ABSTRACT

The elderly population increases and more prolonged life expectancy and increased worldwide, and with this increase, healthy aging gained importance. The increased expectancy of a longer and healthier life has created curiosity about how nutrition can be. Nutrition is one of the critical factors for healthy aging. Some diet models and diet applications (for example, calorie restriction) extend the quality and span of life. Life expectancy is longer in some places globally (Blue Zones, Hunza, Abkhazia, Vilcabamba), which is mainly linked to nutrition. Peoples who live longer eat natural foods, primarily vegetables and fruits, fish, yogurt, and drink pure water. In addition to nutritional behavior, lifestyle is essential. In the world's healthy elderly's have social, mental, and physically active life.

Keywords: Nutrition, aging, longevity, Blue Zones, Mediterranean diet

Live Longer, but How? Nutrition and Aging
Uzun Yaşayalım ama Nasıl? Beslenme ve Yaşlanma

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ÖZET


Anahtar kelimeler: Beslenme, yaşlanma, uzun yaşam, Mavi Bölgeler, Akdeniz diyeti,
INTRODUCTION
In "Global Strategy and Action Plan on Ageing and Health," a report published by the World Health Organization (WHO), it is stated that in 2050, one in five people will be 60 years or older, a total of 2 billion people worldwide (1). The physiological and anatomical changes that occur as part of the aging process affect all body systems and lead to sensory weaknesses, mental problems, and chronic diseases (2). Because an increase in the number of older adults worldwide is being predicted, implementing adequate, balanced, healthy nutrition for healthy aging is also gained importance on the agenda.

There are too many definitions for healthy aging, but all definitions' common point is good health and well-being in social, physical, and mental. Healthy aging descriptions are based on two different theories. Based on the biomedical aging model, the first theory stands on the physiological dimension. It includes physical, cognitive, and functional health. The second theory consists of the psychological dimension: psychological well-being, social activities, new social networks, and enjoys life (3). In addition, healthy aging is linked to some environmental factors like physical activity, avoiding smoking, fresh air, socializing and healthy nutrition (4).

Various studies have shown the importance of nutrition in making people's lives healthy and longer (5,6). It is known that there are some places in the world, Okinawa, Ikaria, Nicoya, which are known as Blue Zones, and other areas such as Hunza, Akhazia, Vilcabamba where people live longer. Notably, these different regions combine on the point of similar eating patterns. Longer life and healthy aging are linked to optimal nutrition with age, social life, and the environment. Some of the mechanisms in the aging process are related to food and eating patterns, and it is considered that optimal nutrition can provide longer life expectancy and healthy aging (7). This review aims to evaluate different dietary models and lifestyle habits for healthy aging.

NUTRITION
Nutrition is defined as the use of nutrients taken from foods into the body to grow and develop, maintain life, and protect health. Therefore, it cannot be denied that nutrition is an essential component in regulating health and physical abilities.

In western societies, the elderly population (those over 65) increases every passing day, and it has been found that a balanced and healthy diet plays an essential role in healthy aging. It is also a fact that the effects of nutrition on physical and mental well-being are higher in the elderly (8–10). With advancing age, food intake changes due to the slowing of the metabolic rate and reduced mobility. However, consuming insufficient food and nutrients is the leading cause of malnutrition (11). In addition, negative physiological changes in the body, increased nutrient requirement (due to impaired digestion or absorption function, infection, inflammatory disease), socioeconomic status, and behavioral factors contribute to malnutrition in the elderly (12).

AGING
Aging is defined as all the irreversible, structural, and functional changes that occur with the progress of time, at the levels of an organism's molecule, cell, tissue, organ, and systems. It is a fact that the functions of tissues and organs are impaired over time. In mammals, aging occurs heterogeneously in multiple organ systems, resulting in a progressive impairment leading to tissue dysfunction. For this reason, aging is accepted as a risk factor for many diseases (13,14). On the other hand, most people expect to live into their sixties and beyond for the first time in history (15).
Aging is divided into two strands as normal aging, and normative aging. Normal aging involves surviving accidents and advanced age-related cognitive diseases. In contrast, normative aging means survival from environmental factors (such as air pollution and infectious agents), behavioral factors (such as smoking and diet), and social factors (such as socioeconomic status and education) to maintain the interaction of epigenetics, cells, and organs (16).

Although some health variations come with genetic, it cannot be ignored that many factors originate with physical and social life. Some of these factors are neighborhood, communities, gender, ethnicity, and socioeconomic status (17).

Blue Zones are the determined locations where people live longer in the world. Blue zones have a limited and homogeneous geographical area. People in the Blue zones share the same lifestyle habits, which are thought the cause of their high life expectancy. For example, Okinawa in Japan, the Nicoya peninsula in Costa Rica, and Ikaria in Greece are Blue Zones. Studies carried out in the Blue Zones Project have shown similar eating patterns in the regions where people live longer. Still, the relationship between Blue Zones and eating patterns needs further exploration (18,19).

**Aging mechanism models**

A review of aging carried out in 1999 showed that more than 300 theories of aging had been reported (20). The most current and comprehensive aging mechanism models and their effects on diet are shown in Table I (7,21).

**CAN NUTRITION STOP AGING?**

It is widely known that a healthy diet decreases the risk of cardiovascular disease and cancer and helps prevent some diseases by its antioxidant and anti-inflammatory properties (51). In particular, nutrient-rich diets positively affect healthy aging because they include vegetables, fruits, nuts, fish, whole grains, and olive oil. Therefore, an adequate, balanced, and healthy diet is associated with higher life expectancy. Each diet is specific to a person; in addition to that, the content of the diet varies according to individual factors. A balanced and healthy diet contains all the necessary macro and micronutrients in adequate amounts for each individual. According to their personal needs, individuals have four main food groups in a meal: grains, dairy products, vegetables and fruits, and meats. The energy distribution must be 45-60% as carbohydrates, 10-20% as proteins, and 25-30% as fats in a balanced diet. In a healthy diet, trans-fatty acid intake is recommended to be less than 1% of the energy intake. In addition, saturated fats (fats in animal-based foods, butter, tallow, tail fat) should be less than 10% (preferably 7-8%), monounsaturated fats (olive oil, hazelnut oil, rapeseed-canola oil) should provide 12-15%, and polyunsaturated fats (corn oil containing omega-6 fatty acid, soy, sunflower and cotton oil and fish containing omega-3 fatty acid, fish oil, walnuts, flaxseed) should provide 7-10% of the total fat. The distribution of omega-3 and omega-6 are also important. Omega-6 should provide 5-10%, and omega-3 0.6-1.2% of the total fat (52). Individuals should eat all the food groups, all colors of vegetables and fruits, and drink at least 6-8 cups of water each day to achieve the requirements of nutrients. They should also limit added sugar, salt, carbonated drinks sweetened with sugar, processed grains, and meat products.

Some dietary models such as Dietary Approaches to Stop Hypertension (DASH), Mediterranean and vegetarian are accepted as reducing the risk of age-related and chronic diseases (53–55). These diet models include lots of vegetables, fruits, fish, grains, and natural, unprocessed foods commonly. In addition to a healthy diet, people also have
### Table I. Aging mechanism and the association with foods and diet

<table>
<thead>
<tr>
<th>MECHANISM OF AGING</th>
<th>MECHANISM OF ACTION</th>
<th>THE EFFECTS OF FOOD OR DIET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxidative stress</td>
<td>Excessive free radical production in cells disrupts normal cell metabolism and causes aging (22).</td>
<td>Consumption of vegetables, fruits, and nuts rich in vitamins A, E, and C, which have antioxidant effects, reduces oxidative stress (23). Also, melatonin, which has antioxidant effects, has positive effects on oxidative stress (24). Reducing the amount of methionine in the diet reduces the production of mitochondrial ROS(25).</td>
</tr>
<tr>
<td>Telomere-telomerase</td>
<td>Telomeres protect the ends of DNA strands in cell renewal. Telomerase is an enzyme that controls and regulates the sequencing of telomeres – the longer the telomeres of a cell, the longer the lifespan (26).</td>
<td>Increasing consumption of legumes and fruit has been associated with long telomeres. On the other hand, red and processed meat consumption, carbonated beverages flavored with sugar, white bread, and sodium have been associated with short telomeres (27–30).</td>
</tr>
<tr>
<td>Epigenetic Regulations</td>
<td>This means the activation of the gene sequence and the inhibition of some unwanted methylation states. It regulates histone modifications which can affect chromatin structure and transcriptional activity such as methylation, phosphorylation, and acetylation (31).</td>
<td>Folic acid, calorie restriction, resveratrol, and protein modifications may affect epigenetic regulation (32,33).</td>
</tr>
<tr>
<td>mTOR (mammalian Target of Rapamycin)</td>
<td>This has effects on cellular growth, regeneration, protein synthesis, transcription, and survival. Low mTor levels have been associated with longevity (34).</td>
<td>Protein restriction (especially of animal origin) lowers mTor levels (35).</td>
</tr>
<tr>
<td>IGF-1 (Insulin-like Growth Factor-1)</td>
<td>Low IGF-1 levels have been associated with longevity (36).</td>
<td>Dietary methionine reduction, calorie restriction, protein restriction (especially animal protein), resveratrol consumption, and intermittent fasting reduce IGF-1 levels(25,37–39).</td>
</tr>
</tbody>
</table>


Table I. Aging mechanism and the association with foods and diet (continued)

<table>
<thead>
<tr>
<th>MECHANISM OF AGING</th>
<th>MECHANISM OF ACTION</th>
<th>THE EFFECTS OF FOOD OR DIET</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIRT1 (Sirtuin 1 Protein)</td>
<td>This regulates various cellular and metabolic processes such as DNA regeneration,</td>
<td>Resveratrol consumption, calorie restriction, and intermittent fasting increase SIRT1</td>
</tr>
<tr>
<td></td>
<td>fat differentiation, insulin sensitivity, fatty acid oxidation, and neurogenesis.</td>
<td>levels (39,41).</td>
</tr>
<tr>
<td></td>
<td>High SIRT1 levels have been associated with longevity (40).</td>
<td></td>
</tr>
<tr>
<td>AMPK (AMP-activated protein kinase)</td>
<td>This increases the glucose uptake into the cell by enhancing insulin sensitivity</td>
<td>Calorie restriction and resveratrol consumption increase AMPK levels (39,41).</td>
</tr>
<tr>
<td></td>
<td>in muscle cells. The increase in AMPK has been associated with longevity (42).</td>
<td></td>
</tr>
<tr>
<td>Autophagy</td>
<td>This is the self-digesting function of the cell by which cellular homeostasis is</td>
<td>Calorie restriction and increasing the amount of spermidine consumed in the diet increase</td>
</tr>
<tr>
<td></td>
<td>produced and prevents the formation of diseases such as cancer (43).</td>
<td>cellular autophagy (39,44).</td>
</tr>
<tr>
<td>Inflammation (Inflammaging)</td>
<td>Cancer, cardiovascular disease, and other diseases in the body have been associated</td>
<td>Foods that contain antioxidants and a diet rich in omega-3 fatty acids reduce the formation</td>
</tr>
<tr>
<td></td>
<td>with increased inflammation (45).</td>
<td>of inflammation markers (46).</td>
</tr>
<tr>
<td>Adrenomedullin (ADM)</td>
<td>Cardiovascular effects were defined when ADM was first described, but later research</td>
<td>Mediterranean diet, vegetarian diet, and plant-based diet (50).</td>
</tr>
<tr>
<td></td>
<td>has shown that it is not just a simple vasodilator and that ADM has a wide range of</td>
<td></td>
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<tr>
<td></td>
<td>effects, from cell growth and differentiation to the regulation of hormone secretion</td>
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<tr>
<td></td>
<td>and antibacterial effects. Increased levels of ADM have been associated with</td>
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<tr>
<td></td>
<td>vasodilation (47-49).</td>
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</tr>
</tbody>
</table>
similarities in lifestyle factors. These factors comprise not smoking, regular physical activity, and socialization. (56).

Another factor affecting this issue is calorie restriction. Various studies have shown that calorie restriction has a beneficial effect on the aging process (37,57). Calorie restriction is a quantitative attempt to lower energy intake, limit food consumed, and reduce energy compared with a standard diet. In addition to decreasing the total energy, it is thought that reducing the energy intake, especially some macronutrients such as proteins, or decreasing both energy and protein intake, has an impact on life expectancy (57). Reducing the intake of essential amino acids such as methionine, tryptophan, and branched-chain amino acids from proteins in *ad libitum* fed mice has been shown to delay aging (58–60). A previous study has shown that calorie restriction is not effective worldwide but is affected by gender, genotype, and diet types (61). Protein and/or calorie restriction can be harmful because they can induce diseases such as malnutrition, sarcopenia, and muscle mass and strength loss, commonly seen in the elderly (62).

The best effect of calorie reduction on life length occurs when total calories are 50%, and protein is 20-30% of total calorie intake. (63).

Therefore, in older adults, adequate energy, macro, and micronutrients are vital for maintaining health. So, the overall diet of older adults must be balanced with the energy provided by macronutrients.

Calorie restriction can be achieved by intermittent fasting-like practices involving the restriction of foods containing high calories and flavor-enhancing substances, especially in western societies. It has been shown that intermittent fasting increases human regeneration markers and delays diabetes, cardiovascular diseases, cancer, and aging (64).

Some metabolic changes, however, occur in the body due to calorie restriction. While ROS production, glycolysis, oxidative stress, inflammation, DNA damage and cholesterol, fatty acid, and triglyceride synthesis, and insulin release decreases, increases in the mitochondrial respiratory rate, gluconeogenesis, glycogenolysis, protein, and fatty acid catabolism and insulin sensitivity (7). As a result, calorie restriction is thought to positively affect aging and the prevention/delay of metabolic diseases. Some of the effects of calorie restriction are shown in Figure 1.

![Figure 1. Metabolic changes that occur with calorie restriction](image)
WHAT CAN WE EAT TO LIVE LONGER?

As has already been mentioned, there are similar attitudes to eating in the places where people live longer. Generally, their diets comprise mostly raw and plant foods, pure and high-mountain water, nuts, fermented foods, and no processed grains. Some of these diet attitudes are discussed below. In addition, these people do not smoke. These older adults also do physical activities like hiking and climbing because they grow their foods as vegetables and fruits picked from gardens, fields, trees, and mountains. They are also essential for family and community life. Their family and friends consider the experiences of older adults. These give a purpose of life to older adults and become a driving force for socializing (18,19,65).

The Blue Zones diet

As has already been stated, the places where people live the longest are called Blue zones. A Blue Zones are a geographical area where the inhabitants have similar lifestyles and a long life span. Not smoking, regular physical activity, socialization, having a purpose in life, spirituality, consumption of a diet rich in vegetables, fruits, whole grains are the factors that are related to long life. (18).

The dietary habits in blue zones comprise the following factors (66,67).

- **Plant-based diet:** 95% vegetable-based foods. Their diet includes foods such as fruit, vegetables, beans, bean curd, lentils, nuts, and seeds, which all make people stronger to fight diseases, and all these foods form the cornerstone of the diet.
- **Unprocessed (whole) foods:** whole foods are not processed in factories. They are made with ingredients recognizable as coming from the earth, such as rice, corn, soy, fruit, and vegetables, or prepared food such as tofu and manna bread.
- **Less meat consumption:** Inhabitants of blue zones eat meat approximately once a week, about the size of a matchbox. Their diet does not include processed meats such as hot dogs and bacon. Instead, they prefer free-range chicken and pork or lamb produced on a family farm.
- **High amount of fish consumption:** Fish is an essential component of the blue zones diet. It is considered that consuming a daily portion of fish is healthy. Wild-caught fish are good choices from the middle of the food chain, such as sardines, trout, snapper, cod, and anchovies. Predator fish, such as tuna, swordfish, and sharks should be avoided because of their potentially high levels of mercury.
- **Small amounts of milk and dairy products:** People in blue zones consume food made of sheep and goat milk (especially yogurt) several times a week.
- **Occasional eggs:** Inhabitants of blue zones consume eggs every day or at least three times a week. The eggs need to be collected from free-range poultry, which can graze naturally outdoors.
- **Seed and legume consumption:** Legumes are a good source of protein, and for centuries the inhabitants of the blue zones have consumed at least one cup a day. Black beans, pinto beans, garbanzo beans, lentils, fava beans, navy beans, and peas are consumed varieties of legumes.
- **Dried fruit and nuts as a snack:** Dried fruits and nuts are healthy fats that help people be psychologically happy. Almonds, hazelnuts, walnuts, peanuts, Brazil nuts, and peanuts are the most preferred nuts, and sunflower and pumpkin seeds are equally popular. People who live in blue zones consume a handful of various nuts regularly, and they generally avoid adding sugar or salt to dried nuts.
- **Bread consumption:** People in the blue zones eat small amounts of bread and prefer sourdough. Unlike other bread made from white flour, sourdough bread does not cause sudden increases in blood sugar.
• **Less sugar consumption:** Inhabitants of the blue zones prefer flavor with fruit and honey instead of sugar-sweetened food. It is known that added sugar increases inflammation and the risk of the body developing diseases (68).

• **Drinks:** Blue zone inhabitants drink coffee for breakfast, tea in the afternoon, wine at 5 pm, and water all day long. They avoid beverages with added sugar, such as soda and juices (19).

### The Hunza diet
Hunza is in the western Karakoram mountains of northern Pakistan. In Hunza, people can be physically and mentally healthy in hundred years and above. It is believed that the secret of this life is associated with lifestyle and dietary habits. Their diet is rich in vegetables and fruits, raw foods, pure water, and unprocessed foods.

• **Hunza bread:** Unprocessed, whole-grain flour is mixed with water and then formed into a pancake. The grain selection for this bread includes wheat, barley, buckwheat, corn, millet, alfalfa, and rye.

• **Vegetable and fruit consumption:** Potatoes, tomatoes, cucumbers, carrots, onions, garlic, and pulses are preferred vegetables. The fruits are mulberries, apricots, apples, grapes, peaches, cherries, and some melons, which are rich in antioxidants.

• **Raw foods:** In Hunza, almost everything is eaten raw, uncooked, and just as nature intended.

• **Freshwater:** In Hunza, meltwaters flowing down from the snow-covered mountains are consumed instead of spring water. It is relatively uncontaminated, fresh, and rich in minerals. The people of Hunza also use this water for growing vegetables and fruit in their gardens. Due to the high quality of water, it contributes to everything eatable in Hunza.

• **Natural foods:** Grains play a vital role in their diet. The length of the growing season is short in Hunza, which encourages the inhabitants to use grain wisely, saving a proportion of each year's harvest to sow in the following year. Poultry and, accordingly, eggs are scarce because there are more minor cereals to feed chickens or other birds (69).

### The Abkhazia diet
Abkhazia is another area that people lived longer, and it is in Georgia. The typical diet of the people there consists primarily of eggs, cheese, butter, yogurt, milk, curds (shor), sour cream, bread, various vegetables, fruits, and herbs. In addition, they eat soup made of yogurt and greens (dovgha) along with various soups made with beans, peas, and grains. The people who have long life did not eat very much bread or products made with flour.

• **Animal fat consumption:** Abkhazians consume a medium amount of animal fat. They believe that if you eat animal fat, you have to balance it by eating fresh vegetables and herbs such as spinach, celery, dill, onions, spring onions, coriander, mint, basil, tarragon, and parsley.

• **Honey instead of sugar:** Sweets have been an essential part of the cuisine for a long time. When they prepare national sweets such as pakhlava, shakarbura, and halva, they generally prefer to use honey instead of sugar.

• **Yogurt consumption:** Since antiquity, it has been believed that regular consumption of yogurt is the secret to longevity as it promotes digestion and rejuvenates the digestive system. When Abkhazian eats meat, they serve it with yogurt sprinkled with mint to encourage its digestion. When they eat yogurt, they add some garlic to it. In Abkhazia, a popular drink (ayran) is made by diluting salted yogurt with water.

• **Garlic:** Modern scientists confirm that the regular consumption of garlic decreases cholesterol in the body and improves blood
circulation (70). They eat garlic with yogurt, which they call *sarimsagli gatig*.

- **Low bread consumption:** In the past, Abkhazians did not overuse bread and flour products.
- **Herbs:** Since antiquity, Abkhazians have been convinced that saffron and licorice prolong life, refresh the skin and face, and promote health for the liver, heart, and kidneys. In addition, these long-lived people traditionally consume large amounts of vegetables and fruit, especially apples.
- **Tea instead of coffee:** Regular tea consumption is another principal characteristic that people frequently practice (69).

### The Vilcabamba diet

Vilcabamba is a small town located high in the Ecuadorian Andes. In Vilcabamba, many of the inhabitants are more than 100 years old, and that some of them are over 140 years old (69).

- **Colloidal minerals:** The results of laboratory analysis of the Vilcabamba water show that the unique balance of enriched colloidal minerals in the local drinking water is ideal for promoting optimum human health.
- **Vegetables and fruit:** They usually add mandarins to their salads. Mandarin orange is enriching in the flavor of the salads and has vitamin C, which enhances iron absorption for the body. In addition to health benefits, it grows abundantly in the valley. Avocados are another 'secret' component of the Vilcabamba diet.
- **Quinoa:** Quinoa is called the queen of grains; it is one of the foods with an almost perfect balance of all eight essential amino acids, so it is used as a protein.
- **Raw foods:** The diet of Vilcabamba is formed from 70-75% raw foods, emphasizing salads, vegetables, and locally grown fruit. According to these dietary habits, people lean and are healthy instead of obese or sick (69).
- **Beans:** The black bean, called Spanish beans or Venezuelan beans, is the most consumed legume.
- **Yogurt:** Their use of natural, organic, unpasteurized yogurt from both goats' and cows' milk also provides beneficial probiotics (69).

### The Mediterranean diet

The Mediterranean diet, similar to the blue zones diet, also helps people to live longer. Low adherence to the Mediterranean diet is associated with diabetes, cardiovascular disease, and other complications (71–73). It is also associated with mortality risk increases. Several meta-analyses show that the inverse relationship between Mediterranean Diet and mortality for all age groups (74, 75). The traditional Mediterranean diet is characterized by a high intake of vegetable-based foods (vegetables, bread, other cereals, potatoes, beans, herbs, and nuts) and fresh fruit. Olives are the primary source of fat. Dairy products, fish, and poultry are consumed in medium to small amounts. Fish is especially essential for omega-3 fatty acids. Egg consumption is limited to four per week. Red meat is consumed occasionally and in small quantities, but no more than once a week. The Mediterranean diet has a low saturated fat content, corresponding to a maximum of 8-10% of the total calorie intake. Calorie intake from lipids is only 30% overall. Modest amounts of wine (1-2 glasses, for achieving moderate alcohol intake: 10–50 g/day for men and 5–25 g/day for women) are usually consumed with meals (56, 76).

Various studies have shown that a diet rich in vegetables, fruit, and whole grains reduces the risk of death from chronic diseases and inflammation biomarkers (28, 77, 78). Therefore, it is thought that nutritional components associated with oxidative stress
and inflammation can affect telomere length (79). Telomeres are susceptible to oxidative stress due to their high guanine nucleotide content. Hydroxyl radicals can cause DNA damage in telomere length to occur through each replication and damaging DNA. Vegetables, fruits, and whole grains can be protecting DNA by antioxidant properties to the damage of free radicals. Soy and legumes, in addition to folic acid content also rich in antioxidant phytochemicals. These phytochemicals are thought to play an essential role in DNA methylation and integrity. For instance, it is widely known that the consumption of whole grains and herbs reduces inflammation (80,81).

Sugar and processed meat increase telomere shortening by increasing cell destruction through chronic inflammation (82–84). Insulin resistance is related to increased oxidative stress and inflammation and is thus thought to cause telomere shortening. Insulin resistance, inflammation, and oxidative stress can occur with increased high sugar intake, which increases glycemic load. As a result of these metabolic changes, telomere shortening can be observed. (85,86). Furthermore, processed meats can increase the formation of advanced glycation end products (AGEs), which act as inflammatory markers because of their high fat and protein content. AGEs can increase intracellular oxidation and cause telomere shortening (84).

According to Mediterranean Diet Foundation and Mediterranean Food Cultures, accompany by the Mediterranean diet, some social and cultural factors have a positive effect on health, and several recommendations are mentioned below.

**Socialization:** Pleasure is vital for taking the social and cultural values of food beyond the nutritional aspects. Activities such as cooking, sitting around the table, and sharing foods with family and friends provide social support and give a sense of community.

**Baking and cooking together:** Sharing baking and cooking can be an essential activity, and arrangements can be made for an appropriate time and place. Because cooking and baking together are relaxing and fun, it can be enjoyed with family, friends, and loved ones (56).

Seasonal biodiversity and traditional, local, and environmentally friendly food products make the Mediterranean diet compatible with a sustainable diet model for today and future generations. Furthermore, the consumption of seasonal, fresh, and minimally processed foods maximizes the content of healthy dietary substances (56). A comparison of the different diet types for living longer discussed in this paper is shown in Table II.

**CONCLUSION**

Blue zones, Abkhazia, Hunza, Vilcabamba, and Mediterranean areas have been known to the longer-lived people than other places. The most important reason is that those regions have different eating habits from other places; their diets predominantly comprise vegetables, fruit, and whole grains. They consume small meals with small portions. Various studies have shown that a low-calorie intake plays a vital role in delaying the aging process. The oldest inhabitants of Okinawa in Japan describe their eating behavior as *Hara Hachi*, an old Confucian term meaning 'eat until 80% full'. A thousand years ago, one of the big polymath Ibn Sina (known in the West as Avicenna), gave advice on eating habits that can make people healthier: "People who want to protect their health should pay much attention to food. They should not eat before feeling hungry. It is not good for them not to wait for their appetite. They should never eat until the stomach is full; they should get up
Table II. Different diet features of the places that people live longer

<table>
<thead>
<tr>
<th>DIET ITEM</th>
<th>BLUE ZONES (18,19)</th>
<th>HUNZA (69)</th>
<th>ABKHAZIA (69)</th>
<th>VILCABAMBA (69)</th>
<th>MEDITERRANEAN (56,76)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Meat</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Low (lamb)</td>
<td>Low</td>
<td>Red meat is consumed occasionally and in small quantities, but not more than once a week.</td>
</tr>
<tr>
<td>Fish</td>
<td>Consuming a daily portion is considered healthy. Sardines, trout, snapper, cod, and anchovies are good choices.</td>
<td>Minimal</td>
<td>Low</td>
<td>Low</td>
<td>Fish is consumed in medium-small amounts</td>
</tr>
<tr>
<td>Bread</td>
<td>Sourdough bread</td>
<td>Hunza bread</td>
<td>Abkhazia bread</td>
<td>-</td>
<td>Wholegrain bread</td>
</tr>
<tr>
<td>Vegetables and fruit</td>
<td>Dried fruits, a 95% plant-based diet, grains, and seeds.</td>
<td>High vegetables: tomatoes, cucumbers, onions, garlic, spinach, turnips, carrots, pumpkins, cabbage, and cauliflower. High fruit: mulberries, apricots, apples, grapes, peaches, cherries, and some melons</td>
<td>High vegetables: string beans, corn, cabbage, tomatoes, spinach, celery, dill, onions, spring onions, coriander, mint, basil, tarragon, and parsley. High fruit: apples, cherry plums, barberries, blackberries, pomegranates, green grapes, tomatoes</td>
<td>High vegetables: potatoes, mayoko, payoko; high fruit: oranges, blackberries, papayas, bananas, figs, avocados, Granaditas</td>
<td>High intake of fresh vegetables and fruit.</td>
</tr>
<tr>
<td>Sugar</td>
<td>Low</td>
<td>Unrefined sugar</td>
<td>Honey instead of sugar</td>
<td>Unrefined sugar</td>
<td>Low</td>
</tr>
<tr>
<td>Common foods</td>
<td>Yoghurt</td>
<td>Yoghurt</td>
<td>Yoghurt and garlic</td>
<td>Quinoa</td>
<td>Olive oil</td>
</tr>
<tr>
<td>Drinks</td>
<td>Coffee for breakfast, tea in the afternoon, wine at 5pm, and water all day long</td>
<td>High: mountain melt water</td>
<td>Tea, Ayran</td>
<td>High: mountain waters (glacial melt)</td>
<td>Medium amounts of wine</td>
</tr>
</tbody>
</table>
Conflict of Interest and Funding
The authors declare no conflict of interest. The study was not funded.

Authors' Contribution
MA and HKBG determined the design of the review. HKBG wrote the first manuscript. MA did a critical review. MA and HKBG approved the final version of the document.

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