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**Backgrounder on nutrition**

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Good nutrition depends mainly on consuming food with high levels of both macronutrients and micronutrients. A balanced diet means that you have a balance between the different kinds of macronutrients as well as a sufficient intake of vitamins and trace elements.

**Macronutrients** include proteins, lipids (fats), and carbohydrates. These are the three so-called “energy elements” that provide energy to the body and ensure its vital functions. Each macronutrient plays a distinct role in the body: improvingmuscle development, helping gain muscle mass, and weight loss.

**Proteins and their function in the body**

There are 20 amino acids that contribute to the development of thousands of different proteins in the body. For example, when someone is exposed to a bacterium or a virus, the immune system develops proteins called antibodies to protect the body against infection.

One of the main functions of proteins is to promote tissue growth. Proteins also help rebuild damaged muscle tissues and contribute to renewing hair, nails, bones, skin, and other elements of the body. They also regulate hormones, manage how the body retains water, and boost the immune system.

Thus, it’s crucial to consume protein-rich foods such as meat, eggs, fish, legumes, and nuts as part of a healthy diet.

**Carbohydrates and their function in the body**

One of the main roles of carbohydrates is to provide energy to the body. After being consumed, carbohydrates are turned into glucose, which is used to create energy in the body.

When blood lacks glucose (one of the component elements of carbohydrates), the major risk is that muscles lack energy. Thus, ensuring an adequate level of carbohydrates through the diet keeps muscles healthy and prevents loss of muscle mass.

Glucose and the other elements of carbohydrates are also important because they provide the energy that allows the brain to function properly. Sources of carbohydrates include fruits, vegetables, and grain products. For a healthy diet, it’s recommended in Mali to consume starchy foods, reduce consumption of added sugars (sweet beverages, candies, dairy desserts, biscuits, and pastries), and increase consumption of fibre-rich foods such as fruits, vegetables, dried vegetables, and whole grains.

**Lipids (fats) and their function in the body**

Fat is vital for the body. It provides energy, helps absorb some nutrients, and maintains body temperature. Of all the macronutrients, lipids contain the most calories. One gram of fat contains nine calories, which is more than double the number of calories provided by carbohydrates and proteins. Some vitamins cannot be absorbed without adequate daily consumption of fats, in particular vitamins A, D, E, and K (the fat-soluble vitamins). Humans needs to eat lipids every day to sustain these functions, but some types of lipids are better than others. Some are considered “good lipids,” and others are considered “bad lipids.”

“Good lipids” promote healthy nervous system functioning, play an essential role in the transport of some proteins and hormones in the blood, and serve as a vehicle for carrying fat-soluble vitamins (A, D, E, and K). They are directly involved in the development of essential hormones such as sex hormones. In addition to direct beneficial effects on health, good fats are considered essential because our body needs them but cannot manufacture or replace them. More than 60% of our grey cells\* consist of fat.

Dietary sources of good lipids include nuts, vegetable oils, and fatty fish.

There are two types of bad lipids. One is trans-fats, which are generated by industrial processes. The other is saturated fats, which are natural but should be consumed sparingly. Sources of saturated fats including fatty meats, high-fat dairy products, and oils such as palm oil, coconut oil, and cocoa butter. Both types of bad lipids increase the risk of diseases such as cancer and cardiovascular diseases.

**Micronutrients:** Unlike macronutrients, the body needs these substances in small or very small quantities) are not used to produce energy in the human body. However, they play a crucial role in producing energy in the body and are thus essential for health. Micronutrients include vitamins, minerals, trace elements, and essential fatty acids.

**The role of vitamins and minerals**

Aside from the proteins, carbohydrates, and lipids mentioned above, the body also needs vitamins to help our cells function correctly.

**Fat-soluble vitamins**

Fat-soluble vitamins dissolve in fats and can be stored in the body. Because of this, there is a risk of consuming too much of them.

They include vitamin A, D, E, and K.

Generally, fat-soluble vitamins are found in dietary lipids (oils, fatty fish, egg yolks, offal, liver, etc.), except for vitamin D, for which the only source is the sun.

Also, vitamins A, C, E, and beta-carotene (pro-vitamin A) acts as antioxidants\*. They play a role in many body functions. Without antioxidants, the body would be more vulnerable to many chronic diseases such as diabetes.

**Water-soluble vitamins**

These vitamins dissolve in water rather than fat and are therefore dispersed in body fluids, are not stored, and are excreted in urine. In general, sources of water-soluble vitamins are fruits and vegetables (which are full of water).

There are 13 water-soluble vitamins, divided into two groups: Vitamin C and the B vitamin group.

**Minerals**

Like vitamins, minerals are substances that are essential for proper body functioning. Most are found in unlimited amounts in nature: rivers, lakes, ocean water, and soil. Therefore, fish and other seafoods, as well as foods grown in soils with adequate levels of mineral salts, are good sources of minerals.

There are 22 minerals in total, divided into two categories: seven macro-minerals and fifteen trace elements. They make up about 4% of body mass and are divided into two categories, macro-minerals and trace elements. Macro-minerals include calcium, magnesium, potassium, phosphorus, sulphur, sodium, and chlorine. Trace elements include iron, zinc, copper, fluorine, iodine, chromium, and selenium.

It’s important to note that a balanced diet\* provides all the vitamins and minerals the body needs.

**Nutrition for pregnancy**

Mothers play a key role in the nutrition of the fetus.

If a pregnant woman lacks adequate food, not only is her own physical condition affected, but that of her unborn child. A lack of essential vitamins and minerals can produce disastrous results for pregnant women, including increased risk of low birthweight, birth defects, a stillborn child, or even the mother’s death. The period from pregnancy to three years old (the first 1,000 days) is the most important period in a child’s life in terms of growth and development. Just as poor maternal nutrition during the first 1,000 days can provide lifelong benefits for the child, so can poor maternal nutrition negatively impact the remainder of the child’s life.

When she is pregnant, a woman’s nutritional needs increase from 2,290 kcal to 2,700 kcal per day, an increase of 150 kcal per day during the first trimester and 350 kcal during the two remaining trimesters. It is recommended that pregnant women consume a diet that is adequate in calories and is nutritionally balanced, with sufficient macronutrients (e.g., through cereals, meat and other protein-rich foods, and oils) and the micronutrients found in fruits and vegetables.

It is important to make sure that the mother has no deficiencies. For example, if she is undernourished, she will not be able to feed her foetus well. The mother needs a balanced and varied diet, rich in iron and with adequate calories. Foods such as offal (liver, intestines, kidney, stomach) can considerably improve iron deficiency.

In 2018, more than 60% of women aged 15 to 49 suffered from an iron deficiency in Mali, including 52% in urban and 67% in rural environments. But they have other micronutrient deficiencies, in particular vitamin A and iodine. Iodine is the most important element for healthy thyroid functioning, thus playing a crucial role in the body. Iodine deficiencies disrupt the functioning of the whole body. And since Mali is landlocked, food grown in the country is not naturally rich in iodine, which is found in high levels in saltwater seafoods. Therefore, people must add iodine to their food by using iodized salt.

**Nutrition for women and children**

In 2016-18 in Mali, according to the Demographic and Health Survey VI children from 6 months to 5 years old represent a quarter of the population. However, 27% of these children are stunted\* or suffer from chronic malnutrition (they are too small for their age), and 10% suffer from severe stunting.

Women and children in Mali have a high rate of anemia. The rate is 81.7% in children from 6 months to 5 years old, and 51.4% in 15-49-year-old women.

With deficiencies such as maternal anemia, the child can suffer damage such as irreversible stunting, which has negative impacts on education, health, development, and productivity. Children suffering from stunting are also more likely to have children with stunted growth. Therefore, women of reproductive age must have nutritionally-balanced, adequate, healthy, and varied food.

Though Mali has signed national and international commitments on nutrition, the situation remains difficult due to a lack of funding. Only 0.7% of the national budget is allocated to nutrition, and malnutrition is costly for Mali.

The costs of malnutrition are estimated at more than 265 billion CFA francs per year according to the survey undertaken in 2018. The difficult situation with food and nutrition persists despite a national nutrition policy and national action plan adopted in 2010.

According to the World Bank, Mali had a strong economic growth rate of higher than 5%, but has one of the highest rates of malnutrition in Africa. A 2018 nutrition and mortality survey found that 10% of Malians have acute malnutrition\* and 2.0% have severe acute malnutrition.

In 2019, according to SMART 2019, the prevalence of chronic malnutrition or stunting in the country was estimated at 26.6%.

A 2018 survey found that 6% of the Malian population was undernourished, defined as an intake of less than 1,800 calories per day. The situation was particularly serious in the Mopti, Gao, and Sikasso regions, where over one-third of households had a poor or limited diet.

However, Mali has plenty of all kinds of food to meet the nutritional needs of its inhabitants, even in rural areas. For example, there are wild fruits high in energy, which should not be ignored. There are also traditional dietary practices such as the use of “bran” by pregnant women. Bran helps the body retain water because it contains fibre. It is part of traditional recipes and helps ensure adequate nutrition and prevent cancer.

A recent study showed that malnutrition is evenly spread in Mali, with no statistical difference between very poor, poor, middle-class, or rich people. It’s only very rich people who differentiate the others.

Chronic malnutrition manifests in smaller size for a given age or stunted growth. The height-for-age index is a reflection of the long-term effects of malnutrition. Stunted growth results from gradual, cumulative, and chronic undernutrition from conception to the age of two. It has serious short-term and long-term effects for physical health and cognitive functioning.

**Consequences for mother and child**

Good nutrition in children starts from birth with optimal breastfeeding up to 24 months. Introducing complementary foods up to six months, fortifying foods, and general or target supplementation with specific nutrients can also provide the infant the young child with the required amounts of micronutrients. In some cases, this continues through school feeding programs. Eating a good diet enables better learning. If the immune system is weak, there can be considerable consequences for mothers and children, including:

* Increased maternal and perinatal mortality.
* Intrauterine growth retardation that leads to stunting.
* Premature delivery.
* Reduced cognitive and psychomotor development.
* Reduced capacity to concentrate, leading to lower school performance, increased tiredness, and reduced capacity for physical exercise, for example, through sport.

Considering the seriousness of the situation, the national children’s parliament in Mali made the following statement before the Malian Prime Minister: “For us, children of Mali, our future results will come from the good food we have in early childhood. Therefore, a well-fed child benefitting from good nutrition from birth starting with breastfeeding, complementary foods, and the fortification of food and then through a school feeding program is an investment for our country. Eating well enables quality learning. We, the children of Mali, thus invite the Government of Mali to take actions to ensure every child has good food from birth, at home, and at school.”

**Nutritional difference between men and women**

Sixty to seventy percent of an individual’s energy requirements are burned by the *basal metabolic rate*\*. The basal metabolic rate is **1792 calories** per day for men and **1567 kcal for women**, with variations depending on muscle mass, height, weight, and other factors. The food we eat provides us with this energy. The recommended energy intake for a 20-40-year-old woman is 2,200 calories and 2700 calories for a 20-40-year-old man. Men need more calories because they are generally taller and heavier and especially because they have more muscle mass that burns calories.

Women’s needs for folic acid increase during pregnancy. Folic acid is essential for proper formation of the fetal nervous system.

It is recommended that half of the total calories we consume be provided by carbohydrates, 25% from lipids, and 25% from proteins.

**Diabetes**

Diabetes is a chronic disease caused by the incapacity of the body to produce insulin\* or use it efficiently. According to the International Federation of Diabetes (FID), diabetes is a major cause of heart disease and stroke, blindness, kidney failure, and lower limb amputation. In 2017, it is estimated that 425 million people had diabetes globally. Africa had 16 million people, and, in Mali, 3,2% of people suffered from diabetes during the same year. There are two type of diabetes: type 1 and type 2.

Type 1 diabetes (which most often occurs early in life) affects children and young adults from birth to 25 years old. In Type 1 diabetes, insulin is not produced by the pancreas; the cells responsible for it were destroyed by the immune system.

In type 2 diabetes (which generally occurs after 40), insulin is produced, but in insufficient quantity (due to depletion of the pancreatic cells.)

Diabetes is a chronic and incurable disease linked to two risk factors, including reversible and irreversible factors. The reversible factors require a change in behaviour to prevent diabetes: avoiding overeating, and in particular eating too much fat and sugar. Obesity, and especially abdominal obesity, is a risk factor for diabetes. It is also necessary to be physically active. Irreversible factors include children born with diabetes or who inherit a tendency to develop diabetes.

In Mali, 3-4% of people suffer from diabetes, and there are 700,000 diabetic children and young adults (0-25 years of age) in the world. About 800 children and young adults from 0-25 years old suffer in Mali from type 1 diabetes. Not only can the effects of diabetes be life threatening, but chronic complications can lead to stroke, blindness, kidney diseases, problems with the nervous system, and problems with the lower limbs.

**Other diseases linked to nutrition**

Non-communicable diseases related to nutrition include cardiovascular diseases—for example, strokes, which are often linked with high blood pressure. Diabetes and some cancers are associated with poor diet, and poor nutrition is a major risk factor in these diseases globally. Eating too much fatty, salty, and sweet food increases the risk of cardiovascular diseases and diabetes.

**Definitions**

*Antioxidants:* Antioxidants prevent or reduce the impacts of free radicals, which can cause damage leading to cardiovascular and inflammatory diseases, cataracts, and cancer. Antioxidants include vitamins (A, C, E), minerals (selenium, zinc), and carotenoids, (lycopene, beta-carotene).

*Balanced diet:* A balance between different nutrients: lipids, carbohydrates, and proteins. A balanced diet also includes a sufficient intake of vitamins, trace elements, and water.

*Basal metabolism or basic metabolic rate*: The amount of energy used by the body at rest.

*Cholesterol:* A component of lipids.

*Grey cells:* (Note that this is an idiom, rather than a scientific term.) Neurons (nerve cells) in the brain. “Grey cells” symbolize thinking and their agitation represents healthy brain activity. Grey cells not only support and protect nerve tissue, but also provide nutrients and oxygen to eliminate dead cells to fight pathogens.

*Insulin*: A hormone produced by the pancreas that helps reduce the level of blood glucose.

*Malnutrition:* Lack of proper nutrition. Caused by not having enough to eat, not eating enough of the recommended foods, or being unable to use the food that one does eat.

*Nutrition:* Science of food, nutrients, and other substances contained in foods, their actions, their interactions, and the links to health and disease. According to WHO, poor diet is one of the main risk factors for a range of chronic diseases, including cardiovascular diseases, cancer, diabetes, and other diseases linked to obesity. The specific recommendations for a healthy diet include consuming more fruits, vegetables, legumes, nuts, and grains; reducing salt, sugar, and fat consumption. It is also recommended to choose unsaturated fatty acids instead of saturated fats.

*Oxidants:* Molecules that interfere with cell functioning, accelerate ageing, weaken immunity, and increase the risk of cardiovascular diseases.

*Stunted growth:* Reduced height for age compared to the norm. Caused by chronic or recurrent malnutrition linked to many factors, including poor maternal nutrition and unfavourable social and economic conditions.

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