Requirement: The Estimated Average Requirement (EAR) is the median daily intake volume that estimated to meet the requirement of half the healthy individuals in a life-stage and gender group. At this level of intake, the other half of the individuals in the specified group their needs have not being met.

Estimated Energy Requirements: An estimated energy requirements (EER) is defined as the average dietary energy intake that is predicted to maintain energy balance in healthy, normal weight individuals of a defined age, gender, weight, height, and level of physical activity consistent with good health. In children, pregnant and lactating women, the EER includes the needs associated with growth or secretion of milk at rates consistent with good health. Relative body weight (i.e. loss, stable, gain) is the preferred indicator of energy adequacy.

Kilocalorie: It is the measure of energy content in nutrients. Approximates the energy needed to increase the temperature of 1 gram of water by 1 °C.

Nutrient dense. Nutrient-dense foods and beverages provide vitamins, minerals, and other substances that may have positive health effects with relatively few calories.



Total Fiber: The sum of dietary fiber and functional Fiber.

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1- Introduction

The recommended dietary allowance (RDA) is the average daily dietary intake level that sufficient to meet the nutrients requirements of nearly all (97 to 98 percent) healthy individuals in a particular life-stage and gender group. The RDA is the aim of usual intake by an individual. The estimated average requirement (EAR) is used to calculate the RDA. It is also used to assess the adequacy of nutrient intakes, and can be used to plan the intake of groups. When an RDA is not available for a nutrient, the adequate intake (AI) can be used as the aim of usual intake by an individual. The adequate intake is not equivalent to an RDA. As intake increases above the tolerable upper intake level, the potential risk of adverse effects increases. If sufficient scientific evidence is not available to establish an EAR on which to base an RDA, an (AI) will be derived instead (Sylvia and Robert, 2011, Dietary Guidelines for Americans 2010).

Scientists believe that, to meet the nutrients requirements, should have an adequate nutrients intake without exceeding the tolerable upper intake level. Individuals were advised to follow the dietary guidelines and food guide graphics. The recommendations contained in the dietary guidelines traditionally have been intended for healthy individuals' ages 2 years and older. Younger than two years, exclusive breastfeeding is essential for infant up to 6 month, after that up to 2 years breastfeeding with suitable healthy family food items is recommended (WHO; 1996).

Getting healthy dietary messages to the public, however, is not an easy task when visual aids or graphic such as pyramid or palm are used for the messages of the diet, nutrition and health, because a great amount of information must be clearly summarized in a small area with the fewest words used in the captions (Fulgoni et al., 2011).

The purpose of all dietary guideline graphics is to suggest an ideal pattern of consumption of foods among food groups that will provide adequate amounts of all essential nutrients needed by the body for growth, development and to protect against chronic illness, minimizing exposure to food constituents that increase risk of unhealthy diet -related diseases such as obesity, diabetes mellitus, dyslipidemia and hypertension (Sylvia and Robert, 2011., Martha et al., 2005).

1:1 Background/Objectives

Kingdom of Saudi Arabia has undergone remarkable economic and social

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The most known dietary guidelines and graphic that reported by The US Department of Agriculture (Food Guide Pyramid), which is the oldest and most widely recognized complementary graphic to a dietary guidelines

document. Other countries worldwide developed their own graphic such as plate (United Kingdom), rainbows (Canada), jugs, and temples with the purpose of guiding dietary selection among food groups toward adequate nutrients intake and optimal health.

2:1 Goals of Dietary Guidelines

The notion behind dietary guidelines and food guide graphic is not only to preserve and enhance nutrient adequacy but also to promote diet that maximizes health by avoiding foods that increase risk of chronic degenerative diseases and emphasizing foods that reduce their occurrence.

The purpose of the food guide graphic is to suggest an ideal pattern of consumption of foods among food groups that provides adequate amounts of essential nutrients and emphasizes intake of foods containing constituents or stimulating metabolic processes that protect from chronic illnesses, minimizing exposure to constituents that increase risk. (<http://www.nutritionevidencelibrary.gov>).

The main goals of the dietary guidelines for Saudis:

- To improve the health by promoting healthy eating choices and encourage physical activities, so that these behaviors become the normal among all individuals in the community.
- To promote benefits of beneficial food sources with high nutrient value like foods high in protein, fiber, vitamins and minerals, and reduce foods of poor nutritional value like food enriched with salt, sugars, saturated fats, and hydrogenated fat.
- To have normal growth and development of infants, children and adolescents.
- Reduce the common diseases related to diet in the community.
- Promoting physical activity.

3.A road map to develop the Dietary Guidelines for Saudis

- Review the dietary habits of Saudis.
- Review the common diseases related to diet among Saudis.
- Review the methods used to develop dietary guidelines based on scientific evidence such as the Dietary Guidelines for Americans, 2010, United Kingdom (UK) and Canada.
- Develop the suitable graphic that suits the Saudis

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3:1 Dietary habits of Saudis

There has been a drastic change in food consumption patterns in the Arab Gulf countries, both quantitative and qualitative change in Arab Gulf countries diet (Musaiger et al., 2012). Scientists showed that even the structure of diet has shifted towards a high-energy-density diet with more fat and sugar added in foods, more saturated fat (mostly from animal origin) and lower intake of complex carbohydrates, dietary fiber, fruit, and vegetables (Arab Center for Nutrition., 2009). These dietary habits led to the development of chronic diseases such as obesity and diabetes mellitus in these countries. Within the first five countries with the highest rate of both obesity and diabetes there were two or three Arab Gulf countries (International Diabetes Federation, 2007).

There were few national published data about the dietary habits of Saudis. King Abdul Aziz City for Science and Technology (KACST, 1995), published its final report – The Evaluation of the Nutritional Status of the People of Saudi Arabia. The total number investigated was 19,598 from all over the Kingdom of Saudi Arabia. The project funded by KACST, the report consisted of dietary survey study section, anthropometric measurement, clinical and biochemical study section.

Their data showed that, three meals were consumed daily by the majority of Saudis, with the lunch being the main meal. The lunch usually consists of rice with meat (mutton, chicken) with salad, and only 38% of the subjects consume fresh vegetables on daily basis. Fruits consumed by 40% daily, 29,2 % they consumed fish between 2- 4 times per week, and 60% of the participants consumed milk or milk products on daily bases (KACST 1996).

The surveillance of risk factors of chronic diseases among Saudis which was supported by Ministry of Health (MOH), KSA, World Health Organization (WHO) and King Faisal Specialist Hospital and Research Center (KFH& RC) in Riyadh. The surveillance involved 5000 subjects that their ages were between 15 – 64 years. Their data showed that 91.6% of males and 95.4% of females consumed daily less than 5 serving size of vegetables and fruits. On weekly bases the mean males consumption of fruits was 3.4 days/week, whereas for females was 3.5 days/ week. The mean males consumption of vegetables was 4.4 days/week, whereas for females was 4.3 days/ week (MOH, KSA, WHO and KFH&RC, 2005). Musaiger A (2002) reported that, the main contribution to fiber intake in KSA came from vegetable-based foods (31%), followed by cereal and their products (26%), and fruit and their products.

Study published in 2010, involved 239 Saudis aged 13 - 18 year old



adolescents from both sexes, living In Jeddah West of KSA. The results showed that higher intake of both carbohydrate and fat compared to the reference dietary intake; where as the intake of calcium and iron were lower than the reference dietary intake. The biochemical tests showed that, 30.5% of them having a high cholesterol blood level and 53.6% having a low hemoglobin level (Washi and Ageib., 2010) . They concluded that poor diet quality and food habits are related to impaired nutritional status.

3:2 Common diet-related diseases in KSA:

3:2:1 Obesity:

The prevalence of overweight and obesity in Saudi Arabia is increasing ranges from 6 % to about 83%. The available data clearly indicates a high prevalence of adult obesity in the Kingdom. This wide variation could be due to the differences of ages, sex, and health status.

Al-Baghli et al (2008) has examined 195, 874 Saudi subjects from the eastern province of Saudi Arabia to describe anthropometric characteristics of participants and the influence of socio demographic and cardiovascular risk factors involved in the prevalence of obesity. The overall prevalence of obesity was 43.8%, while 35.1% were overweight. The prevalence of underweight was 1.3%. The peak prevalence of obesity was observed in the age group 50- 59 years. Obesity was higher among women than men, higher in housewives, and among the less educated than others.

Al-Nozha et al.,(2005), has examined 17,232 Saudi subjects from selected households who participated in their study. The prevalence of overweight was 36.9%. Overweight is significantly more prevalent in males (42.4%) compared to 31.8% of females. The age-adjusted prevalence of obesity was 35.5% in KSA. Females are significantly more obese with a prevalence of 44% than males 26.4%.

Ministry of Health, KSA and other partners, reported that among 5000



subjects from different region of KSA, the mean body mass index (BMI) was 27 kg/m² among males and was 29 kg/m² among females. Their data showed that 43.3% and 28.6% of both females and males respectively were obese their BMI above 30 kg/m² (MOH, KSA, WHO and KFH&RC, 2005).

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3:2:2 Diabetes Mellitus:

The General Directorate of Non- Communicable Diseases, MOH, reported that, 17.9% of the Saudi subjects those fasting blood sugar above 7.0 mmol/L, which was higher among males(19.2% versus 16.6%) compared to the females (MOH, KSA, WHO and KFH&RC, 2005).

A community-based national epidemiological health survey, conducted by examining 17232 Saudi subjects in the age group of 30 - 70 years of selected households over a 5-year period between 1995 and 2000. The overall prevalence of DM obtained from this study was 23.7% in KSA. The prevalence in males and females were 26.2% and 21.5% respectively. Diabetes mellitus was more prevalent among Saudis living in urban areas compared to those living in rural areas (25.5% versus 19.5%). Despite the readily available access to healthcare facilities in KSA, a large number of diabetics 1116 (27.9%) were unaware of having DM (Al-Nozha et al., 2004).

3:2:3 Dyslipidaemia

A cross sectional national epidemiological randomized household survey. Studied the prevalence of metabolic risk factors for cardiovascular diseases, obesity, diabetes mellitus, hypercholesterolemia and other cholesterol related risk factors among Saudi population, 2059 Saudi subjects, aged 30 - 64 years were selected. The prevalence of hypercholesterolemia, whether using cut-off levels of >5.2 mmol/l or >6.2 mmol/l was similar between male and female subjects. They were lower than the prevalence of hypercholesterolemia among sex and age matched subjects whether from developed or from some developing countries. The prevalence of total cholesterol/high density lipoprotein ratio, >6.5, for Saudi subjects was higher than some other developing countries. There is a need to monitor the trend of cardiovascular diseases (CVD) and the risk factors which can be used to assess the efficacy of control programs (Al-Nuaim et al., 1997).

Al Nozha et-al (2005) and his team conducted community – based on national epidemiological health survey by examining Saudi subjects in age group 30 -70 years in Saudi Arabia. Low HDL affects 81.8% of females and 74.8% of males with MS leading all other factors. and it continued to be consisted in all different age group. They reported that, metabolic syndrome is a risk factor for CVD, as the prevalence of coronary artery diseases (CAD) were higher among patients with metabolic syndrome (6.7%) compared to subjects without metabolic syndrome (4.6%) (Al Nozha et al; 2005).

3:2:4 Ricketts and Osteoporosis

Scientists from KSA have carried out a retrospective study at King Abdul Aziz Medical City-King Fahad National Guard Hospital in Riyadh, Saudi Arabia. The records of Saudi infants under the age of 14 months over a 10-year period (between January 1990 and January 2000) were reviewed. There were 283 infants diagnosed with nutritional rickets due to vitamin D deficiency (67% males) who were between 6 and 14 months of age. They concluded that, nutritional rickets is still prevalent in Saudi Arabia with the primary etiology being vitamin D deficiency (Al-Atawi et al., 2009). Another authors showed the prevalence of rickets among Saudi is high compared to the neighboring countries (Al-Jurayyan et al., 2002).

Cross-sectional study has been carried out at university hospital from first February 2008 to 31 May 2008 on a healthy Saudi men and women in the peak bone mass (PBM) age group and those aged ≥ 50 years were recruited from the outpatient department of King Fahd University Hospital. The data showed that among individuals with a normal 25OHD level, 50% of women and 7% of men in the PBM age group and 26.4% of women and 49.2% of men aged ≥ 50 years had low bone mass. In patients with 25OHD insufficiency, 84.2% of women and 88.9% of men in the PBM age group and 83.3% of women and 80% of men aged ≥ 50 years had low bone mass. Their data showed that, there was a significant positive correlations between 25OHD level and BMD (Sadat et al., 2011).

A total of 122 apparently healthy postmenopausal Saudi women were recruited from the Center of Excellence for Osteoporosis Research in Jeddah. Most of the sample population was found to be vitamin D deficient with a serum vitamin D level below 50 nmol/l. Overall, mean total caloric, total fat, and saturated fat intakes were above recommended levels. Almost 60% of the total study population had lower calcium intake than the estimated average requirements whereas the whole population had vitamin D intake level below the estimated average requirements. The BMD of the femoral neck showed significant correlations with serum vitamin D level (ALissa et al., 2011). They recommended supplementation of dietary vitamin D and calcium in osteopenic patients in the Saudi population.

3:3- Physical activity:

A school-based cross-sectional study has been conducted during the years 2009 / 2010 in three cities; Al-Khobar, Jeddah and Riyadh. Participants were 2908 secondary-school males (1410) and females (1507) aged 14 -19 years, randomly selected using a multistage stratified sampling technique.

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Ministry of Health, KSA and other partners, reported that, the physical-non active (practicing physical exercise less than 10 minutes daily) were 67.7% among subjects from different regions of KSA (www.emro.who.int/ncd/stepwise.htm).

In this section a comparison has been done by analyzing international visual graphics such as:

- The graphic from other countries such as Japan and India were also reviewed. The comparison has been done by analyzing the three visual graphics (pyramid, plate and rainbow), with or without considering the dietary guidelines that might accompany them according to the specifications of the number of servings per day. The presence or absence of recommendations with regard to the number of servings and/or portion sizes per day. The proportional area of each food group within the graphic. The position of each food group with regard to vertical or horizontal orientation was assessed. The presence or absence of sugar and fats anywhere in the graphic. Additional characteristics of food groups. Additional issues such as messages, use of colors, photographs, and lifestyle recommendations were analyzed.

1. There were agreement concerning the amount of serving size in all graphics reviewed in all food groups.
2. The distribution of the area of each food group was proportional to the number of servings in all food guide graphics reviewed. Small serving occupied a smaller area compared to another food group with more

serving size. An example the area of grain and bread group is bigger than the area of the meat and meat substitutes.

3. The main differences were the number of servings of milk and milk products, number of servings of both fruits and vegetables.

4. The majority of graphics did not mention water at all.

3:5 Develop the suitable graphic that suit Saudi culture

Develop the suitable graphic and guidelines that suit Saudi culture, habits, and adopt servings of different food groups to reduce the common diseases related to diet in the community (Musaiger et al., 2012). The guidelines' documents in their entirety, however, are not necessarily expected to be read by the public. For the lay public, the message is most often reduced to colorful graphics such as the US Department of Agriculture (USDA) Food Guide Pyramid which was one of the first such graphics (Dietary Guidelines for Americans., 2010).

The public is encouraged to substitute foods within the same group and combine foods between groups to attain a healthful diet. Hence, an idea of balance in terms of the proportion of servings in each group is conveyed. At a practical level, the nutrient goals of a population need to be translated to food-based dietary guidelines that can be easily implemented and understood (Kearney et al., 2001).

Countries are at different stages of advancement in the development of nutrition education policies and programs for their populations. The adaptation of geographical, economical, and cultural realities may be reflected in the simplicity, complexity, or nationalistic or cultural symbolism of the graphics, confirming that food emblems in guidelines tend to reflect—among other characteristics—the country's reality with respect to food habits and socioeconomic status as well as the role of food in culture (WHO., 1996).

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4- Food Guide Palm:

The palm graphic was chosen due to a number of reasons such as:

- Palm trees are of huge cultural and economic significance to the people of the Arab world. Every part of this tree finds a use in daily life. In the Arab world palm trees are not a mere plant but have huge cultural influence over the society.
- In Islam, palm and its fruits dates have received more attention than any other tree(s) or fruit(s).
- The national flag of the Kingdom of Saudi Arabia consists of a palm tree on top of two crossed Arab swords. The palm tree symbolizes vitality, growth and prosperity.
- The intention of a Palm graphic food guide is to ritually display a balanced diet that adequately satisfies nutritional needs of Saudi.
- Palm food graphic or guides illustrations assist Saudi nation in communicating proper nutrition which in turn aids in developing preventive measures for avoiding malnutrition & chronic diseases.

4:1 Milk Servings:

Milk and milk products group: In the food pyramid (2005) the number of servings of milk and milk group were 2 - 3 servings daily. In the Canadian rainbow graphic, the number of servings for all group between 2- 4 servings daily, 2 for children and adults 3 - 4 servings for teen age and adolescents.

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The main source of this food group is calcium and vitamin D beside other nutrients. The prevalence of vitamin D deficiency due to insufficient exposure to sun light and due to the weather (Canada) or social reasons especially for females (KSA). The committee decided to have the number of milk and milk products servings to be between 2 - 4 servings, to have normal growth, to reduce prevalence of rickets and osteomalacia among Saudi society. The number of milk servings is more than what is in US food pyramid (2005, 2010), and similar than what is in the Canadian rainbow.

4:2 Water

In this dietary graphic (palm graphic), water has been added. Water has numerous roles in the human body. It acts as a building material; as solvent, as a carrier for nutrients and waste products and in thermoregulation. Both water intake and water losses are controlled to reach water balance. Healthy adults regulate water balance with precision, but young infants and elderly people are at greater risk of dehydration (Jéquier and Constant, 2010). Generally if you drink enough fluid so that you rarely feel thirsty and produce 1.5 liters (6 cups) or more of colorless or light yellow urine a day (Sawka et al., 2005).

Human water requirements are not based on a minimal intake because it might lead to a water deficit due to numerous factors that modify water needs (climate, physical activity, diet and health). The regulation of water balance is essential for the maintenance of health and life. On an average, a sedentary adult should drink at least 1.5 litre of water per day, as water is the only liquid nutrient that is really essential for body hydration (Jéquier E and Constant F., 2010). In Canadians dietary guideline, water is not showed in the rainbow graphic; they added a statement in the dietary guidelines (Satisfy your thirst with water), drink water regularly. Drink more water in hot weather or when you are very active.

The committee has decided to add water in the food guide palm due to the importance of drinking water especially in hot weather in Kingdom of Saudi Arabia and other Gulf Countries.

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The reasons for choosing the design (The healthy food palm) for the Kingdom of Saudi Arabia:-

People of Saudi Arabia are in need to be aware about the dietary and health issues concerning the right kind of food that they should take daily. That will help them to avoid illness caused by the wrong feeding behaviors (diet-related diseases), and to be a dietary pattern guide for individuals. This require to set the food groups and the serving size in a form template (graph) from the local community.

- Choose a graph well known to the community, that Saudi people of all categories will accept it, for this reasons the palm food graph or template were choosing as dietary guideline. The shape of the palm is easy to understand by Saudis, easy to follow and compliance with the dietary intake (According to food servings), which help to reduce obesity and other diet-related diseases.
- The shape of palm (its trunk and leaves) help to form the suitable graphic to fulfill the scientific and dietary purposes to make the Saudi Dietary Guidelines, and to place the food groups and serving sizes in aesthetic image and easy to understand. The designing was made according to the food groups. The importance of water is put into consideration because the weather is very hot in the kingdom of Saudi Arabia especially in Summer season.
- Physical activity is also added because it is important for health. The idea of the graphic (healthy food palm) is the best way to disseminate the dietary guideline for Saudi and better than the food pyramid or food plate or other food graphics.

Acceptance of the healthy food palm graphic

A questionnaire was designed to see the view of the public concerning the healthy food palm graphic. A sample from Riyadh city, both sexes from different sectors, dieticians, nutritionist, university staff and students, normal public and patients were participated to see the acceptance or view of the Saudis for the healthy food palm graphic as way to follow a healthy diet. The results as follow:

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1- If the healthy food palm graphic:

- a. Easy to understand 84.5% (218 Subjects).
- b. Moderate 13.2% (34 subjects).
- c. Difficult to understand 2.3% (6 subjects)

2- If the food items in the graphic part of your daily food intake:

- a. Yes 95% (245 subjects).
- b. No 4.3 % (11 subjects).
- c. I do not know 0.8% (2 Subjects).

3-Is the color of the healthy food palm is consistent and clear:

- a. Yes 84.9 % (219 subjects).
- b. No 13.2 % (34 subjects).
- c. I do not know 1.9 % (5 Subjects).

4-Is it easy to apply the healthy food palm in your daily food habits;

- a. Yes 73.6 % (190 subjects).
- b. No 5.4 % (14 subjects).
- c. Not sure 0.4% (One Subject).

5-Do you have any observations (addition or delete);

- a. Yes 16.7 % (43 subjects).
- b. No 82.9 % (214 subjects).
- c. Not sure 0.4% (One Subject).

Most of the reasonable observations has been taking into consideration and implemented in the design of the final form of the Healthy Food Palm graphic.



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The Scientific Details of the Healthy Food Palm :-

- The food groups were distributed and placed in the palm truck and leaves according to the size of the food group.
- The large group was set or placed in the bottom big leaf. Starting with the large food group, cereal and bread group, from scientific point of view, bread and cereals are the most important sources of carbohydrates.
- Vegetables and fruits come next. They are the most important sources of vitamins and minerals. The food item in this group can be taken freely or according to the recommended allowance.
- Thirdly, milk and its products, which are important sources of protein and calcium. The smallest group from the major food groups constitutes meat and beans, the most important sources of protein.
- Sugar and fat were set in the smallest upper leaves of the palm, this represent the need to minimize the intake of sugar and fats.
- The different types of food groups and the amount of each serving size was set in the palm truck in a way that can easily be understood.
- Water was added to the healthy food palm, due to the hot desert climate of the Kingdom of Saudi Arabia. Sufficient amount of water is needed to prevent fluid losses, renal stones or heat stroke.
- Physical activity is important together with balanced diet. The healthy food palm is urging people to practice exercise for a period of time estimated at (30 - 60) minutes daily and should be individualized according to the health status.
- A table was made to illustrate the number of serving size from each food group according to the age, sex and physiological status as illustrated in the healthy food palm (See attached table page 30).

5 Developing Dietary Guidelines for Saudis:

The main message is that a healthful diet includes variety, balance, and moderation. Dietary guidelines are tools that translate the science of nutritional requirements to a practical pattern of food choices for the general population. On a national level, they provide guidance for health promotion and risk reduction, and often form the basis of national food and nutrition policies and education programs.



5:1 Dietary Guidelines for Saudis

The Dietary Guidelines serve as the basis for nutrition messages and consumer materials developed by nutritionist, dieticians and other health professionals for the general public. It is clear that healthy eating patterns and regular physical activity are essential for normal growth and development and for reducing risk of chronic diseases. A diet high in fruits and vegetables is associated with a decreased risk for many chronic diseases and some cancers, and can aid in weight management. The goal of the Dietary Guidelines is to put this knowledge to work by facilitating and promoting healthy eating and physical activity choices, with the ultimate purpose of improving the health of all (Sylvia and Robert 2008., Martha et al., 2005).

Dietary guidelines to be effective and feasible need to consider prevailing dietary patterns and food availability in each country. Dietary guidelines need to be sensitive to the traditional cuisine and cultural habits of the populations for which they are intended (Dietary Guidelines for Americans., 2010).

Saudis are experiencing an epidemic of overweight, obesity and diabetes mellitus. Poor diet and physical inactivity also are linked to major causes of illness and death. To correct these problems, many Saudis must make significant changes in their eating habits and lifestyle.

The Dietary Guidelines for Saudis, 2012 was based on the most recent scientific evidence review (Musaiger et al., 2012, Dietary Guidelines for Americans., 2010).

5:2 The Dietary Guidelines for Saudis, 2012

1. Enjoy a variety of food items from major food groups daily.

- Achieve and maintain a healthy eating pattern that includes foods from each of the major food groups as illustrated in the healthy food palm, and ensure adequate nutrient intake without exceeding energy needs. No one food contains all of the essential known nutrients.
- Consume a variety of fruits, vegetables, grains and grain products.
- Include dairy products, fish, legumes, nuts, seeds, poultry, and lean meats in your eating pattern.
- Avoid food intake high in saturated fat, sugar, and salt.
- Vitamin and mineral supplements are not a substitute for a balanced and nutritious diet designed to emphasize the intake of fruits and vegetables. There are functional nutrients in fruits and vegetables important for human health.

The healthy Food Palm





2. Choose whole grains.

- Choose grain such as rice and grain products such as bread prepared with little or no added sugar, fat or salts. Grains provide complex carbohydrates, vitamins, minerals, and fiber.
- Select food prepared from whole grains or cereals. Choose brown bread better than white bread made from processed cereals
- Take fiber- rich food items (vegetables- fruits- grains) promote satiety and helping to control calorie intake and body weight and reduce total and low density cholesterol (LDL) levels. Preventing constipation and reducing the incidence of cancers (e.g. : colon..)
- Cereal nutrient-fortified and enriched should be major sources of calories in the diet.

3. Consume a variety of fruits and vegetables.

- Fruits and vegetables are high in nutrients, fiber and relatively low in calories and hence have a high nutrient density.
- Take fruits and vegetables of different colors and textures throughout the day, both as meals and snacks.
- Dietary patterns characterized by a high intake of fruits and vegetables are associated with a lower risk of developing heart diseases, stroke, and hypertension.
- To ensure an adequate fiber intake, whole fruits and vegetables rather than juice are recommended.
- Choose vegetables prepared with little or no added fat or salts.

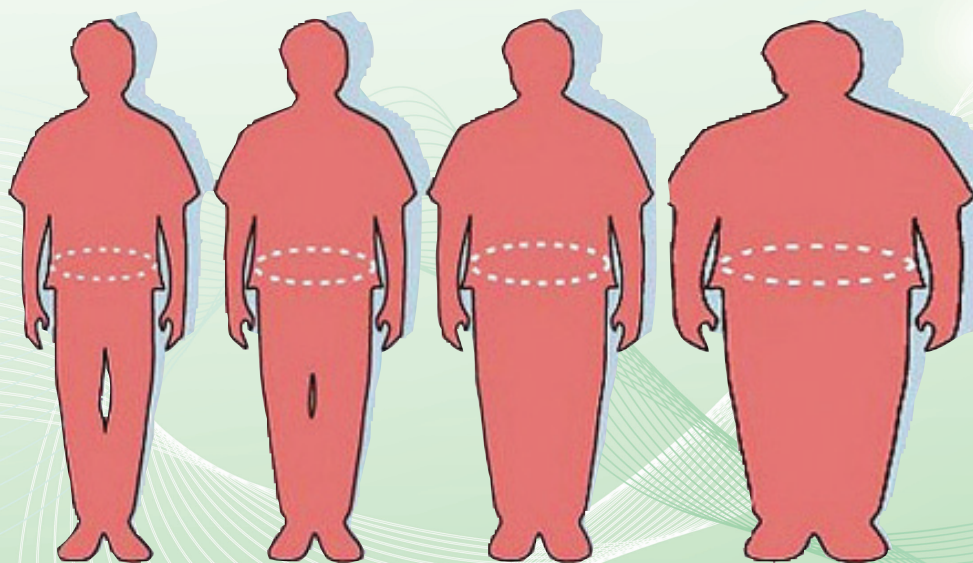


4. Limit the intake of foods with a high content of saturated fatty acids cholesterol, salt and sugar.

- Select low fat milk and milk products.
- Have lean meat and meat alternatives such as beans, lentils, fava beans and chickpeas.
- Take unsaturated fatty acids from vegetables, fish, legumes, and nuts.
- Limit the intake of salt (sodium chloride) to <2.3 g per day. It is preferable to use iodized salt especially in cities that are not sea side or those Living in Mountain areas.
- Avoid sugary food items.
- Use oven or the barbecue cooking instead of frying in oil or fat.

5. Achieve and maintain a healthy body weight.

- Match intake of energy (calories) to overall energy needs; limit consumption of foods with a high caloric density, including those with a high content of fat and sugars.
- Fat provides ≈ 9 kcal/gram (g), whereas carbohydrate and protein provide ≈ 4 kcal/g
- Maintain a level of physical activity that achieves fitness and balances energy expenditure with energy intake.



The healthy Food Palm





6. Drink water.

- It is important to drink (1.5 liter) daily which is approximately equal to (6 cups).
- Water is an important fluid to eliminate waste and metabolism residues from body.
- Improve the health of kidneys.
- Best way to quench your thirst and it is calorie free
- To balance level of minerals and vitamins in the body



7. Purchase, prepare, cook and store food in ways to ensure food safety.

- Purchase fresh vegetables and fruits from a safe sources
- Prepare and cook food in hygienic environment.
- Store food items in a proper ways.
- Keep cooked food items in a suitable temperature.
- Use appropriate tools and equipments suitable for the food items and cooking.
- Achieve appropriate sanitary conditions (hygienic situation) in the place of cooking and trading the meals.
- Apply health requirements for food handlers.

8. Be physically active

- Initially, for sedentary individuals, engaging in a moderate level of physical activity, such as intermittent walking for 15 to 30 minutes, 3- 4 times/week is recommended.
- Subsequent increases in physical activity for 30 to 60 minutes on most if not all days of the week.
- Duration of exercise and number of days/week need to be individualized.
- It may also be useful to focus on reduction in sedentary time such as time spent watching television, and using smart devices such as computer or mobiles (not more than 2 hours).

THE USES OF THE HEALTHY FOOD PALM:

1. The healthy food palm should be circulated as a mean of dietary educational and awareness for all official authorities or agencies.
2. It should be taken as a nutritional guide for all people in the society and the mass media should take the responsibility for spreading the benefits of the healthy food palm.
3. All health institutions should be abide or compliance by it and take it as a healthy suitable guide for the patients diet.
4. Diet clinics should employ it as a educational dietary guide for planning the in patients and out-patients diet, according to the health status.
5. It can be useful in educational and social institutions, sports clubs, summer centers and for the healthy people also.
6. Circulate it to the health institutions in the Gulf Area, Arab Countries and international organizations.
7. It can be used by the institutions interested in food and nutrition.
8. It should be included in school curriculum for primary and intermediate levels so as to be part of healthy attitudes from an early age.
9. It is important to spread it through awareness health activities, campaigns, and festivals that support the goals of the healthy dietary guidelines.
10. The healthy food palm goals should be printed and distributed to the Saudi families.
11. Finally making cultural and health competitions for the society about the healthy food palm.



The healthy Food Palm



The innovation steps of the Saudi Dietary Guidelines (The Healthy food palm).

No.	Step	Implementations or executed individual (s)
1	Idea	Director of the Directorate General of Nutrition Mr Mushary bin Hamad AL-Dkheel
2	Primary Discussion	Scientific and technical committee Mr Mushary AIDakheel Dr Bushra ElBashir Dr Khalid Shaheen Dr Saed Bahr Dr Syed Ahemd Mustafa Mr Ashraf Abdullah
3	Design or graphic discussion	All staff of the Directorate General of Nutrition
4	Initial approval	Support and encourage by the Assessment Deputy Minister for Curative Medicine (previously) Dr Aail Al Gamidi. Support of Deputy Minister for Health Affairs his Excellency Dr Mansour AL-Hawasi. Agreement from his Excellency Minister of Health Dr Abdullah Al-Rabeeah
5	Scientific views	A scientific committee (their names and position on page 31) and a steering committee from them - view the scientific data again.
6	Public opinions Through questionnaire	A sample from Riyadh city, both sexes from different sectors, dieticians, nutritionist, university staff and student, normal public and patients. The idea and the design of the healthy food palm was accepted by 98% of those involved in the questionnaire. Few have notice discussed by the scientific and technical committee,
7	Final Approval	Adopted and approved by his Excellency Minister of Health Dr Dr Abdullah Al-Rabeeah to inaugurate and implement the Dietary Saudi Guidelines and the healthy food palm in the health institutions and other sectors.

The healthy Food Palm



Daily Recommended Food Servings According to Age Groups

Food Group Age Group	Cereal & bread*	Vegetables & fruits	Milk and products	Meat & substitute	Sugar & Fat Minimal amount
Children 2-3 years	3	4	2	1	Sugar & Fat Minimal amount
Children 4-8 years	4	5	2	1	
Children 9- 13 years	6	6	3- 4	1 - 2	
Adolescents 14-18 years females	6	7	3 - 4	2	
Adolescents 14-18 years males	7	8	3 - 4	3	
Adults 19- 50 years females	6	7 - 8	2	2	
Adults 19- 50 years males	8	8 - 10	2	3	
Adults > 50 years females	6	7	3	2	
Adults > 50 years males	7	7	3	3	
Pregnant women	8	8 - 10	4	3	
Lactating mother	8	8 - 10	4	3	

The healthy Food Palm



Rations allowable daily food groups In The Healthy Food Palm

No.	Food Groups	Serving numbers	The amount of serving size
1	Cereal & bread	6-11	= 25 grams of bread = 1/4 Arabic bread medium size = one slice of toast. = 1/2 cup of cereals such as rice 
2	Vegetables	3-5	1 cup of raw leafy vegetables = 1/2 cup of other vegetables, cooked or chopped raw = 3/4 cup of vegetables juice 
3	Fruits	2-4	= 1 medium apple, banana, orange. = 1/2 cup of chopped or canned fruits. = 3 medium dates = 3/4 cup of vegetables juice 
4	Milk and products	2-4	= 1 cup of milk or laban or yogurt = 3 spoon of milk powder = 60 gram of processed cheese. 
5	Meat & substitute	2-3	= 60-90 grams of cooked lean meat, poultry or fish. = One egg. = 1/2 of cooked dry beans. = 4- 6 tablespoon of peanut butter 
6	Fat & sugar	Lower amount posible 
7	Water	6	At least 6 cups daily. 

The healthy Food Palm



The Scientific and technical Committee

No.	Name	Institute	Position
1	Mr Mushary AL-Dkheel	Directorate General of Nutrition MOH	Director of Directorate General of Nutrition & Head of the committee
2	Pro. Hamza Abu-Tarboush	Faculty of Nutritional Science & Agriculture King Saud University	Teaching Staff
3	Dr. Badr AL-saleem	King Fahad Medical City MOH	Pediatric Consultant Head of GIT & Nutrition
4	Dr. ALi AL-Majwal	Applied Medical Science King Saud University	Teaching Staff
5	Dr. Bushra EIBashir	General Directorate of Nutrition (DGN)MOH	Deputy Director of Medical Clinical Nutrition
6	Dr. Saeed Bahr Hassan	Directorate General of Nutrition . MOH	Consultant Medical Clinical Nutrition
7	Dr. Syed Admed Mustafa	Directorate General of Nutrition MOH	Specialist Medical Clinical Nutrition
8	Dr. Hisa AL-Husaini	Directorate of non-communicable diseases (DNCD)	Head of Physical activity and Nutrition program
9	Dr. Adel Badr	Amal Hospital Riyadh MOH	Consultant Nutritionist
10	Ms. Al-Johra AL-Nasaeb	King Fahad Medical City	Head of Clinical Nutrition section
11	Ms. Amal Kenana	King Saud Medical City	Head of Clinical Nutrition section
12	Mr. Abdullah Al-Mitari	General Directorate of Nutrition MOH	Director of Medical Clinical Nutrition
13	Mr. Mirza Biq	Prince Sultan Humanitarian City (PSHC)	Director of Clinical Dietician
14	Mr. Abdulmageed Nasrallah	PSHC	Nutritionist
15	Mr. Azialdin Mohammed	PSHC	Nutritionist
16	Mrs. Kholoud AL-Hiwidi	DNCD	Clinical Dietician
17	Ms. Rabab Makki	Specialized Medical Hospital- Riyadh	Head of Clinical Nutrition section
18	Ashraf Abdullah	DGN- MOH	Public Relations Supervisor
19	Mr. Ibrahim Al-Aseeri	DGN- MOH	Rapporteur of the Committee

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