

# Nutrition in the kitchen



# **Nutrition in the Kitchen**

**A guide to understanding the science,  
and experiencing the health benefits  
of adopting a plant-based diet; and  
help save the planet along the way!**

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**Note**

The reader is advised that this book is not intended to be a substitute for an assessment by, and advice from, an appropriate medical professional.

This book is dedicated to the memory of  
Anne Karine & Frank  
Founders of Moinhos Velhos retreat.

And my wife, Debby  
For supporting me during my time-consuming studies,  
and beyond....



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# Preface

A journey into nutrition

In 2015, After finishing my nutrition studies in the Netherlands and starting my online practice, together with my wife Debby, we decided to give up the rent and give in to our wanderlust, which was fuelled by several extended travels we previously enjoyed together. This time we left the Netherlands without a date of return.

We spend 20 months on the road which was one of the best experiences of our life, taking us all over Southeast-Asia, India, and Nepal. The freedom of travelling gave me the opportunity to develop my culinary skills by attending cooking classes all over Asia, and this is where my love for spices originated.

After returning to Europe, we decided to go the Southwestern tip of Europe, Portugal. This is where we ended up at Moinhos Velhos retreat, initially starting as volunteers to work in the organic garden, one thing turned quickly into another, and I got employed as nutritionist. Debby was given the opportunity to travel to India to become a Yoga teacher. Since then, we have been part of the team facilitating the juice fasting programs at Moinhos Velhos.

In 2020, 'Healthy eating' retreats were added to the calendar of Moinhos Velhos, where the guests are provided with 3 healthy whole foods plant-based meals daily. Besides preparing all the meals for these retreats, I give daily cooking workshops and nutrition classes during the retreats.

Working the last 7 years as nutritionist at Moinhos Velhos gave me the opportunity to meet guests from all over the world. This showed me that even 'health-conscious' people have widely differing views about what constitutes a healthy diet.

This put me on a quest to unravel this question and separate hype from real nutrition advice based on the best available balance of evidence. My initial nutrition studies I completed in the Netherlands had given

me a good basic knowledge of nutrition, but many questions still remained unanswered. After reviewing all the nutrition textbooks I could get my hands on and filling up a bookcase with books on nutrition, my understanding of nutrition has significantly expanded, and continues to grow.

Not the least by the advent of the internet, with databases containing all papers published in scientific journals. The issue with many studies locked behind a paywall was solved by the Sci-hub website, the first pirate website to provide mass access to tens of millions of research papers. Links to the papers cited in this book, over 600, can be found in back of this book.

Studying biochemistry has had a big impact on my understanding of nutrition, as this shows the principles of how metabolism works on a cellular level.

Subsequently, I completed online courses on the microbiome by Wageningen University, and “science and cooking” by Harvard University. Deepening my understanding of nutrition as well as making the link between science and the kitchen.

After multiple remarks from guests that I should write a book, I eventually decided to embark on that project, which result you are now holding in your hands. This is my attempt to answer the questions ‘what to eat’, ‘why to follow such a diet’, and ‘how to prepare nutritious meals’. The science in this book will answer the questions of ‘what’ and ‘why’, while the recipe sections will show you how to prepare your own delicious and healthy plant-based meals.

Ed, 2023

# 1.

## Introduction – Nutrition science

Evidence based nutrition and common sense

*“What to eat for health?”, a simple question that seems hopelessly difficult to answer nowadays, as we are bombarded with an infinite stream of conflicting dietary advice. To get a reliable answer to this question, we have to look at the preponderance of the evidence that science provides us. However, even nutrition science is tainted by conflicting interest, obscuring a clear answer, and compromising our health in the process.*

Our food choices are, for a big part, determined by culture and social life, even though the food choices we make have an enormous effect on our personal health, as well as the health of our planet. There was a time, not so long ago, when people knew what to eat. Nowadays, people have generally become out of touch with nature and have little instinctual or rational basis for their diet.

When reliable information is hard to find, people, who have evolved to conserve energy and are thus lazy by nature, stop looking for the right information and believe the information most readily available to them. These opinions, often from questionable sources, are not true knowledge. True knowledge is based on opinions justified by an expert consensus answer to the question ‘why?’. This lack of knowledge and the inherent difficulty of nutrition science, prevents people to rationally explain dietary advice and turns any suggestion of dietary change into an emotional issue.

In the current landscape of nutrition advice, there is a voice to be found for any, often questionable, advice. Many people are hopelessly confused about what constitutes a healthy diet. This is evident in the global obesity epidemic, with more than half of the adult population in the West being overweight and 20% of the adult population obese.<sup>1</sup> The worldwide prevalence of obesity is increasing fast, and when current trends continue, it is estimated that there will be 2.7 billion overweight adults and 1 billion people with obesity by 2025.<sup>1</sup>

In the developed world, we mostly eat what is marketed by food companies. Massive marketing budgets are used to make us think eating is complicated, and the food industry is in a better position to make the food choices for us, so we do not have to worry about it. Therefore, we end up with an endless supply of processed foods, as processing food adds value to the product, increasing profits. There are only small profit margins on whole plant foods, which is why you do not see advertisement for broccoli or apples.

However, the basic truths about a healthy diet are simple, although often concealed from the general public. These basic truths are the product of a multitude of science combined with common sense, supported by expert consensus globally.

The internet is awash with influencers who present their personal opinions as facts, often cherry-picking data from limited or poor-quality studies. Evidence-based nutrition provides the data to support the basic truths about a healthy diet. These truths are stable over time and are supported by the weight of the evidence, compared to much dietary advice that is transient and often supported by only a single study or an anecdote. In this way, evidence-based nutrition provides a clear path through the forest of dietary advice.

Science is the systematic knowledge of the world gained through observation and experimentation, after which the obtained data is critically and rigorously evaluated and interpreted. Science is incremental and accumulative, and it is built on previous knowledge. Especially in nutrition research, it is necessary to look at the preponderance of all the evidence instead of only a few studies. Much of what we know about nutrition comes from lesser definitive evidence than absolute proof. If we would only use absolute proof for health recommendations, we would still not be sure that smoking causes cancer. Studies that could provide this type of proof would be unethical as it would entail a group of people who will have to commit to smoking for at least several decades. When something appears detrimental in early research, there is a responsibility, and stopping the experiment will be strongly considered.

## ***Glossary***

- **Whole plant foods:** are foods that are as close to their natural state or have undergone the bare minimum of processing. A food that can still be recognized as being harvested from a plant is considered whole.
- **Plant-based:** a term nowadays used to mean any diet that focuses on plant foods but does not necessarily have to be exclusively plant-based, although this was the original meaning.
- **Vegan:** is more than a dietary choice. It is a lifestyle that aims to exclude all animal cruelty and reject the commodity status of animals. Therefore, vegans will avoid animal-derived products in food, clothing, beauty products, or others.
- **SOS free:** Acronym for Salt, Oil, and Sugar.
- **Metabolic pathways:** are vital in capturing useful energy in the body, compared to uncontrolled combustion. Metabolic pathways are organized so that energy is released slowly, allowing the body to utilize it. Metabolic pathways either maximise the energy captured or minimize its use.
- **Free radicals / Reactive Oxygen Species (ROS):** are a normal by-product of metabolism. We are also exposed to ROS from various environmental factors such as drugs, pesticides, smoke, and other pollutants. These ROS miss an electron, making them unstable. ROS collide with the body cells, stealing an electron to make up for this missing electron, which can cause the human cell to malfunction. Antioxidants, produced by the body and from the diet, can neutralize these ROS.
- **Oxidative stress:** is the damage caused by ROS. Oxidative stress results from an imbalance of oxidant (ROS) production with antioxidants.
- **Atherosclerosis:** is the narrowing of the arteries due to plaque build-up inside the artery, causing cardiovascular disease. Atherosclerosis develops slowly and starts in our youth as fatty streaks inside our arteries that develop into plaques. These plaques can affect all arteries in the body, reducing the supply of oxygen to the organ supplied by the artery. When these plaques burst, a blood clot forms, which can restrict or completely block the blood flow, resulting in a heart attack or stroke. High cholesterol levels and an unhealthy lifestyle are the main risk factors for atherosclerosis.

The gold standard in research is a randomized controlled clinical trial. In these trials, two groups of people are compared, one intervention and one control group. Afterward, the results must be adjusted for confounding factors like smoking, body weight, or activity level.

A study designed to give absolute proof that one diet is better than the other must be a long-term randomized controlled clinical trial. Because the differences in health outcomes are expected to be small, the sample size of participants must be exceedingly large. We also know that nutritional effects start in utero and that diet influences your health for your whole lifespan. Thus, the study would need to begin in utero, with thousands of pregnant women adhering to their assigned diet. Breastfeeding would be standardized for all participants, as nutrients are transmitted through breast milk. The babies would have to stick to their assigned diet for their whole life and optimally live to over 100 years of age to examine optimal diets. This would require a second generation of scientists to continue the study till they can evaluate the outcomes. You can understand that such a study would be impossible to perform.

The problem with trials in nutrition research that want to show the effect of a single food or nutrient is that they are costly and difficult to perform. The effects of a single given food or nutrient can only be understood in the context of the complete diet. When you eat more of A, you eat less of B or change your total caloric intake.<sup>2</sup>

Moreover, nutrition research is affected by bias. When participants in a study have to self-report their food intake, there is an inherent tendency to under-report bad behaviour and over-report behaviours that are seen as good. Also, bias occurs when people in the intervention group are not blinded. When participants know they are in the intervention group, there is an enormous placebo effect. Blinded studies are often not possible in nutrition science, especially when looking at whole foods. You cannot put cauliflower in a pill without changing its properties. The participants will always be aware of what they are eating.

The inherent issues with studying whole foods and diets are the cause of a reductionist view in nutrition science, where we try to understand



things by breaking them down into ever smaller parts.<sup>3</sup> By focusing on single nutrients, there is a tendency to lose the bigger picture. Whole foods are complex combinations of many nutrients that all work synergistically, affecting each other. At the same time, the sum of nutrients is often better than the nutrients on its own.

Examples of this reductionism in nutrition science are lectins in beans or fructose in fruit. Theorizing about potential toxins in beans or fruit does nothing to invalidate the reliable, established effects of fruit and bean consumption.<sup>4-6</sup> Population studies overwhelmingly show that the more fruit or beans people consume, the less incidence of chronic diseases and the better the overall health. Whichever effect is attributed to part of the food does not say anything about the effects of the whole food.

Most randomized controlled clinical trials only run for short periods and only look at specific health markers. The big problem is that many chronic diseases take decades to develop before symptoms occur.

Studies that compare different diets and health outcomes are often designed by those who favour one diet over another, turning the losing diet into the strawman. In these types of studies, you really must look closer at what these people have been eating. For example, vegan diets do not necessarily have to be healthy. When the participants eat lots of refined and processed foods, they may have been eating a vegan diet, but their fibre intake would be very low.

The evidence supporting a plant-based eating pattern consists of a massive body of science, ranging from international population studies that look at diet and health outcomes to human intervention studies that show disease arrest and reversal after switching diets. Experimental animal studies also show a strong and causal relation between diet and health.<sup>7-12</sup>

All this evidence for plant-based diets is seen as controversial, as it challenges some of our basic understandings of disease and nutrition. Standard Western medicine tries to cure cancer by killing cancer cells, seeing cancer as a local disease. On the other hand, a nutritional approach aims to heal the body as a whole and put cancer cells into

remission, treating cancer not as a local but as a systemic disease. This challenges how we view cancer as a disease and the classic narrative that disease and nutrition are only partially connected. Plant-based nutrition can be used not only as prevention for cancer but also as adjuvant therapy for existing cancers.

Except for vitamin B12, no other nutrients in animal-based foods are not better provided by plants. The only nutrients found predominantly in animal-based foods are vitamins A, D, and B12, of which vitamin B12 is the only essential ingredient. Our body produces Vitamin A from the beta-carotene in plant foods, while vitamin D is produced through exposure to sunlight. On the other hand, plants are sources of antioxidants, fibre, and other beneficial phytonutrients, of which animal foods are almost entirely devoid.

An intriguing group of people who have been the subject of lots of nutrition research consists of members of the Seventh-day Adventists in Loma Linda, California. This Christian church teaches that your body is a holy temple and should eat the healthiest foods. The recommended diet emphasizes whole plant foods and discourages animal foods. Some Adventists follow a strict plant-based diet, and others eat a vegetarian diet that includes eggs and dairy. Some include fish, while others also have meat in their diet. Looking at these different groups of people shows a consistent relationship between diet and body mass index (BMI), with a stepwise reduction in average BMI the more the diet trends towards being entirely plant-based.<sup>13</sup>

Besides plant-based diets, the traditional Mediterranean diet is also considered healthy. A high intake of varied fruit and vegetables, olive oil, nuts, beans, and cereal, and a moderate intake of fish, poultry, and red wine, characterize this diet. The traditional Mediterranean diet was the most popular diet in Spain, Italy, and Greece until the 1960s.

The most extensive study to date on the health effects of the Mediterranean diet is the PREDIMED study from Spain.<sup>14</sup> In this 6-year study, they followed over 7000 people between 55-80 years of age with a high risk for cardiovascular disease. The participants were randomized to follow one of 3 diets, a Mediterranean diet with the addition of olive oil, a Mediterranean diet with mixed nuts, or the

control diet. The participants on the control diet got advice to reduce their dietary fat intake.

The study was cut short before the fifth year due to ethical reasons. The people on the Mediterranean diet had a 30% lower risk for cardiovascular events, a reduced risk for type 2 diabetes, breast cancer, and being overweight, which made it unethical to let the control group continue their diet. Both Mediterranean diets performed much better than the control diet. When comparing the diet with added olive oil with the added nuts, the diet with the added nuts showed slightly better health improvements.

Every day we keep learning more about nutrition with massive amounts of research published yearly. However, some of this nutrition science is of questionable reliability. Nutrition science is one of the few disciplines in science that has direct links to product marketing. Because the food industry funds most studies, there is ample opportunity for conflict of interest. Industry funding can be a force for good or bad. However, commercial interests have taken over much of science. The industry influences science by setting the agenda, determining what is researched, and often promoting research into supplements, pharmaceuticals, and expensive treatments.<sup>15</sup> As well as trying to influence policy decisions. Using the tobacco industry's playbook, they are in the business of creating doubt. You don't have to be correct. When people have doubts, they will no longer listen to nutrition recommendations and eat whatever they want.<sup>16</sup>

Despite all these hurdles in nutrition research, the world is slowly catching up, and all major national health institutions and the WHO nowadays recommend a plant predominant diet.<sup>17</sup>

## 2.

# A healthy diet

### Part 1: Food groups

*Humans are the only species on the planet that does not know what to eat, all other animals appear to know what to eat. Overweight and obesity does not occur in animals besides livestock and pets, i.e., animals fed by humans. More and more people living in cities and the current media landscape have certainly contributed to us becoming so out of touch with nature. However, many questions on nutrition can be answered with common sense, most people understand that eating ultraprocessed foods will not be beneficial for their health, whereas eating more fruit and vegetables will. Or as many a mother has proclaimed to their children “Eat your veggies”.*

What is considered a healthy diet? First, a diet is something you adopt for the long term, not something you follow temporarily. A healthy diet should provide adequate energy from macronutrients and sufficient micronutrients. Energy-providing carbohydrates, protein, and fat are needed in relatively large amounts, which is why they are called macronutrients. Vitamins and minerals are micronutrients because we only need them in small quantities, but they are nonetheless essential. A healthy diet supports growth, development, metabolism, and all the other bodily functions, as well as allowing for vibrant health and fostering longevity. A healthy diet is not oriented primarily toward weight loss. Still, for many people who adopt a healthy diet, the diet leads to losing the excess weight they could not get rid of before.

There is not one diet that guarantees a life free of disease, and there are many dietary approaches that sustain or improve health. These approaches have in common that they are all plant-predominant diets of wholesome foods in sensible combinations. Any diet rich in vegetables, fruits, beans, grains, nuts, and seeds, with relatively little of everything else, is a healthy diet. Or in the adage of the journalist Michael Pollan: “Eat food, not too much, mostly plants”.<sup>1</sup>

Wholesome foods are fresh foods that come straight from the plant, also called unprocessed foods. Whereas processed foods are not all equal, and we must distinguish between minimally processed and ultra-processed foods. Minimally processed foods like rolled grains, tofu, nut butters, and grain flours are processed with few, if any, added ingredients. Ultra-processed foods have undergone extensive processing and often have a long list of added ingredients, many of which you won't find in a typical kitchen pantry. These products are mostly found in the packaged foods section in the supermarket, and they usually have a long shelf life.

A diet completely devoid of processed foods is neither necessary nor practical. Some degree of processing adds convenience to our busy modern lives. However, processed foods tend to be denser in calories and can be absorbed faster by the body. Always consider the degree to which food has been processed and how often you consume these foods.

A massive and consistent body of evidence supports plant-predominant diets. However, this is not the impression you get when you follow the media, who like sensational headlines which are often only partly true and sometimes even downright false. We are being sold a new fad diet and shortcut to health every week in the media. From newspapers to the internet, there is an endless source of questionable dietary advice. Nutrition research is complex and oversimplified by the media. Good headlines are made by highlighting a study that contradicts our current understanding.

All this media attention leads to the perception that some 'experts' undermine the credibility of others. Like "this expert is the real expert; the others don't know what they are talking about". But this is not how science works. Science is an ongoing process that builds on previously attained knowledge, with new studies constantly being published, expanding our understanding. Contradictory studies may occur and are a natural part of the scientific process.

Science overwhelmingly shows that the healthiest diet is a whole food plant-based diet low in added sugars, oils, and salt (SOS). This diet is the only eating pattern that has been shown to reverse cardiovascular

disease and many other chronic diseases.<sup>2,3</sup> You can look at your diet on a spectrum, with a plant-based SOS-free diet on one side and a diet high in saturated fat, refined foods, salt, sugar, and oils on the other. How strict you must follow a healthy diet depends on your state of health. A healthy body can handle some animal and ultra-processed foods when you are generally healthy. But when trying to overcome a disease, it is often necessary to follow a healthy diet more strictly. Sustained health is achieved by making gradual, long-term, balanced adjustments to your diet and lifestyle.

Diet is probably the most crucial factor that influences health. Other factors are sleep, stress, exercise, environment, community, and purpose in life. On the other side, health is only one aspect of our food choices. The choices you make are a personal matter involving things like taste, culture, and pleasure. Moreover, our social life tends to revolve around the dining room table.

A healthy plant-predominant diet focuses on the four main food groups: fruits, vegetables, whole grains, and beans. With the addition of mushrooms, spices, nuts and seeds, plant-based meals can provide you with all your daily requirements and come with plenty of fibre. The only exception is vitamin B12, which is recommended to supplement when you follow a plant-based diet or if you are over 50 regardless of diet.

(Discussed in more detail in the chapter 'What about B12' p278)

## **Fruit**

Eating a variety of fruits is recommended, as each fruit comes with its own set of nutrients. Give preference to fruits that are in season and grown locally, as these will be the freshest and most delicious fruits. Whole fruits are your best option and can be an easy snack between meals. Smoothies are another easy way to increase your fruit intake. However, smoothies are digested faster compared to eating the whole fruit, which can cause a spike in your blood sugar, and juices even more so. By breaking up or removing the fibre, the sugars in the fruit are rapidly released and absorbed, providing less satiety.

The available evidence on fruit consumption doesn't suggest an upper limit.<sup>4</sup> This means you can eat as much fruit as you wish. Population studies show that people who eat more fruit have a longer lifespan.<sup>5</sup> Arguments against high fruit intake are not supported by medical science. Even for people with high blood sugar issues like type 2 diabetes, the consumption of whole fruits is recommended.<sup>6-8</sup> There is lots of evidence showing fruit is beneficial for insulin sensitivity. It makes your cells more responsive to insulin, so less insulin is required to lower your blood sugar levels.<sup>13,14</sup> Chronic high blood sugar and high insulin levels are both associated with increased disease risk.

Dried fruit is also a good option when consumed in moderation, as they are five times more concentrated in calories than fresh fruit, making it easier to overeat. You can add dried fruits to your green salads or rice, and dried fruit works well as a sugar replacement in many recipes. Dried fruits are a wholesome source of sweetness as they still have other beneficial nutrients not present in refined sugar. However, many conventional dried fruits contain sulphites to retain their colour, to which some people develop a sensitivity.

## **Vegetables**

Vegetables provide your body with energy, vitamins, minerals, fibre, and other beneficial plant nutrients. All vegetables are considered healthy, and different vegetables will provide you with their unique set of nutrients. Try to incorporate as many different vegetables as you can find. Bright colours are a good indication of freshness, as many of the beneficial nutrients are also responsible for the colours of the vegetables. Dark green leafy vegetables and cruciferous vegetables (cauliflower, kale, broccoli, mustard greens) are especially loaded with beneficial nutrients. Aim to increase your vegetable intake by combining several different vegetables into one dish. Smoothies are another easy way to incorporate more vegetables into your diet. Vegetables can be eaten the same way as fruit, 'ad libitum', which means as much as you desire.

## **Whole grains**

This food group includes brown rice, grains like wheat, rye, oat, barley, corn, and pseudo cereals like quinoa, chia seeds, and buckwheat. Also,

products made from these whole grains, like bread and pasta, belong in this food group. Bread has twice the calorie density as compared to the intact grain. Whole grains are a good source of energy, fibre, B vitamins, and minerals and are naturally low in fat.

The less processed, the more nutrients will be retained, and the more it will fill you up.

Refined grains, like white rice or white flour, only contain the grain's endosperm. The endosperm consists primarily of starches and protein. Most of the beneficial nutrients and fibre are in the germ and bran of the grain. Whole grains also retain the germ and bran. Refined grains are stripped of most of their beneficial nutrients and become, for the most part, a source of calories.

Less processed is always better, but it is also unnecessary to be too strict. If you are generally healthy and don't have a sedentary lifestyle, you should be able to handle *some* refined grains in your diet. In Asia, for example, several billion people live on a traditional diet with white rice as their staple food and maintain their health pretty well. You can offset some of the adverse effects of refined grains by combining them in a meal with some fibre-rich produce, like beans, another staple-food in Asia.

## **Beans**

Giving beans a prominent place on your plate is one of the healthiest choices. Beans are nutritional powerhouses and are one of the best sources of dietary fibre in our diet, as well as a source of protein, minerals, and B vitamins. This food group includes beans, peas, lentils, as well as products made from beans, like tofu, tempeh, and miso. Another reason why incorporating beans in your meals is so beneficial for your health is that they are often used to replace animal products on your plate. A dish with beans will fill your stomach and provide satiety while being low in calories.

Beans are known to cause gassiness and bloating, especially when you are not used to eating beans. It can take some time before the bacteria in your gut are adapted to the high amount of fibre from the beans. When you experience discomfort after eating beans, the best thing to do



is start with small portions and slowly increase the amount of beans in your diet. Always make sure that your beans are cooked thoroughly. They should be soft and easily squished between your fingers. At this point, the gas-forming compounds are mostly broken down.

Another method to reduce these gas-forming compounds in beans is to soak them in hot water before boiling. After washing your beans, bring them to a boil in a pot with plenty of water, turn the stove off and leave them overnight. The next day you discard the water and prepare them as you would normally.

Sprouting your beans is another way to break down these compounds in the beans. Also, spices like black pepper, cinnamon, cloves, garlic, ginger, and turmeric are prized for their ability to diminish the gas production from beans.

Your diet is healthy when your meals consist mainly out of these food groups. You can increase the health benefits of your diet by adding some nuts and seeds, mushrooms, spices, and a regular B12 supplement.

### **Nuts and Seeds**

Nuts and seeds are very beneficial additions to your diet, with small amounts incorporated into your diet already offering significant health benefits.<sup>9</sup> Nuts and seeds are a good source of healthy fats, protein, and fibre. When you struggle with weight or need to restrict calories, nuts and seeds are best minimized. The high amount of healthy fats makes them high in calories (500-600 calories per 100 grams) and thus easy to overconsume. However, when you eat whole nuts and seeds, your body will not absorb all the calories from the nuts and seeds, and part of the calories are excreted with your stool. Conversely, the calories from nut butters are almost completely absorbed.

### **Mushrooms**

Since ancient times people have used mushrooms for a variety of reasons. Ötzi, the ice mummy found in 1991 in the Italian Alps, had three types of mushrooms with him. He probably used them to make fire, brew medicinal tea, and treat wounds. Ötzi died some 5500 years ago.

The medicinal properties of many different mushrooms can be explained evolutionarily by the fact that fungi are more closely related to the animal kingdom than the plant kingdom, so they often had to defend themselves against the same microbes that attack us. Therefore, mushrooms produce a surprisingly wide range of natural antibiotics.

Mushrooms are a good source of fibre, minerals, and B vitamins, and they are a source of vitamin D when they have been exposed to sunlight. Their meaty texture makes them ideal foods to replace animal products on your plate.

Preferably buy organic mushrooms because as they grow, they act like a sponge, and the mushrooms absorb all pesticides. Thus, when the growth environment is contaminated with pesticides, these will also be found in the mushrooms.

## **Spices**

Adding a little spice to your food can elevate the flavours of your meal to another level while also adding lots of nutritional value. Spices are the most concentrated sources of beneficial plant nutrients and antioxidants.<sup>10</sup>

Even the tiny amounts you add to your dishes can bring significant health benefits. These same beneficial nutrients of the spices are responsible for their flavours.

Experiment with different spices, as variety is the spice of life. Moreover, most spices are grown in developing countries for which they are a vital economic resource, improving the livelihoods of the people involved in the spice cultivation and trade.

When these foods are the main components of your daily diet, together with a reliable source of vitamin B12, either as a supplement or from fortified foods, your diet enables you to live a vibrant and healthy long life.

# 3.

## A healthy diet

### Part 2: Calorie density

*“How much should I eat” is another common question asked. Modern processed fast foods override our satiety signals, making us prone to overeat on those foods. However, by choosing the right foods in relatively unprocessed condition, we can eat till we are full and satiated, while still reducing the calories we consume.*

Many diets focus on restricting calories by counting the calories consumed. These diets are hard to sustain in the long term as they will leave you hungry and demand a constant focus on food, weighing your portions, and calculating the calories. Especially for people with a history of disordered eating, this obsession with food contributes to unhealthy eating habits. Counting calories is adversely associated with eating disorders and is increasing exponentially with the many phone apps available nowadays that can be used to track the calories consumed.<sup>1-3</sup>

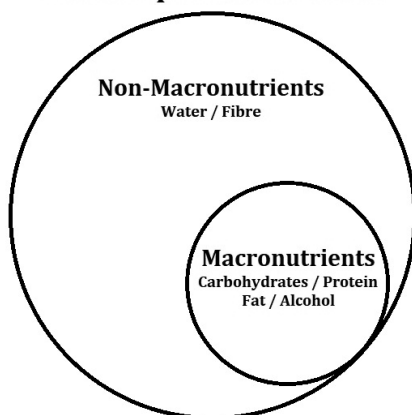
A better approach to weight management and diet might be the concept of calorie density, also known as energy density. The calorie density of food gives you the average calories per weight, as some foods contain more calories than others. Restricting your calories while consuming processed foods like pizza will allow only a few slices of pizza before you reach your daily caloric limit. Those few slices of pizza will not fill up your stomach and will leave you feeling hungry. On the other hand, when you include lots of vegetables in your meals, you can fill up your stomach several times a day and still restrict your caloric intake.

Foods with a low-calorie density contain lots of water and fibre, which do not add any direct calories to your food but add bulk, filling up the stomach. Low-calorie density foods are also low in fat, which adds more than twice the calories per gram compared to carbohydrates and

protein. Foods with a high-calorie density tend to be high in fat while low in water and fibre, as in processed pre-packaged foods.

The removal of water and fibre during the processing of foods has the greatest effect on calorie density, as water and fibre account for more than two-thirds of the food people consume by weight.<sup>4</sup> A higher proportion of fat also increases calorie density. Still, the macronutrient composition only affects less than a third of the total food weight. Therefore, macronutrient composition only has a limited effect on calorie density compared to water and fibre. However, modest changes in dietary fat content can still result in significant changes in calorie density.

### The composition of foods



People are creatures of habit and tend to eat similar amounts of food per weight on a day-to-day basis, regardless of changes in fat content and calorie density.<sup>5,6</sup> Thus, by eating more of the low-calorie density foods, you can eat the same amount of food as usual, or more, and still reduce your caloric intake. The clear advantage of eating foods low in calorie density is that these foods fill up the stomach, giving a feeling of fullness and satiety while low in calories.<sup>7</sup>

Whole plant foods are high in water and fibre and thus low in calorie density. Low-calorie density foods also increase feelings of satiety because it generally takes longer to consume whole plant foods than refined foods. When foods contain complex carbohydrates, protein, or

fibre, the texture of the foods is likely to be firm. A firm texture requires proper chewing before food particles are small enough to be swallowed, increasing the time it takes to eat the food. Fat, however, does not affect the eating rate in this way. For the most part, fat provides sensations such as creaminess and softness in the mouth, enabling a swift passage through the oral cavity, and resulting in a faster eating rate.<sup>8</sup> When oral exposure to the food is short, there is insufficient time for satiety signals from the mouth to induce a feeling of satiety, which may result in a higher food intake.<sup>8</sup>

Food that is chewed will fill up your stomach and remain there for a longer time, promoting a feeling of satiety. On the other hand, fat and liquids won't give you a sense of satiety and don't fill up the stomach as much. Therefore, it is best to be cautious with liquid calories, especially when you want to lose weight.

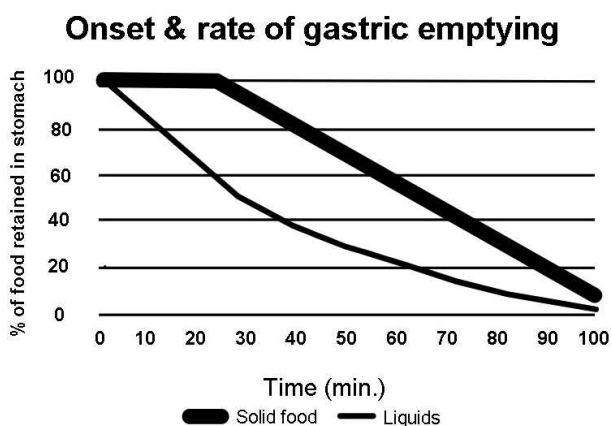
Soups are the exception to the rule, soup can be qualified as a liquid, but because soups are eaten with a spoon, the eating rate is similar to solid food. Besides eating rate, weight, volume, palatability, temperature, and salt content all contribute to making soup just as satiating as solid foods.

When food reaches the stomach, large solid particles are first retained in the upper part of the stomach, while liquids get dispersed throughout the stomach. When part of the liquid load leaves the stomach, the solid particles move towards the deeper part of the stomach, where they get broken down into smaller particles before emptying into the intestines.

Digestion of a solid meal is characterized by an initial lag phase, after which the stomach is gradually emptied. Liquids get emptied faster from the stomach without an initial lag phase.<sup>9</sup> In meals containing a combination of solids and liquid food, the liquid part is first emptied from the stomach. While water is almost immediately emptied from the stomach, liquids that contain nutrients are processed more slowly.<sup>9</sup>

Therefore, soups containing chunky bits are emptied more slowly from the stomach and consequently cause less of a spike in insulin, enhancing the feeling of satiety.<sup>10</sup>

Similarly, smoothies are an excellent way to increase your fruit and vegetable intake but eating the whole fruit is way more satiating. Blending or chopping up food increases the surface area of the food, which in turn speeds up digestion and absorption in the body.



Another added benefit of low-calorie-density foods is that they also tend to be the most nutrient-dense foods. Fruits, vegetables, whole grains, and beans are the most significant sources of vitamins, minerals, antioxidants, and other beneficial phytonutrients in our diet. People following a low-calorie diet tend to consume fewer calories but more food by weight. They have lower intakes of fat, higher intakes of fruits and vegetables, and higher intakes of vitamins and minerals.<sup>11</sup> This makes calorie density probably the most straightforward approach to healthy eating and weight management.<sup>12-16</sup>

Different food groups have a similar average calorie density, with vegetables being the lowest in calorie density, whereas oils and fats are up to 40 times denser in calories. One tablespoon of vegetable oil has 120 calories, which is equivalent in calories to 8 cups of cucumber slices. A spoonful of oil will not fill your stomach but eating eight cups of cucumber slices would fill your stomach twice, as the average human stomach can expand to contain around 4 cups of food.<sup>17</sup>

This shows that it is practically impossible to overeat certain foods because they are so low in calorie density. Non-starchy vegetables are the lowest in calorie density and average around 100 calories per

pound. Leafy vegetables are even lower in calories as they contain lots of water and fibre. Lettuce only has around 60 calories per pound, so you would have to eat around 100 heads of butterhead lettuce to get 2000 calories, an impossible task.

Fruits have an average of 300 calories per pound, berries being on the low end of the spectrum, while tropical fruits tend to be higher in calories. The avocado is the exception to this rule; avocado is a fruit high in fat that packs around 250 calories per fruit. Mashed avocado contains about 700 calories per pound.

Dried fruits are a more concentrated source of fibre and sugars. The calorie density of dried fruits increases five-fold compared to fresh fruit. By removing the water, the calorie density of dried fruit averages 1200 calories per pound.

On average, whole grains and other starch sources like potatoes and corn contain 500 calories per pound. The potato is at the lower end of the spectrum, providing around 400 calories per pound. Therefore, potatoes may be a better choice than rice or pasta for weight-loss regimens. People tend to eat the same amount of food by weight, so a plate of potatoes will provide fewer calories than a similar portion of other starches.<sup>18</sup>

Beans like peas, lentils, chickpeas, and pinto beans average around 600 calories per pound. These seeds of the bean plant family are concentrated sources of fibre and other beneficial nutrients. A meal consisting of these four low-calorie food groups will physically fill up the stomach while being relatively low in calories and high in beneficial nutrients.

On average, animal-derived foods like dairy, eggs, seafood, and meat contain 1000 calories per pound. There is some variability between different foods in this group. Whereas muscle meat has similar properties no matter the source, full-fat cheeses can contain up to 2000 calories per pound. Generally, the fattier the food, the more calories it contains.

Processed carbohydrates are stripped from their fibre and, as a result, are much denser in calories. Bread and other foods from refined grains

average around 1400 calories per pound, whereas refined sugar contains 1750 calories per pound.

Junk foods are primarily foods that contain high amounts of refined sugar and fat. Chips, cookies, ice cream, or fried foods average around 2300 calories per pound. A medium serving of boiled potatoes, a starchy vegetable, has 170 calories, while the same serving of fried potatoes will pack around 330 calories.

Nuts and seeds are high-calorie foods, as they are low in water and high in fat. Furthermore, nuts and seeds are also full of vitamins, minerals, and other beneficial nutrients. They are a healthy addition to your diet when consumed in moderation. It is easy to overconsume nuts and seeds because they will not fill the stomach. They pack around 2800 calories per pound. Thus, on a weight-loss regimen, nuts and seeds are best minimized.

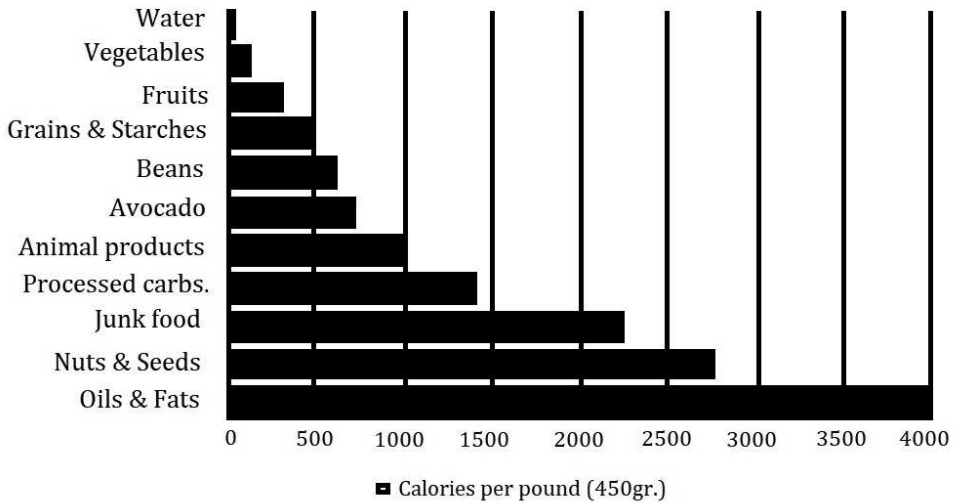
When nuts and seeds are eaten whole, not all calories are absorbed, and a part gets excreted with the stool. Nut-butters, on the other hand, are much easier for the body to digest, and the body will absorb most calories.

The most calorie-dense foods are pure fats like vegetable oils and ghee, clarified butter. One pound of oil has 4000 calories per pound or 120 calories per tablespoon. Olive oil is around 7-8 times denser in calories than the olives it was extracted from. Restricting oils and fats in the diet will significantly reduce calories without any noticeable difference in the amount of food consumed.

An expert report published by the World Cancer Research Fund reviewed all the science on the links between cancer and diet, physical activity, and body fat.<sup>19</sup> The expert panel came out with recommendations for reducing cancer risk. The report recommends a healthy diet, being physically active, and maintaining a lean body mass within the normal range. A healthy diet is described as a plant-based diet with the possible addition of animal foods as a condiment. A diet with an average calorie density of 600 calories per pound is considered optimal for reducing cancer risk.



## Calorie density of common food groups



A diet with an average calorie density of 600 calories per pound is achieved by focusing on low-calorie-density foods. Foods with a calorie density below 300 calories per pound can be eaten freely (as much as desired), and you will not gain weight. Foods with a calorie density of up to 700 calories per pound can be eaten in relatively large portions while still being able to lose weight.

The meals served in the leading fast-food chains often have twice the calorie density of this recommended healthy diet. This high-calorie density undermines normal appetite control systems. People tend to eat the same amount of food by weight, not adjusting for the calorie density. Therefore, typical fast-food meals significantly contribute to excess caloric intake and the development of obesity in regular consumers.<sup>20</sup>

Try to limit the intake of high-calorie-density foods and when using them, combine them with low-calorie-density foods in the same meal. Add, for example, some nuts and raisins to your oatmeal porridge, or add an avocado to a green salad.

Moreover, when you start your meal with the lowest calorie density foods as a starter, you tend to eat fewer calories overall with your meal. Good dishes for a starter are, for example, a soup that consists of lots of calorie-free water or a salad without an oily dressing. One study showed this effect by giving people a 50-calorie salad before their main course.<sup>21</sup> When given the salad as a starter, they consumed 65 calories less from the main course. Thus, the net effect of the salad is a negative 15 calories. The salad as a starter will start filling up your stomach, promoting a feeling of satiety.

A soup with chunky bits as an appetizer appears to be the best choice for reducing overall caloric intake, as this soup is more satiating than a blended soup. A chunky soup with 95 Calories as a starter reduced the overall caloric intake by 20% for the whole meal.<sup>10</sup>

Similarly, having an apple or some berries as a starter can help to reduce the overall calories consumed from the whole meal.<sup>22</sup> A study compared a whole apple to applesauce and apple juice with or without added fibre, and their effect on satiety. The whole apple was the most satiating and reduced subsequent food intake the most.<sup>23</sup> The difference in volume between the apple dishes can explain only part of the difference in satiety. Dietary fibre is thought to contribute to satiety, but in this study, adding the fibre back into the juice did not affect satiety. Adding the lost fibre back to a beverage did not increase satiety. It did reduce palatability.

To summarize, calorie density is an easy-to-follow, sensible approach to weight management. You can increase the amount of food you eat and reduce the calories you consume. Although not necessarily targeted towards health, by focusing on low-calorie density foods, you will also eat the most nutrient-dense foods. Adding more fruit and vegetables to your diet will lower overall caloric density, whereas adding oils and fats will increase calorie density. By focusing on whole foods that need to be chewed, you can lose weight without going hungry.

***'Living a healthy lifestyle will deprive you of poor health.'***