

T.C.
YEDİTEPE UNIVERSITY
INSTITUTE OF HEALTH SCIENCES DEPARTMENT OF NUTRITION
AND DIETETICS

**DETERMINATION OF OPINIONS OF STUDENTS
OF A FOUNDATION UNIVERSITY ON PLANT
AND ANIMAL BASED NUTRITION**

MASTER THESIS.

AÇELYA GÜL

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SUPERVISOR

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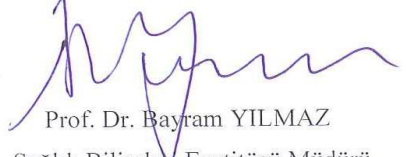
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ONAY

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Sağlık Bilimleri Enstitüsü Müdürü

DECLARATION

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.

Date: 29.06.2018

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TABLE OF CONTENTS

THESIS APPROVAL FORM	ii
DECLARATION	iii
ACKNOWLEDGEMENTS	v
LIST OF TABLES	viii
ABSTRACT	x
ÖZET	xi
1. INTRODUCTION AND PURPOSE.....	1
2. GENERAL INFORMATION	3
2.1. ENVIRONMENTAL IMPACT	3
2.2. LAND USE	4
2.3. WATER FOOTPRINT	5
2.4. CLIMATE CHANGE	7
2.4.1. DIET and CLIMATE CHANGE	10
3. EFFECT OF ANIMAL-BASED NUTRITION STYLE TO THE WORLD.....	15
3.1. MICRO AND MACRO NUTRITION CONTENT	18
3.1.1. PROTEIN	19
3.1.2. FATTY ACIDS	20
3.1.3. IRON	20
3.1.4. ZINC	21
3.1.5. CALCIUM	21
3.1.6. IODINE	22
3.1.7. VITAMIN D	23
3.1.8. RIBOFLAVINE	23
3.1.9. VITAMIN B12	23
3.2. HEALTH EFFECTS	24
3.3. PROTEIN QUALITY	25
3.3.1. PROTEIN EVALUATION	27
3.3.1.1. BIOLOGICAL VALUE	27
3.3.1.2. PROTEIN EFFICIENCY RATIO	27
3.3.1.3. NET PROTEIN UTILIZATION	28
3.3.1.4. PROTEIN DIGESTIBILITY-CORRECTED AMINO ACID SCORE	28
3.3.1.5. OVERESTIMATION	29

3.3.1.6. TRUNCATION	29
3.3.1.7. BIOAVAILABILITY	29
3.3.1.8. DIGESTIBLE INDISPENSABLE AMINO ACID SCORE -(DIAAS)	30
4. SUSTAINABLE DIET	32
4.1 PREFERENCE OF PLANT-BASED PRODUCTS	33
4.2 REGIONAL AND SEASONAL PRODUCTS	34
4.3 CHOICE OF MINIMAL PROCESSED FOOD	37
4.4. ORGANIC FOOD	37
4.5 FAIR TRADE PRODUCTS	38
4.6. SOURCE SAVING HOUSEHOLD	38
5. SUSTAINABILITY, DIET CHANGE AND THE ROLE OF DIETITIANS	39
5. MATERIAL AND METHOD	43
6. FINDINGS	44
7. DISCUSSION	55
8. CONCLUSION	62
9. RECOMMENDATIONS	63
10. REFERENCES	64
11. APPENDIX	72
12. APPENDIX -2: Informed Consent Form	73
13. APPENDIX -3:	74
14. APPENDIX -4: CURRICULUM VITAE	79

LIST OF TABLES

Tablo 2.1: Global Warming Potential for Agricultural Related Gases	8
Tablo 2.2: Carbon dioxide, methane and nitrogen oxides emissions of 22 commonly consumed products in Sweden, from farm to the table . (Values represent kg CO2 equivalents over a 100-year time interval.)	11
Tablo 7.1: Distribution of findings related to research	45
Tablo 7.2: Distribution of findings related to research	46
Tablo 7.3: Distribution of findings related to research	48
Tablo 7.4: Investigation of some findings related to research	49
Tablo 7.5: Investigation of some findings related to research	51
Tablo 7.6: Investigation of some findings related to research	52
Tablo 7.7: Investigation of some findings related to research	53

LIST OF SYMBOLS AND ABBREVIATIONS

CH₄: Metan gases

CO₂: Carbon dioxide

CO₂eq: Carbon dioxide equivalent

DIAAS: Digestible Indispensable Amino Acid Score

DNA: Deoxyribonucleic Acid

GHGE: Green House gas Emmissions

Gm³: Giga cubicmeter

Gr: Grams

GWP: Global Warming Potential

FAO: Food and Agriculture Organisation

KM: Kilometre

LCA: Life Cycle Assessment

Lt: Litre

M²:Square metre

M³: cubicmeter

M³/Ton: cubicmeter /Ton

MJ: megajoule

mmHg: Milimetre mercury

n: Sample number

N₂O: Nitrous oxide

PDCAAS: - Protein Digestibility-Corrected Amino Acid Score

tHcy: Fasting plasma total homocysteine

WHO: World Health Organization

Yy:century

ABSTRACT

Gül, A. (2018). Determinaton Of Opinions of Students of a Foundation University on Plant and Animal Based Nutrition". Yeditepe University Institute of Health Sciences, Department of Nutrition and Dietetics. Master Thesis. Istanbul.

This study was conducted on the students studying at Yeditepe University Faculty of Health Sciences, to determine the approach of new generations to plant-based diet and to examine its contribution to sustainable food. Data collection tools were used for information purposes about 310 students in the age range of 18 to 25 who accepted to participate in the research in Yeditepe University at the Faculty of Health Sciences. The socio-demographic characteristics of the participants were determined, nutritional habits, animal and plant-based product preferences were evaluated, it has been determined if the foods they consume harm the nature, and if they do, which foods will cause more harm to the nature, and assessment of change of eating pattern to protect the nature, was made. It was stated in the study that 97.7% of the participants had a mixed diet, 63% preferred to consume animal products for a healthy eating pattern. While 61% of the participants thought that the food they consumed did not harm the nature, 79,7% stated that animal-based products cause more harm to the nature. 66.5% of the participants stated that they could change their diet to protect nature. As a result of the study, it has been seen that the majority of the new generation may volunteer to change their diet to protect nature and leave a better world for future generations. New strategies should be developed to further increase and disseminate this number.

Key words: Animal Based Nutrition, Plant Based Nutrition, Sustainability, Environment.

ÖZET

Gül, A. (2018). “Bir Vakıf Üniversitesi Öğrencilerinin Bitkisel ve Hayvansal Kaynaklı Beslenme ile İlgili Görüşlerinin Belirlenmesi”. Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü, Beslenme ve Diyetetik ABD. Master Tezi. İstanbul.

Bu çalışma, Yeditepe Üniversitesi Sağlık Bilimleri Fakültesinde eğitim görmekte olan öğrencilerin bitkisel kaynaklı beslenmeye yeni kuşakların yaklaşımının belirlenmesi ve bunun sürdürülebilir gıdaya katkısının incelenmesi amacıyla yapılmıştır. Yeditepe Üniversitesi Sağlık Bilimleri Fakültesinde araştırmaya katılmayı kabul eden 18 ile 25 yaş aralığında olan 310 öğrenciye bilgi edinme amaçlı veri toplama formları veri toplama aracı olarak kullanılmıştır. Araştırmaya katılanların sosyo-demografik özellikleri belirlenmiş, beslenme alışkanlıkları, hayvansal ve bitkisel kaynaklı ürünlerin tercihi değerlendirilmiş, tüketilen besinlerin doğaya zarar verip vermediği veriyorsa hangi besinlerin doğaya daha çok zarar vereceği tespit edilmiş ve doğayı korumak için beslenme tarzı değişikliğinin değerlendirilmesi yapılmıştır. Çalışmaya katılanların %97,7'sinin karışık beslenme tarzına sahip olduğu, % 63,'nün sağlık açısından faydalı beslenmede hayvansal ürünleri tercih ettiği belirtilmiştir. Katılımcıların %61 tükettikleri besinlerin doğaya zarar vermediği düşünürken, %79,7'si doğaya daha fazla zarar veren besin türünü hayvansal besinler olarak belirtmiştir. Katılımcıların %66,5'i doğayı korumak için beslenme tarzı değişikliği yapabileceklerini ifade etmişlerdir. Çalışmanın sonucunda doğayı korumak ve gelecek nesillere daha iyi bir dünya bırakabilmek için yeni kuşakların çoğunun beslenme tarzı değişikliğine gönüllü olabileceği görülmüştür. Bu sayının daha da arttırılması ve yaygınlaştırılması için yeni stratejiler geliştirilmelidir.

Anahtar Kelimeler: Hayvansal Kaynaklı Beslenme, Bitkisel Kaynaklı Beslenme, Sürdürülebilirlik, Çevre.

1. INTRODUCTION AND PURPOSE

Nutrition and diet play a significant role in the survival of living beings and the prevention of noncommunicable diseases [1]. Food provides for macro nutrient items such as energy, protein, carbohydrate and fat , and micro nutrient needs such as vitamins and minerals of human beings [2]. At the same time, food also contributes to the formation of the social identities of people, the shaping of cultures, and formation of pleasure phenomena of individuals [2] Individuals need a balanced and adequate diet, considering their characteristics such as age, gender, physiological condition and nutrition habits [1].

World population is increasing day by day [3]. World population is expected to reach 9 billion from 7 billion from the year 2010 to 2050 [4]. Along with the increasing population, per capita food consumption is also increasing. From 2000 to 2050 it is predicted that the consumption of meat in the world will be 2 times higher and cereal consumption will increase by 60% [4]. According to Agriculture and Food Organization, global food demand is expected to increase by 60% from 2007 to 2050 [5]. Humankind needs to cope with global challenges, that play significant roles on shaping food habits. Problems such as power supply and increases in long term energy prices, climate change, poverty and world hunger, water scarcity, soil degradation, the reduction of biodiversity can be given as examples of global difficulties [6].

Center for Disease Control and Prevention has declared that obesity is a public health outbreak and that 68% of Americans are overweight, more than 34% are obese [7]. The percentage of overweight or obese people worldwide continues to increase [8]. As natural resources are limited and obesity increases with the population, future generations may face the problem of rapid depletion of natural resources [9]. The influence of food, along with sourcing, on both the local and global environment is great [2]. The production, processing, preservation and distribution of food constitutes 20-60% of environmental impacts such as greenhouse effect, eutrophication and acidification [10]. The greenhouse effect caused by human activities has increased by 70% in the last 40 years. The increase in global average temperature, will cause adverse effects, including serious environmental impacts and future food and water availability [11].

Worldwide meat, milk and egg consumption is growing [12, 13]. This will exacerbate the environmental impact associated with livestock [14-16]. According to Garbens-Leenes et al., humanity is in the transition phase in food consumption [17]. This transition phase is also associated with both developed and developing countries. In developing countries, meat consumption is increasing along with the increase in per capita income and protein demand. It is observed that in developed countries with a stable protein consumption, the intake of fat and carbohydrates also increases due to the increase in per capita food and calorie intake [18]. The study carried out by Garbens-Leenes et al. shows that the food consumption pattern and consumption structure can play a greater role in resource use in comparison to population growth in the future and the study also shows that the issue of growing land use should be addressed [18, 19]. The study by Westhoek et al. shows that the global livestock industry is responsible for the 12% of the world's greenhouse gas [20]. Studies by Stehfest et al. show that the global transition towards low meat diets could reduce the cost of climate change mitigation by 50% by the year 2050 [21]. Methane gas (CH₄), diazotmonoxid gas (N₂O) and carbon dioxide (CO₂) gases produced by animals increase the greenhouse effect. Supporting transition from meat-weighted classical Western diet to vegetative weight-feeding is considered an option for reducing climate change [24]. To prevent this, sustainable food consumption should be universalized [22].

In this study, it is aimed to determine the approach of new generations to plant-based nutrition and to examine the contribution of this to sustainable food. For this purpose, a research based on the attached informative data form has been conducted on the sample of students of Faculty of Health Sciences at a foundation university.

2. GENERAL INFORMATION

2.1. ENVIRONMENTAL IMPACT

The impact of agriculture and food production, along with human activities, on the issues of the use of natural resources and environmental sustainability is rather high [3, 25]. Factors such as greenhouse gases generated during the food production, land use, water pollution have adverse effects on the environment. The adverse effects of food production on the environment is increased by consumers' demands and consumers' eating habits [3]. However, differences in agricultural production, transport distances and transport methods, can change the overall picture of environmental impact for plant and animal-based products per kilograms (kg) [2]. Life Cycle Assessment (LCA) studies indicate that plant based products have less negative impact on environment when compared to animal-based products. Even though the environmental impact of fruits and vegetables is less, the damage to the environment can be made even less by using wheat instead of products like potato as a carbohydrate source. In general, the reason for this is the greenhouse gas produced by fruits and vegetables and the amount of soil they use is much higher than cereals and less than meat and dairy products [26]. Animal-based products constitute the largest portion of the ecological footprint. Consumption of meat and meat products accounts for 31% of ecological footprints and consumption of milk and dairy products accounts for 18% [18].

Deforestation associated with increased land use during food production covers 24% of greenhouse gas formation. However, 70% of the freshwater resources in the world are used in agriculture. In addition, overuse of nitrogen (azotlu) and phosphoric (fosforlu) fertilizers and inappropriate use of pesticides cause soil and water pollution [5].

Agriculture causes a significant amount of atmospheric release of carbon dioxide (CO₂), nitrous oxide (N₂O) and methane gases (CH₄). The emission of CO₂ gas in agriculture is largely due to the microbial decay (mikrobiyal çürüme), plant garbage (bitki çöpleri) and burning of organic materials in the soil. CH₄ gas is released when organic materials decompose under anoxic conditions, especially from the fermentative digestion of ruminants, stored fertilizers, and rice grown under water. High energy is used during the fertilizer production process and it contributes directly to N₂O emission [27]. The release of N₂O gas is produced by the microbial

transformation of the nitrogen in the soil and fertilizers. It is increased especially under wet conditions when the present nitrogen is exceeding the requirements of the plant [4]. However, N₂O emissions occur when artificial fertilizers, manure and plant residues are applied on the nitrogenous soil [27]. In addition, apart from food production, increased energy use during the transportation, processing, marketing and cooling of food also cause an increase in carbon emissions and damage the environment [27].

People living in high income countries in the northern hemisphere need much more agricultural land than people in the southern hemisphere. It is shown that the main reason for this land requirement is that the nutritional forms of these countries are animal-based. The production of animal based products requires more land, compared to the production of plant based products. Feeding ruminants such as cattle, goats and sheep mostly in uncultivated pastures, and goats' digesting the crude plant cover are shown as examples of soil use [6]. In short, the environmental impacts of food production, especially the livestock sector, such as greenhouse gas formation, land use, water and nitrogen footprint, are quite higher than other foods [28, 29].

2.2. LAND USE

Changes in land cover and land use, have increased carbon emissions by 12.5%. This qualifies land use as the second most important source in carbon emissions after burning fossil fuels [30, 31]. The livestock sector is an important indicator of human intervention in land use. Only 12% of the 58% plant biomass in the world is directly consumed as food by living beings [32]. The total land use in livestock production constitutes 80% of the agricultural area [31].

Deforestation is one of the critical points in land use issue. Factors such as establishment of new pastures for animal grazing or expansion of arable land to increase animal feed, such as soy, are greatly responsible for deforestation [33, 34]. In the Amazon Forests, while cattle pastures are considered to be the prime mover in deforestation, soybean cultivation, which is used for livestock breeding, is indirectly triggering the conversion of forest pastures by expanding previously used meadow areas [35].

Decreasing animal based calorie intake by 15%, by the year 2050, is expected to decrease the carbon emissions resulting from land use by 78% [31].

Studies on change in food consumption patterns suggest that the average per capita land in 2030 and 2050 will reach about 5000 square meters (m²) [21, 36, 37]. It is estimated that the transition to a consumption pattern that restricts red meat consumption will reduce the need for future per capita land use to 2200-3500 m² [38].

2.3. WATER FOOTPRINT

Food has an important share in the use of natural resources such as water. Animal based products have a particularly larger water requirement compared to plant-based products. For example, the total water footprint of pigs is two times larger than the water footprint of legumes, four times larger than the water footprint of grains [41]. Nowadays, the global water footprint of animal production is almost one third of the water footprint of total agricultural production, and this rate is likely to increase [42, 43]. Water footprint calculation is a tool that calculates water consumption of products. Water footprint measures freshwater consumption and pollution throughout product supply chains [44]. The water footprint is a multidimensional display that gives water consumption quantities according to the pollution type, by source and dirty volumes. Green and blue water footprint refers to water consumption, gray water footprint refers to water pollution. The distinction between green and blue water footprint is important. Because along with hydrological, environmental and social effects, economic opportunity costs for surface and groundwater production are different from the impacts and costs of rainwater use. The water footprint provides a useful overall number for the volume of available fresh water, thus provides a comparison of water requirements of different products or a comparison of water requirements for a particular product from different countries or production systems [41].

The water footprint of a particular piece of meat is determined by water consumption and water pollution at each process step in the product's production chain. The most important factors in water consumption and pollution are water used for the feeding of animals, drinking water for animals and cleaning in livestock and slaughter houses [44]. Water footprint of meat is related to three main factors. The first is the efficiency of feed conversion and the measure of how much animals eat. The second is the feed composition of the animals, and the last factor is the source of food in the animal feed. One of the main underlying factors is the type of the production system.

Because system type affects feed conversion efficiency, feed composition and nutrient source [45].

Feed conversion efficiency depends on the type of production system. Feed conversion efficiency, is more suitable for meat and pork compared to beef. It's affected by high physical activity levels, slaughter and gender of animals [45].

The water footprint of animal feed is also quite important. It depends on the composition and the source of the food [45]. The composition of the animal nutrients consists of concentrated feed and coarse feeds. There are big differences in the ways that concentrate feeds and coarse feeds form the water footprint. Concentrated feeds have a relatively larger water footprint, while rough feeds have a relatively smaller water footprint. Averagely, the water footprint of concentrated feeds is five times larger than the water footprint of coarse feeds. While the total mix of coarse feeds (grass, crop residues and feed crops) has a water footprint of around 200 cubic meters per tonne (m^3 / ton), it is about $1000 m^3$ / ton for the packaging of components in concentrated feeds [46]. Globally, the total water footprint consists 38% of pasture, 17% of corn, 8% of feed crops, 7% of soybeans, 6% of wheat and barley, and 3% of oats [41].

In a recently published report, Burlingame and Derni emphasize the need for a more sustainable food production and consumption system. [47]. In terms of resource utilization, 1 liter (L) of green water consumption is equivalent to 1 liter of blue water consumption, but the effect of the green water footprint on the environment is generally much smaller than the effect of the blue water footprint. The gray water footprint is a source of worry as it points to a contamination in the groundwater surface. In terms of sustainable consumption, particularly the types of meat with big blue and gray water footprint should be avoided. The differences between countries, suggest that there are possibilities to reduce the water footprints of meat production by finding an appropriate balance between low water footprint feed composition and high feed conversion efficiency [45]. The water footprint created by the consumption of animal based products in the world which is 2422 giga cubic meters ($Gm^3 = m^3 * 10^9$), can be reduced by replacing animal based-products with plant-based products or by reducing food waste. The meat footprint is generally much larger than the water footprint of equivalent plant-based foods [41]. As shown by Hoekstra, in an industrialized country, a consumer's water footprint for food can be reduced by 36% by passing a vegetarian diet through an average meat-based diet [48]. Chapagain and James found that the water

foodprint of preventable food waste in England met the water footprint of 6% of UK citizens' total water footprint [49]. In general, food and, in particular the meat footprint can be significantly reduced by modifications in consumption, but this will require a major transition in the current nutrition model and a reduction in food waste, especially in the western countries [45].

2.4.CLIMATE CHANGE

Climate change is the most alarming problem for our species and our planet. The increase in the density of greenhouse gases in the atmosphere by human influence is an important factor that directs global climate change. Current growth in the concentration should be balanced or reversed by preventing the average global temperature from increasing by 2 ° C or less [50, 51]. The greenhouse gases in the earth's atmosphere constitute greenhouse gas effect by absorbing infrared radiation which is meant to be radiated into space [52]. Greenhouse gas effect, increases global average temperature and excessive rainfall by altering the radiation balance of the Earth's climate system and increasing the amount of retained heat [52]. The heat holding effect of the greenhouse gas is usually measured by net radiative forcing (RF). Net positive radiative forcing indicates the increase in heat held in the world by global warming. Different greenhouse gases have different net radiation powers according to their properties such as heat radiation absorption properties, atmospheric concentrations and atmospheric lifetime [52]. If temperatures continue to rise, climate change will cause decrease in food productivity by affecting food production negatively [53].

Agriculture uses about one-third of the arable land, about three-quarters of the global water resources, and one fifth of the energy. In these stages, agriculture is influential both in terms of resource use and in terms of the formation of greenhouse gases during preproduction, production and postproduction processes. The most commonly used scale to measure the climate effect of greenhouse gas is global warming potential (GWP). GWP is an index that measures radiative forcing following emission of a particular unit of greenhouse gas mass compared to CO₂ at a given time interval in today's atmosphere, based on the radiative properties of greenhouse gases [54]. The greenhouse gas emission known as global warming effect is measured by carbon dioxide equivalent (CO₂ eq). CO₂ is the most significant greenhouse gas with global warming potential. Two other important factors increasing global warming are N₂O and

CH₄ gases [53]. Although CH₄ gas has a strong greenhouse effect, it stays in the atmosphere for 12,4 years, half – life shorter compared to other gases. Although CO₂ is a weaker greenhouse gas, it stays longer in the atmosphere. N₂O's lifetime in the atmosphere is 121 years. Therefore, it is necessary to specify the time periods to be used in determining the potential contributions of different greenhouse gases to global warming. Great climate scientists and political organs state that the 100-year period used for the global warming potential is "no scientific argument" and therefore is a "value judgment" compared to other periods of time [54]. GWP effects of greenhouse gases are stated in Table 2.1

GREENHOUSE GAS	20 YEARS	100YEARS	500 YEARS
N₂O	289	298	153
C[55]H₄	72	25	7,6

SOLOMON, Susan. Intergovernmental Panel on Climate Change. Working Group I. Climate change 2007: the physical science basis: contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. 2007.

The CH₄ gas in the food system is generated as a result of anaerobic decomposition of organic wastes that contain manure and food waste, primarily as a result of enteric fermentation of ruminant animals. CH₄ emissions of most plant-based foods, except rice, are very low. Approximately 44% of total CH₄ emissions are related to livestock [52].

Goodland and Anhang's surveys show that animal farming form 51% of global greenhouse gases due to respiration [56, 57]. Omnivore diets contribute greatly to CO₂ emissions. Because animal agriculture accounts for 35% of the arable land, which mostly is pasture, and 80% of the land use [25]. It is important to be aware of the fact that there may be long-term imbalances between the amount of CO₂ gas given to the atmosphere through respiration, and the amount of CO₂ gas used from the atmosphere during photosynthesis. The fact that less CO₂ will be absorbed from the atmosphere during photosynthesis, depending on the changes in land use over time, is shown as a result for this [52]. In a work by Castanheira et al., differences in net CO₂ emissions resulting from the production of soybeans used to feed animals are associated with the existing plant cover and differences in the amount of soil organisms and land cultivation

practices [58]. Deforestation and its contribution to the global warming resulting in imbalance in net CO₂ emissions, that started 7000 years ago by the increase in planting and animal breeding are shown in the study [52, 59].

Global temperatures potential of N₂O in both short term and long term is quite effective. While N₂O gas is liberated in a much lower rate than CH₄ gas, the global warming effect is greater because N₂O is higher in global temperature potential [60]. The N₂O effect of the production of animal feeds such as corn and soybeans is quite high. In countries with developed agricultural systems such as the United States, agriculture represents more than 80% of local N₂O resources. In the United States, 45% of corn production and 47% of soy production are used as animal feed [52, 61]. Reducing animal based-products in the diet will benefit the climate change by reducing N₂O emissions. Reducing poultry meat consumption in many industrial countries by 2020 will result in a reduction of 19% in global N₂O emissions [62].

Germany speaks of three main factors that intensify the effect of greenhouse gases. These factors are; human transport, habitation and nutrition. Each of these three factors, causes about 20% of total greenhouse gas emissions [6]. Climate change occurs as a natural process in a wide range of area and time. In order to reduce climate change, is a way to reduce meat consumption. [24].

Intergovernmental Panel on Climate Change, stated that 'human impact on the climate system is clear' to combat climate change. Climate experts demand particularly from those high-income countries, actions that contribute to climate change to reduce greenhouse gas emissions such as replacing renewable energy sources instead of fossil fuels, increasing energy efficiency, sustainable land management, prevention of deforestation and finally transforming into a climate-friendly societies. Transforming into a climate-friendly society requires a transition to a sustainable lifestyle that includes factors such as lifestyle, nutrition, and energy production. The concept of Sustainable Diet takes these factors into account and aims reduction of greenhouse gas emissions by influencing consumer behaviors [52].

2.4.1. DIET and CLIMATE CHANGE

Current trends in food selection show increasing environmental impacts [63]. Working on different diets on sustainability, Duchin says that Mediterranean diet, which is predominantly plant-based, is closer to the public health guidelines given by the World Health Organization (WHO), with very few meat and animal-based products, and therefore has less environmental impact than the current western diet [64].

Methane is produced in oxygen-free conditions, especially from digesting of ruminant animals through fermentation, from stored fertilizers and from rice grown under water conditions. This is why the production of food such as meat, milk and rice may be responsible for the emission of CH₄ gas [65-67]. Manure's (feces and urine) liquid separation, can produce significant amount of CH₄. NO₂ is formed by microbial transformation of the nitrogen in the soil. Higher emissions can be observed in the environments where animals are kept on large numbers and under limited conditions such as dairy farms, cattle feeds and intensive pig farms. Because, in these environments manure is formed in liquid systems. Ruminants and herbivores are of other CH₄ sources. Animals such as cattle, buffaloes, sheep, goats and deer produce considerable amount of CH₄ gas. Beef, in particular, is at the front row in the formation of CH₄ emissions originating from enteric fermentation. Poultry causes emissions of greenhouse gases not lower than that of beef and pork [63].

It is developed under wet conditions, especially, when it exceeds the plant requirements. NO₂ emission can be connected to animal products along with products grown under these conditions [65-67].

Greenhouse gas emissions of fresh vegetables, grains and legumes are the lowest. While meat and fruits transported by air have the highest greenhouse gas emissions, eggs, certain fish and frozen vegetables cause medium greenhouse gas emissions. Animal based products produce between 1.5 and 30 kg of greenhouse gas emissions per kg of food. Chicken and egg are more climate friendly than meat and beef. Normally the greenhouse gas emissions of fruits are low, but the effect of greenhouse gases produced by the fruits transported by airline can be as great as the effect of animal based products. Fish, however, may or may not produce high CO₂ emissions depending on the use of fossil fuels [63]. Due to the use of heavy fuel for trawling, the emission produced by morino fish is close to 9 kg / kg of product. In the European Union, the average CO₂ emission per kilometer is 186 grams (gr).

Consumption of 1 kg of beef in a house produces CO₂ emissions equivalent to 160 km (km) of car use [63]. As shown in Table 2.2, consumption of plant-based products will be an important factor in reducing greenhouse gas emissions.

Table 2.2: Carbon dioxide, methane and nitrogen oxides emissions of 22 commonly consumed products in Sweden, from farm to the table . (Values represent kg CO₂ equivalents over a 100-year time interval.)

FOOD	CO ₂	N ₂ O	CH ₄	TOTAL
Carrot (fresh)	0.38	0.04	0.0	0.42
Potato (cooked)	0.40	0.06	0.0	0.45
Honey	0.46	0.0	0.0	0.46
Whole wheat (Cooked)	0.54	0.08	0.0	0.63
Apple (fresh, oversea by boat)	0.80	0.02	0.0	0.82
Soy beans (cooked, oversea by boat))	0.92	0.0	0.0	0.92
Milk (% 4 fat)	0.45	0.14	0.45	1.0
Sugar	1.04	0.03	0.0	1.1
Italian pasta (cooked)	0.96	0.12	0.0	1.1
orange (fresh, oversea by boat)	1.1	0.10	0.0	1.2
Rice (cooked)	0.59	0.21	0.52	1.3
Green bean (Southern Europe , boiled)	1.2	0.12	0.0	1.3
Herring(cooked)	1.5	0.0	0.0	1.5
Vegetables(frozen,boiled, oversea by boat)	2.2	0.05	0.0	2.3
Egg (from Sweden,cooked)	1.7	0.74	0.04	2.5
rapeseed oil (from Europe)	1.5	1.5	0.0	3.0
Chicken (cooked)	3.1	1.2	0.01	4.3
Codfish (cooked)	8.5	0.0	0.0	8.5
Pork (cooked)	3.9	1.6	3.8	9.3
Cheese	5.0	1.3	4.5	11
Tropical fruit (oversea)	11	0.23	0.0	11
Beef ,(cooked)	6.9	6.6	17	30

Carlsson-Kanyama, A. and A.D. González, Potential contributions of food consumption patterns to climate change-. The American journal of clinical nutrition, 2009. **89**(5): p. 1704S-1709S.

Studies have shown that proteins from soy and other leguminous plants cause very low environmental impacts compared to proteins acquired from animal based products [68]. Consumption of climate-friendly protein, may include a diet containing grains, leguminous plants and fish (in appropriate fishing conditions) [63]. In several studies, reducing meat consumption is suggested. Smil, in his study, described the use of proteins acquired from plant based products replacing red meat used in hamburgers

and sausages [69]. McMichael et al., have proposed a 10% reduction in global average meat consumption, which is 100 g per day [70].

A number of studies investigating the relationship between diet and climate have emphasized that increasing the amount of plant-based nutrition in the diet and reducing the amount of animal-based nutrition is the greenhouse gas-reducing effect. In general, plant-based diets have less environmental impact than omnivorous diets [52]. One of the most outstanding studies on this subject, Hallström et al. have found that the vegan diet is the diet that reduces the greenhouse effect most effectively. In the study, vegan diet was reported to reduce the greenhouse effect by 50%. In the same study, lacto-ova vegetarian diets were found to be in second place in decreasing greenhouse effect after vegan diets [38]. To estimate the total effect of diets on climate, the amount of CO₂ eq released per kilogram of food can be found by multiplying the number of people and per capita food [52]. Using LCA, greenhouse effect per unit can be found with different foods. Greenhouse effect per unit can be identified using LCA with different foods. According to LCA results, the greenhouse effect of grains, legumes, soy, refined sugar, fruits and vegetables is lower than that of red meat, chicken, fish and dairy products [29]. The main reason why the animal based products have high greenhouse effect is low fertility. In other words, consuming the plants that convert solar energy into food energy directly, is more efficient than consuming animals fed with these plants.

In The United States, land use is 163 times, water use is 18 times, NO₂ emissions are 19 times, and CO₂ emissions are 11 times higher than those of potatoes, wheat and rice in terms of red meat consumed by humanbeings. In a study on Swedish food system, high protein foods such as soybeans were compared with beef. As a result, it was inferred in the study that, the amount of energy per g of protein in red meat was 18 times higher than soybeans, and CO₂ eq is 71 times as soybeans [27]. In a study by Scarborough et al. with 65,000 participants in the UK, the greenhouse effect of those who consume high amounts of meat was found to be 1.9 times, and those who consume moderate amounts of meat was found to be 1.5 times higher than lactose-ova vegetarians. Likewise, the contribution of high and medium meat consumers to greenhouse gas is 2.5 times and 2 times higher than vegans [71]. In 120 LCA analyzes published on the global level, greenhouse gas effect of ruminant animal meats were found to be 250 times higher than legumes due to the release of CH₄ gas [29]. In the

study where Tilman and Clark investigated the effects of current diet conditions by 2050, mediterranean, pesketerian, lacto-ova vegetarian and omnivorous diets were examined. The study revealed that the omnivorous diets produced 4 times more greenhouse effect than the lacto-ovary diet. In addition, it was observed that 40% of the greenhouse effect caused by lacto-ova vegetarian diet was due to milk and dairy products [29]. 63 people participated in the study of Turner-McGrievy et al. which was in the form of an intervention and the study lasted 2-6 months. In the study, nitrogen footprints of vegan, lacto-ova vegetarian, pesketerian, semivejetry and omnivorous diets were examined. As a result of the study, compared to other diets, nitrogen footprint and N₂O release of vegan diets were found to be the lowest [72]. Compared to omnivorous diet, climate friendliness of plant-based diet is obvious. However, certain types of food have different effects on climate. In a study where cow milk compared to oatmeal, the effects of oatmeal on climate was found to be less. Soy is known for its high protein content and its impact on the climate is relatively smaller compared to animal derived proteins [52]. Beef has the highest greenhouse gas effect amongst all of the animal based products [52]. De Vries and De Boer show that 1 kilogram of beef production needs more soil and energy than 1 kg of pork, poultry, egg and milk production [74]. Peter et al. examined the relationship between meat consumption and land use. As a result of the study, they found that meat and milk fat increased land use [75]. Copane et al. and Vanham et al. examined the water footprints in different countries. It was stated in the study that, reducing meat consumption in Europe could be an important factor in reducing water footprint. [76, 77]

Studies have shown that reducing the consumption of red meat and processed meat has many benefits both on health and the environment [3]. Reducing meat consumption by 50% will reduce animal feeding by 50%. By this means, pastureland and domestic by-products used for livestock can be used for agriculture. In addition, meat products are very rich in terms of micro and macro nutrients. This will allow people to take protein, vitamins and minerals in sufficient quantities as well as reducing the harm to the nature [26].

In a study of Zhu et al., about meat consumption and greenhouse gas effect in low, medium and high income countries, it was shown that if high-income countries prefer plant-based products instead of 10 kg of meat they consume, the amount of CH₄ and N₂O in the atmosphere will decrease significantly. Zhu et al. also reported in their

studies that dietary modification should be done, not only in high-income countries, but also in middle-income countries as well [78]. In an effort to examine whether people are ready to change their diet to protect ecology, people are asked whether they would prefer to have meat meals with 15 % of reduced content. As a result of the study participants' responses were 41% yes, 21% could be and 23% no. This study shows that most of the participants can change their diet to protect nature [24].

In short, it is necessary to have a change in our diets to protect ecology. The complete removal of animal-based products from the diet, that is, the transition to a vegan diet is the greatest factor of reducing the greenhouse gas in the atmosphere. However, in cases where it is difficult to completely switch to a vegan or vegetarian diet due to cultural or personal reasons, transition to a healthy eating pattern, in which animal-based products are reduced and plant based products are promoted, has the effect of reducing the greenhouse effect [38].

3.EFFECT OF ANIMAL-BASED NUTRITION STYLE TO THE WORLD

One of the most important problems of our time is the increase in the production of industrialized animals since the 20th century [79]. By 2050, the world population is expected to reach 9 billion from 7 billion [80]. Due to the constant growth of world population and per capita income, it is expected that demand for livestock products will increase by 70% by 2050 [61]. It is estimated that this population increase in the world will be in developing countries where meat production is currently lower. Until recent years, most meat production in the World was in North America, Europe and Australia. Today, the meat production in Brazil has reached 2 times the meat production in America. In China, beef production is half the production in America. Today, beef production in China is more than 3 times than 20 years ago. In addition, China supplies 60% of pig production in the world. Recently, chicken production in the world has increased dramatically. Traditionally a consumer of very low meat products, India is now one of the top ten chicken producers in the world. Most of this growth in the global livestock production has been achieved by improvements in the economic situations of the concerned countries [81].

With the prolongation of human life, economic prosperity and population growth, it is expected that demand for meat and dairy products will increase in the coming years. There is serious concern about this increase in livestock production and its impact on land and water use and the greenhouse gases that will cause global warming [81]. Beef production has impacts such as climate-change, acidification, generating agricultural emissions from eutrophic compounds and consumption of natural resources. [82]. Livestock production causes land, water and carbon footprints. While about 40% of the global mainland is used for agriculture, 70% of the agricultural land is used for livestock farming to provide large grassland areas with three-quarters of all land [83]. For example, soy produced for livestock feeding is the main cause of deforestation in the Amazon region. At the same time, livestock is the largest cause of water pollution in the agricultural sector and is the end user of irrigation water; much of the expected increase in irrigation water in the coming years will be due to an increase in animal feed production to meet the increasing demand for livestock products [22].

The environmental effects of different meat products vary within themselves. For example, the environmental impact of chicken meat is much less than beef. In

addition, damage to the environment, such as the formation of greenhouse gases and land use in the process of the formation of a 1 kg of cow milk, is 2 times as the damage done in the process of producing 1 kg of soy milk [9]. Eshel et al. compare the environmental effects of ruminant animals with other animal products such as pigs, chickens, and eggs. At the end of the study, ruminant animals were found to have 28 times more land use, 11 times more water use and 5 times more greenhouse gas emissions compared to others [28]. While milk production produces less greenhouse effect compared to beef production, land and water use is greater than egg, poultry and pork production. Reduction in consumption of beef and use of plant based products, chicken, pork or egg instead of beef can reduce the greenhouse effect of the food sector by 35%. We can also provide certain benefits to use fish instead of beef, but in this case it greatly depends on the type of fish, fish feed and production system [53].

Animals will cause loss of human edible energy by providing their energy needs from animal feed. The situation is a little different for ruminant animals. These animals are fed with feeds that are not suitable for direct human consumption and grown in land that does not support conventional agriculture. But in many parts of the world, these feeds are supported by high nutritional products such as soy, corn and wheat. However, ruminant animals are rather inefficient at converting the energy and protein they receive from the feed they consume into energy and protein when they are transferred to people consuming these animals as meat [81]. The Wilkinson in his study showed that the feed conversion rate for beef production (feed consumption per unit of fresh product) was between 13.2 and 40 for energy and between 8.3 and 26.3 for protein depending on the production system used. Also, the highest values in the study were seen in animals fed with fresh, preserved feed. However, when the data are re-expressed in terms of the amount of human edible feed consumed by animals, these numbers have dropped to 1.9-6 for energy and to 0.92-3 for protein. These values were found to be 6,3 for energy, 2,6 for protein, in terms of pig production; 3,3 for energy and 2,3 for protein in terms of poultry.[84. In order to obtain 1 megajul (MJ) of energy from meat, it is necessary to use 3-6 MJ renewable energy to feed the animals. Given the background of this increase in food demand, it is quite normal to question the use of natural resources [81].

The conversion efficiency of plants into animal material is around 10%. Moreover, given that approximately one-third of world grain production is given to animals as feed, parallel to the decline in consumption of animal products, the food

supply for humanbeing will also increase [12, 85]. In addition, although the meat group is a good source of protein, obtaining protein from cattle requires more water and land use than plant-based proteins such as grains [21]. Moreover, approximately 80% of agricultural land is used for animal grazing and animal feed, the meat produced accounts for only 15% of the global human diet [4].

Agriculture accounts for 22% of total greenhouse gas emissions, 80% of which is related to livestock. This situation can be related to deforestation, fossil fuel use on the farm, animal manure, and gases created by animals [81].

Stehfest et al. explored the question what would happen if the global population consumed less meat. If animal products are not consumed in any way, adequate food production will be achieved until 2050. While supplying these products, less arable land will be used than today. This will make significant contributions to forest generation. Also, greenhouse gas emissions could be reduced by one third. Another method is that, if people transfer to healthy nutrition pattern as recommend the experts, pastureland and pasture areas on the earth will be reduced along with the number of the ruminant animals [21].

In the studies of Carlsson-Kanyama and Gonzele, they have found that, transition to a nutrition pattern where all the meat, especially of the ruminant animals, are discluded, will reduce greenhouse gas effect significantly. Nevertheless, it has been shown in the study that a healthy diet containing meat reduces the greenhouse effect by 35%. That is, red meat, especially ruminant animal meat, is the determining parameter in the greenhouse effect. In the same study, it was found that the diet containing poultry meat and pork instead of ruminant animal meats reduced the greenhouse effect by 35% [63]. Audsley et al. replaced % 75 Of the ruminant animal meat in the diet with poultry and pork, and at the end of the study they found that this reduces the demand for land by 40 %. However, when 50% of the consumption of poultry and pork is replaced by a plant-based diet, the demand for land is reduced by only 5% [86].

The Germans are doing a multidisciplinary study taking Dutch as an example. German consumers reduce their total protein intake by a third, and consume plant based protein instead of animal-based protein. As a result of the work it is found that the environmental pressure is reduced [87].

3.1.MICRO AND MACRO NUTRITION CONTENT

Animal-based products are of high-quality, easily digestible, richer in proteins and in many macro and micro nutrients [88]. Animal based products include vitamins and minerals such as calcium, iron, zinc, B12, riboflavin. With the consumption of animal based products, along with Vitamin A, riboflavin and vitamin B-12 are also supplied with calcium intake.

Bioavailability of iron and zinc in animal-based products is high. The vitamin A is among the vitamins of both animal and plant-based. The bioavailability of carotenoids, the antecedents of plant-based vitamin A, is low [89].

Meat provides an important contribution to the daily protein, energy, vitamin B-12, zinc, riboflavin, calcium and iron needs. Likewise, milk contributes to the protein, calcium, riboflavin and vitamin A needs [89]. 100 g of cooked beef meets the entire daily requirement of vitamin B-12 and half of the protein and zinc needs. In the same way, 2 large eggs meet 20% of daily protein, 30% of B2 vitamin and 66% of B-12 needs. 30 g of cheddar cheese meets 20% of daily calcium, more than 10 % of zinc, and 12 % of B2 and B12 vitamin requirements [88]. In addition, the content of sodium, phosphorus, saturated fat and cholesterol of animal-based products are also very high [9]. Therefore, excessive consumption of animal-based products can lead to obesity and to diseases associated with obesity [88].

Although legumes are known as the protein source of vegetables, their content of protein is low compared to that of meat, and they do not contain B-12 vitamin. Although the vitamin B-12 is an animal based vitamin, it is also present in some renewable algae and fungi, but the biological activity of vitamin B-12 found in these products is very low [9].

As plant based products may not contain these micro and macro-nutrients in sufficient levels, or may have low bioavailability, this may lead to vitamin and mineral deficiencies in people fed with plant based products. In order to prevent people fed with plant-based products from having vitamin and mineral deficiencies, they should consume either vitamins and minerals or products enriched with vitamins and minerals. In addition, plant-based foods have low fat content, high fiber content, high vitamin C and manganese content [89].

In the study where plant-based products are consumed instead of meat and dairy products, inadequate intake of zinc, thiamine and B-12 vitamins were increased. Calcium intake decreased by 25% in women and men, zinc intake decreased by 29% in

women, by 45% in men, vitamin A intake decreased by 58 % in women, and by 64% in men. In the study, the intake of saturated fat was reduced by 35% while the intake of fiber increased by 30%. In the same study, despite protein intake was reduced by % 20, adequate intake on a population basis continues [9].

Shortage of these vitamins and minerals in the diet leads to anemia, night blindness and developmental retardation in short term; and to blindness, cognitive performance deterioration, neuromuscular impairment, and even death in long term [89].

3.1.1.PROTEIN

Consumption of animal-based products is directly related to protein intake and protein quality. For example, almost all of the fat free portion of the meat consists of protein. In addition, meat products contain all amino acids such as lysine, histidine, isoleucine, leucine, valine, threonine. Thus the protein quality is quite high compared to other nutrients [90]. Protein quality of plant-based products is fairly low because, they do not contain essential amino acids such as lysine, isoleucine, threonine, tryptophan, and sulfurized amino acids [88]. In addition, plant-derived proteins contain fewer branched-chain amino acids [91]. Furthermore, vegetable-based proteins such as whole grains, legumes, etc., have an adverse effect on the digestion of nutrients in food because of the factors they contain [92, 93].

The quality of a protein source has a direct effect on protein digestibility. Because the majority of high-quality proteins are absorbed and become available for bodily functions [88]. The meat taken by diet also has a contribution to protein quality in terms of digestibility [92, 93]. In addition, the amino acid score of animal-based diet proteins is quite high [90].

Legumes, oilseeds, grains are plant-based protein sources. These nutrients also contain sufficient amounts of branched chain amino acids. 100 gr Pumpkin seeds contain 30.2 gr, lentils 24.6 gr, raw black beans 21.6 gr, raw almonds 21.2 gr, tempeh 20.3 gr, tofu 17.3 gr, oats 16.9 and raw kinoa 14.1 gr of protein. These foods can be used as a source of protein in the diet of vegetable-fed individuals such as vegetarians [91].

3.1.2.FATTY ACIDS

Fat is one of the important macro-nutrients of diet. Oil provides energy in the diet, acts as a carrier for fat soluble A, D, E and K vitamins and enhances the taste of food. The fat content of animal-based products varies. The fillet is the leanest part of the beef, leg is the leanest part of lamb and chest is the leanest part of poultry, while skin is the most fatty part of poultry [88].

While the total fat and saturated fatty acid content of animal-based products is high, the content of unsaturated fat is very low. Meat and meat products contribute not only in essential fatty acids such as linoleic acid and α -linolenic acid but also they contribute to polyunsaturated fatty acids such as eicosanoic acid and docosanoic acid found in meat phospholipids [88]. Ruminant animal meats and fatty fish are important sources of eicosanoic acid and docosanoic acid [94, 95]. But animal-based foods also, naturally contain trans fats. Conjugated linoleic acid is a trans fatty acid found in meat and dairy products. Conjugated linolenic acid biosynthesis is the result of microbial isomerization of nutritional linoleic acid in the digestive tract of ruminant animals. Thus, the products obtained from ruminant animals are sources of conjugated linoleic acid [94, 96, 97].

3.1.3.IRON

Iron is found in foods in two different forms as heme and non-heme. Heme iron is found in animal-based products. Non-heme iron is found in plant and animal tissues [98]. Iron content in vegetable sources such as whole grains, legumes may be similar to diet content in omnivorous diet. However, the bioavailability of plant and animal derived iron is not the same [91]. Bioavailability of heme-iron is higher than non-heme iron [98]. There are also different factors that affect iron bioavailability. Vitamin C increases the absorption of iron in foods. However, nutritional factors such as phytic acid found in lentils, legumes, grains and rice, tannin found in tea and coffee and calcium inhibit iron absorption [90, 98]. However, the amount of phytic acid in the non-heme iron sources such as legumes can be reduced by soaking in water [91].

Iron deficiency is more common in communities where animal-based diet is rare, and where plant-based diet which contains plenty of inhibitors such as renal and phytic acid is common [90]. Iron deficiency may occur in tissues as a result of low bioavailability or inadequate iron intake. Iron deficiency in the tissues causes anemia.

Anemia can cause weakness in motor function in individuals, fatigue, and lack of cognitive development in children. Exacerbation of the anemia also increases the risk of mortality [90].

The risk of colorectal cancer and cardiovascular disease are high in communities where there is high amount of iron intake as a result of animal-based nutrition [98]. Since serum ferritin concentrations in vegetarian individuals are low, the risk of heart disease in these individuals is lower [90].

3.1.4.ZINC

Zinc is involved in cell growth, repair, and protein metabolism, along with deoxyribo nucleic acid (DNA) stabilization and gene expression [91]. Animal-based products such as red meat, dairy products, cheese, chicken are of important zinc sources [90]. Zinc is also common in plant-based products, but its absorption is rather poor [91]. Despite beans are plant-based zinc sources along with grains and oily seeds like cannabis and pumpkin seeds, their absorption is very low due to the phytate contents [91]. Because of this, the bioavailability of zinc in the vegetarian diet is less than that of omnivorous [99]. Zinc bioavailability can be increased by protein, but animal-based proteins should be prioritized because phytic acid content of plant-based proteins is high [99]. In addition, the processing of food, immersing in water, fermenting may reduce the amount of phytate and increase bioavailability. Briefly, the bioavailability of zinc in conjunction with the amount of zinc in the diet is rather important in zinc absorption [91].

3.1.5.CALCIUM

Calcium is available in many food especially in dairy products. Beans, legumes, dark green leafy plants are herbal sources of calcium. Although broccoli, chinese cabbage, cabbage with spinach, arugula, dark green leafy vegetables are rich in calcium, these plants have low bioavailability, since fiber, phytate, (especially oxalate) contents are high in these plants. Because of this, the calcium intake of vegetarians, especially vegans, is much lower than omnivores. So, vegetarians, especially vegans, need to choose nutrients with low-oxalate and high calcium contents, along with calcium fortified products [91].

Before calcium is absorbed by the intestinal wall, it has to be ionized. The various molecules found in the diet become soluble in calcium or are kept in solution in the ileum. Milk proteins such as phospholipids derived from casein and amino acids and L-lysine and L-arginine, which form soluble chelates with calcium, are examples of this. It is known that lactose increases the passive absorption of calcium. Other dietary factors such as oxalate, phytate, irreversibly insolubilize calcium at neutral pH. The high calcium level in dairy products plays a particularly important role in the development, durability and intensity of bones for children and prevention of osteoporosis in the elderly [88]. In addition, calcium is also required for blood clotting, nerve conduction, muscle stimulation, and vitamin D metabolism [91].

3.1.6. IODINE

Iodine is a substantial trace element that is necessary for physical and mental growth and development. It plays an important role in thyroid function and metabolism. Excess or inadequate intake of iodine causes thyroid dysfunction. In addition, vegetables such as cabbage, cauliflower, rutabaga (a kind turnip) and radish are goitrogenic. Goitrogenic substances may cause thyroid dysfunction by reducing the use of iodine in the body [91].

Common sources of iodine are fish and dairy products. In the dairy industry, cows are given iodized casein in order to increase lactation. In addition, teats and milk tankers are cleaned with iodophors disinfectants. Thanks to these implementations, the amount of iodine in milk and dairy products is increased [90]. Seaweed and sea vegetables are also rich in iodine. The content of iodine in foods varies depending on the soil-iodine content, the agricultural methods used during production, the season and the species of fish [91].

Vegetarians' especially vegans' iodine intake is low, because along with dairy products there is no fish in their diets. Moreover, because of the reduced consumption of iodine in the body due to high intake of goitrogenic substances thanks to plant-based diet, iodine deficiency may be seen in these individuals [91].

3.1.7.VITAMIN D

Vitamin D is a fat-soluble vitamin produced in the skin. It is essential for calcium absorption and bone health and plays an important role in many physiological processes. People can create vitamin D from direct sunlight on their skin or intake in their bodies with animal products and fortified foods. Vitamin D is plenty in milk and dairy products. Cholecalciferol is an animal, ergocalciferol is a plant-based vitamin D. But ergocalciferol has lower bioavailability than cholecalciferol. Therefore, vitamin D deficiencies can be seen especially in vegans. To prevent this, fortified products with vitamin D and vitamin D supplementation are recommended [91].

3.1.8. RIBOFLAVINE

Milk and dairy products are the main riboflavine sources in the diet. Riboflavine acts as a coenzyme in folate metabolism, especially in regulating plasma fasting total homocysteine (THcy) levels [91].

3.1.9. VITAMIN B12

Vitamin B12, also known as cobalamin, is very important in hematological and nervous systems. Vitamin B-12 is present in the body in the form of methylcobalamin and adenosylcobalamin. Methylcobalamin is a coenzyme in the synthesis of methionine. Adenosylcobalamin is involved in the enzymatic degradation of fatty acids with methyl acyl CoA mutase [100]. Cobalamin is synthesized from anaerobic microorganisms in the rumen of cattle and sheep. That is why people often consume pre-formed cobalamin from animal products, which are the main source of B-12 in the diet [91]. Red meat, liver, fish, eggs and dairy products are rich sources of vitamin B-12. Thus, vitamin B12 deficiency is common in people who can not consume sufficient amounts of animal products [90]. B-12 deficiency is common in vegans who are not fed with animal-based products. 50% of the vegans participating in the UK cohort study were detected to have B12 deficiency. In addition, B-12 levels were found to be low in 21% of the vegans. As a source of B12, fortified products with B12 and nutrients with B12 are recommended to be used in vegan diets. If vegans do not receive sufficient amount of vitamin B-12, irreversible neurological damage may develop due to prolonged cobalamin deficiency [91]. In addition, pernicious anemia may also develop due to B-12 deficiency [90].

3.2.HEALTH EFFECTS

Contribution of products obtained from animals such as cattle, sheep, goats, pigs, chickens to the diet can be beneficial or harmful for general human health [88]. Although animal-based products contain important micronutrients necessary to provide protein and optimal body function at high biological value, they are also rich in fat and saturated fatty acids; however, they should be balanced against potential adverse health effects[88, 90]. Excessive meat consumption in many parts of the world can cause obesity, diabetes, cardiovascular disease, and cancer [81]. Animal-based products, especially meat, are very rich in saturated fat. Excessive consumption of saturated fat in the diet is associated with increased cardiovascular disease and stroke [26]. WHO states that in the European region, 25% of the total mortality rate is associated with cardiovascular disease and 15% is caused by stroke [26]. The average saturated fat consumption in Sweden is above recommended. This situation is not desirable as it will cause an increase in the risk of cardiovascular diseases. Case studies in the UK and Brazil show that a 30% reduction in saturated fat and cholesterol intake from animal sources can reduce ischemic heart disease by about 15% [10].

The pressure on the vessel wall by the blood in the vein is called hypertension. Blood pressure is measured as systolic and diastolic. When the blood pressure goes up to 120 millimeters of mercury (mmHg) systolic and 80 mmHg diastolic, the risk of cardiovascular disease and stroke increases. Hypertension is considered to be one of the world's leading causes of death and it causes 51% of stroke-related deaths and 45% of coronary heart disease-related deaths. A diet rich in saturated fat and sodium increases the risk of hypertension. Animal-based products naturally contain very little sodium. Sodium is usually added to meat as salt during cooking, for the reasons such as increasing sensory properties, decreasing water activity. However, Processed meat has a very high sodium content. In addition, low potassium intake also increases the risk of hypertension. Because of this function of potassium, the hypothesis that populations consuming vegetarian diets often have low incidence of hypertension and heart disease has been proposed [88].

Meat and dairy products are foods with a high content of energy and nutrients. Excess consumption of these foods is associated with obesity [81]. Obesity is known to be an excess of fat accumulation in the body. Obesity also brings about co-morbidities such as metabolic syndrome and cardiovascular disease [88].

Cancer is known to be the disease of the genes that are susceptible to mutation, especially during the increased human life [101]. Carcinogenesis can be triggered by environmental factors, lifestyle and diet [88]. For example, there are indications that consumption of red meat and processed meat is associated with increased risk of colorectal cancer [102-104]. In addition, there will be indirect health benefits such as reduction in antibiotic use due to the reduction in livestock production. [105].

Plant-based products have contribution to health because of the high content of complex carbohydrates, low saturated fat, cholesterol, and purine. Plant-based products are higher in content for some vitamins, minerals and phytochemicals than animal-based products. In addition, there are dietary fibers in plant-based products. In this respect, plant-based products also increase the feeling of satisfaction compared to animal –based products [6].

Vegan diets are low in total and saturated fat content and high in omega-6 fat content compared to vegetarian and omnivorous diets. This is associated with decrease in heart disease, hypertension, type 2 diabetes, cholesterol and cancer in vegans. Due to the absence of sea-based fats, vegans consume less omega-3 fatty acids. Omega 3 fatty acids are essential for normal growth and development. They have an important role in cardiovascular health, inflammatory and chronic diseases. Omega 3 fatty acids have anti-inflammatory, antithrombotic, antiarrhythmic, hypolipidemic, vasodilator and antiproliferative features [91].

3.3.PROTEIN QUALITY

Protein is one of the most important nutrients in the diet. Proteins are generally regarded as indicators of food safety. That is, if protein resources consumed by individuals are sufficient, nutrient sources can be sufficient [2]. Meat is the premier source of protein in Europe. According to De Boer, Helms, and Aiking, European eating pattern includes 40 kg of protein per year. 62% of this amount is of animal-based[106]. Average protein intake in Europe is more than recommended. Even though there is a 50% reduction in animal-based products in the diet, average protein intake in Europe will still be higher than necessary [26].

Proteins are not nutritionally equal. Proteins may vary according to origin, individual composition of amino acids and bioactivity. Protein quality is evaluated by

protein bioavailability. Bioavailability measures the proportion of amino acids that is absorbed from the diet and used in the body [107]. Bioavailability is a measure aimed to predict the nutritional protein sources and the capacity of diets to meet the body's amino acid and nitrogen needs [108]. The food matrix in which a protein is consumed can have significant impact on the bioavailability of amino acid for metabolic needs. The food matrix in which a protein is consumed can have significant impact on the bioavailability of amino acid for metabolic needs. The food matrix in which a protein is consumed can have significant impact on the bioavailability of amino acid for metabolic needs. Protein quality has two important points. One of these is the properties of the protein and the food matrix in which the protein is consumed, the other is the demands of the individuals who consume food and are affected by age, health status, physiological status and energy balance [109]. The goal of protein quality assessment is to determine the ability to meet specific needs in situations such as growth, pregnancy or lactation, in addition to meeting protein maintenance needs [109].

Methods for evaluating protein quality have been discussed by the Food and Agriculture Organization (FAO) since the 1950s in order to make it possible to compare the capacities of various staple protein sources to meet general human protein requirements. Protein sources with higher protein quality scores can provide better amino acids to be used by the body [107]. There are several methods to evaluate protein quality. Such methods usually measure the amino acid composition, protein digestibility and bioavailability of individual amino acids [110].

Current protein quality methods assess animal growth (protein efficiency ratio) , in humans, nitrogen balance, where both digestibility and the suitability of the amino acid pattern of absorbed amino acids (biological value) determines net protein utilization [109].

3.3.1.PROTEIN EVALUATION

The quality of a protein is determined by evaluating the essential amino acid composition, digestibility and bioavailability of the amino acids. There are various scales and techniques used to evaluate protein quality [111].

3.3.1.1.BIOLOGICAL VALUE

Biological value measures protein quality by calculating the nitrogen used for tissue formation divided by the nitrogen absorbed from food. This product is expressed as the percentage of nitrogen used, by multiplying by 100. Biological value measures how efficiently the body uses the protein consumed in the diet. Biological values were determined as 80 for beef, 77 for casein, 100 for egg, 91 for milk, 74 for soy protein, 64 for wheat gluten, and 104 for whey protein [111].

3.3.1.2.PROTEIN EFFICIENCY RATIO

It determines the activity of the protein by measuring the animal growth. This technique primarily requires feeding the rats with a test protein. It then measures the weight gain in grams per consumed protein. The calculated value is compared with the standard value of 2.7. 2.7 is the standard value of casein protein. High value food is associated with a high content of essential amino acids [111].

Animal-based proteins have a higher biological value than plant-based proteins. Protein efficiency rate was 2.9 for beef, 0 for black bean, 2.5 for casein, 3.9 for egg, 2.5 for milk, 1.8 for groundnut, 2.2 for soy protein, 0.8 for wheat gluten , and 3.2 for whey protein [111].

Nevertheless, there are some problems with this rating system. Biological value does not take into account some key factors that affect protein digestion and its interaction with other foods before they are absorbed. Moreover, although this calculation provides a measure of growth in rats, it does not strongly correlate with the growth needs of human-beings [111].

3.3.1.3 NET PROTEIN UTILIZATION

Net protein utilization resembles biological value, except that it requires direct measurement of retention of the absorbed nitrogen. Net protein utilization and biological value measure the same nitrogen retention parameter. The difference between them is that the biological value is calculated from the absorbed nitrogen, while the net protein utilization is calculated from nitrogen ingested. Net protein use was determined to be 73 for beef, 0 for black beans, 76 for casein, 94 for eggs, 82 for milk, 61 for soy protein, 67 for wheat gluten and 92 for whey protein [111].

3.3.1.4. PROTEIN DIGESTIBILITY-CORRECTED AMINO ACID SCORE

The practical difficulties and poor susceptibility of the nitrogen balance method have led to the adoption of the protein digestibility corrected amino acid score (PDCAAS) approach [109]. PDCAAS was a method selected by the Committee of Codex Herbal Proteins in the late 1980s. PDCAAS was regarded to be the best available method to describe the quality of the available protein by that time [107], in an expert consultation by FAO and WHO on protein quality in 1991. PDCAAS is based on the combination of an age-related amino acid reference model, which represents human needs and predictions of protein digestibility [109]. The amount of potentially limiting amino acids in the test protein, identifies the single most limiting amino acid that determines the amino acid score, by comparing with their respective content in the appropriate reference pattern [109]. At the plateau of nitrogen balance, any increase in plasma amino acids stimulated the increased oxidation and elimination of the excess amino acids, expressing that protein quality was not above requirements [109]. This score was assumed to predict the biological value or the possibility of test proteins absorbed to fulfill their human amino acid requirements [109]. The score was then corrected for digestibility, that gives PDCAAS value which was yielded to predict the net protein utilization [109]. Essentially for PDCAAS or nitrogen balance, the provision of the substrate for protein synthesis and other means is limited by the present (digested and absorbed) indispensable amino acids. Thus, protein use is estimated from the expected digestibility and composition of the amino acid. These two characteristics of the protein determine the minimum human amino acid requirements for nitrogen balance of a dietary protein and thus the ability to meet the quality of food [109].

For protein mixtures in one meal, this score is calculated from the amino acid model of the digested protein mixture [109]. Because the protein in food is initially limited to digestibility that can not exceed 100%, PDCAAS does not exceed 100% [109]. PDCAAS was found as, 0.92 for beef, 0.75 for black beans, 1.00 for casein, eggs, milk, 1.00 for ground protein, 0,25 for wheat gluten, 1 for whey gluten.

Although PDCAAS, which has been used for a long time, is widely accepted, still, it has been criticized for significant technical limitations [107]. There are three critical limitations of the PDCAAS method. These are overestimation, truncation and bioavailability [107].

3.3.1.5. OVERESTIMATION

PDCAAS is based on an estimation of the crude protein digestibility that is detected on the total digestive system, but the protein in feces is mainly of microbial origin [107]. Amino acids moving through the terminal may be an important pathway for bacterial consumption of amino acids, even though it does not appear in feces, it is not possible to use any amino acid that reaches the columns for protein synthesis. For this reason, in order to obtain a truly valid measure of fecal digestibility, the place where protein synthesis is determined is important for a more accurate detection. Thus, ideal digestibility will provide a more accurate measure of digestibility [111].

3.3.1.6. TRUNCATION

PDCAAS has been applied along with "truncation" which reduces the protein digestibility scores to a maximum of 1.00 when the body's indispensable amino acid requirements exceed 100%. This ignores the high nutritional value of animal-based proteins [107].

3.3.1.7. BIOAVAILABILITY

PDCAAS invalidates the quality of proteins that contain anti-nutritional factors [107]. Anti-nutritional factors such as trypsin inhibitors, lectins and tannins have been reported to increase endogenous protein losses of protein sources such as soybean flour, peas, and pods in terminal ileum. These anti-nutritional factors may cause decrease in protein hydrolysis and amino acid absorption. This can be more affected by age.

Because the capacity of the intestines to adapt to dietary movements can be reduced by the aging process [111].

3.3.1.8.DIGESTIBLE INDISPENSABLE AMINO ACID SCORE -(DIAAS)

Finding a method that precisely determines dietary protein quality as accurately as possible is due to the importance of optimally matching the rapidly growing world population and food supply and human protein requirements to the nutrients of limited land, water and food resources. The 2007 FAO report on "protein and amino acid requirements in human nutrition" underscores a number of concerns about protein quality assessment, both conceptual and technical, that have not been completely resolved, and identifies possible conditions in which the poor protein quality can put the nutritional status into danger . In 2010, the International Dairy Federation, voiced concern over the methods of PDCAAS to FAO and announced its limitations [107]. Upon this, FAO and WHO published a report in 2013 to specify a more accurate method for assessing protein quality. The aim of the report was to propose DIAAS, a new method for assessing the quality of dietary proteins. The method tries to use the best available scientific information to explain that each dietary protein source can meet human protein and amino acid requirements more accurately. This is the most significant change in protein quality assessment since the PDCAAS was introduced [107].

DIAAS is expected to overcome the limitations of PDCAAS. In contrast to crude protein, DIAAS will focus on individual amino acid digestibility and determine amino acid digestibility at the end of the terminal ileum, and these will provide a more accurate measure of the amount of aminoacid absorbed by the body and its contribution to a person's aminoacid and nitrogen requirements [107].

DIAAS will remove the PDCAAS' "truncation" process, which will identify the proteins at the top of the scoring system better and recognize the nutritional value of high-quality proteins as a supplement to low-quality proteins [107].

DIAAS is expected to identify the biologically available lysine more accurately and this additional variance is expected to remain in nutritional quality. When report is discussed, indispensable amino acids such as lysine can be severely destroyed during food processing, especially grain processing. Existing analytical methods for determining lysine in foods do not make a complete distinction between destroyed and biologically available lysine, but new tests are expected [107].

The FAO report also said that there is insufficient data to permit immediate implementation of DIAAS. As with any new methodology, there is currently no adequate approved data on ileal digestibility to support a rapid movement of DIAAS. Preliminary data for DIAAS, are mostly based on studies on rats and pigs, preferred animal model for human digestion of proteins needs to be verified. Before being adopted, the model also needs to develop a robust DIAAS dataset for a wide variety of foods [107].

4.SUSTAINABLE DIET

Diet is a choice of food consumed by the individual, selected from those offered by the food system [5]. The sustainable food system is a food system that provides people with food safety and nutrition on an economic, social and environmental basis, and does not jeopardize the feeding of future generations [5]. Sustainable diet is a diet that contributes to sustainable food systems that contribute to good nutrition and long-term good health for the individual and the community, thereby is a diet that contributes to the long-term food safety and nutrition of food [5]. Although the concept of sustainable food systems is not new, interest in how food and dietary patterns are linked to ecosystems, and how natural resources are used in environmental, economic, social and culturally in sustainable ways has recently been increasing [3].

The combination of problems of sustainability and nutritional imbalance constituted by population growth and changing climate and environmental conditions that will make food production in the coming years increasingly difficult and unpredictable [22]. Long-term food safety can only be achieved if we consider the sustainability of our food supply [112].

According to the definition of the United Nations, "Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" [112]. While ensuring food safety, it is also necessary to reduce the environmental impact of food production [4]. Despite the fact that food availability has increased by 26% between 1970 and 2000, Africa is still the only continent that does not get surplus of food. Approximately 800-1200 million people are malnourished, and the rapid increase in food prices is also increasing significantly [4]. Hazell and Wood argue that the problem of starvation is mainly an income distribution problem more than a food shortage. People in hunger are poor to buy produced food and are undernourished. In wealth, people suffer from obesity and chronic illnesses due to the intake of excessive amounts of food. Increasing global food production will not solve these problems. The majority of the poor live in rural areas. These people are dependent on agriculture and related activities for both food and means of living [4]. Sustainable diets are defined by FAO as " protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable;

nutritionally adequate, safe and healthy; while optimizing natural and human resources” [26]. As defined in 2010, sustainable diets are “diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations” [5]. Sustainability means "to meet the needs and aspirations of the present generation without compromising the ability of the future generations to meet their needs and aspirations" [53]. Sustainable diets are diets that have low environmental impact and contribute to food and nutritional safety and that are a healthy life for the present and future generations [112].

In recent years, various countries have begun to integrate sustainability into presidential nutritional recommendations. According to a recent report by FAO's 83 countries with official dietary guidelines four countries have been reported to speak of environmental factors in nutrition guidelines. These include Sweden, Germany, Brazil and Qatar [53].

The concept of sustainable nutrition is summarized as preference of plant-based foods, organic foods, regional and seasonal foods, preference of minimally processed foods, fair trade products, resource-saving housekeeping. However, sustainable nutritional principles are systematically examined in five dimensions: health, environment, economy, society and culture [6].

4.1 PREFERENCE OF PLANT-BASED PRODUCTS

It is extremely important to reduce the amount of animal-based- products and increase the amount of plant-based products. There are many different ecological benefits such as reducing greenhouse gas emissions [6]. For example, in Germany, 72% of the greenhouse gas emissions in the nutrition sector are generated by animal-based products. Plant-based products account for only 28% of greenhouse gas emissions in Germany [6]. The concept of virtual water is defined as the water needed in the production process of the agricultural and industrial products or services [113]. Virtual water consumption is also fairly low for plant-based products. Virtual water consumption is 15.415 lt/kg product for cattle, 5.988 lt/kg product for pigs, 5.060 lt/kg product for cheese, 3.265 lt/kg product for eggs, 1.827 lt/kg for wheat, 822 lt/kg product for apples, 287 lt/kg product for potatoes and 214 lt/kg product for tomatoes [41, 114]. In addition, the use of land for the production of plant-based products is significantly less than that of animal-based products. Because productivity is usually low when

converting plant-based products into animal-based products. For these reasons, preferring plant-based products provides less intensive production compared to animal-based products [6].

One-third of the world's arable land is used for animal feed production, which compete with food production especially in areas with food insecurity. Feed and food imports cause conflicts in land use in low-income countries. Deforestation of tropical rain forests in particular for soybean and palm oil production or for pasture land is a very serious problem for both humanbeing and the climate [6].

Plant-based products have positive effects on our health due to decreased consumption of total fat, saturated fatty acid, total cholesterol and purine with increased consumption of complex carbohydrates. In addition, some vitamins, minerals and phytochemicals are more abunding in plant-based products than animal-based products. However, dietary fiber, which is found only in plant-based products, increases feeling of satiety, although the energy content of plant-based products is lower than that of animal-based products [115, 116].

4.2 REGIONAL AND SEASONAL PRODUCTS

The problem of consuming more seasonal foods has come to the fore to discuss how to shift existing dietary intake to more sustainable consumption models to minimize the environmental impact of the diet. Consuming more seasonal and local foods, especially eating fruits and vegetables, is one of the recommended dietary changes for transition to a more sustainable dieting. In a study conducted, 2 definitions were evaluated for seasonal foods. The first definition is about where the food is produced, the second definition is about where the food is produced and consumed [117].

Global seasonality: The food grown or produced during the natural growing season for the country or region where it is grown. It doesn't necessarily need to be consumed locally where it is produced. For the production-based definition, the food is produced during the natural growing or production season but is not necessarily consumed in the same place. apples grown in season naturally outdoors in New Zealand and eaten in Europe in the spring and summer by this definition would be globally seasonal [117].

Produced and consumed in season (local seasonality): It includes food produced and consumed in the same climate zone without high energy use for climate modification or storage. The production and consumption based definition, requires the food to be produced and consumed in the natural growing or production season within the same climatic zone. This is often interpreted as locally seasonal food, which opens another debate about what distance constitutes local [117].

The most important aspect of both these definitions is that the food is grown or produced outdoors in their natural season without the use of additional energy, thereby not creating additional greenhouse gas emissions [117].

While these definitions are clear at first glance, some problems may be encountered when looking at the details. For example, in the future, it will be less obvious for many people to determine when and where food is available in the season, since many products will change their natural growth season with predicted climate changes. This emphasizes some complexities that can investigate how environmental, health, economic and social consequences can change with different definitions, along with seasonality understanding. In terms of nutrition and health, local seasonality can have an impact throughout the year to reduce food availability and diversity, especially in countries with limited production seasons. Throughout history this has been overcome with the storage and preservation of food, but this may require additional energy for the operations such as freezing, canning, drying food, and thus may contradict the definition of the local seasonal legislation of the work. That food should never be stored, is not only for supplying it, but also for not increasing food waste [117].

When consumers need to be encouraged to consume more seasonal foods, the perception, awareness, and understanding of seasonal foods is important. Seasonal foods are often associated with locally produced foods, better quality meals or limited choice of food, and some are foods associated with annual cultural events. Locally grown seasonal fruits and vegetables are generally considered to be tastier, fresher and better quality than equivalent imported or off-season grown products. But these foods are seen as more expensive, less suitable and more time consuming. There is insufficient evidence that people are willing to pay more for seasonal products [117].

Seasonal foods are asserted to be a piece of a sustainable diet that can often be interpreted as local food. The environmental impact of the food system is multi-dimensional with climate change, water use, land use, biodiversity, soil degradation and pollution effects. There are very few studies covering all these issues related to seasonality. Most of these studies focus on greenhouse gas emissions in relation to climate change. One of the benefits of consuming seasonal food is the reduction of the greenhouse effect. Because there is no need for artificial heating or lighting because it is in the natural growth season, no high energies are required [117]. There are a number of studies in the literature that show that the greenhouse effect of certain foods produced in heated glass houses in the United Kingdom is higher than the same species grown abroad naturally and brought to the United Kingdom [118, 119]. The high-energy use needed for heating and lighting to grow products out of season can have higher GHGE than the emissions associated with transportation.

Short distances from farms to consumers, reduce energy consumption and greenhouse gas emissions. The transportation needs and emissions are the most for aircraft, followed by trucks and trains. Open seasonal planting is less susceptible to greenhouse gas effects because it does not require heating oil for greenhouses and plastic tunnels [6].

Because of the long maturation period, regional products may contain more basic and health promoting substances. Seasonal products not produced in heated greenhouses or plastic tunnels usually contain less harmful residues such as nitrates and insecticides. In addition, seasonal products taste more delicious because they have a longer maturation period. Adaptation to seasonal changes leads to more diverse food choices and increased regional biodiversity [6].

Relying on local seasonal foods throughout the year can reduce fruit and vegetable consumption. But water stress, changes in the land use and environmental impacts on biodiversity are less than other diets. Based on the current evidence, there is no obvious advantage or disadvantage to advocate a food system for global or local seasonal food production [117]. To achieve more sustainable consumption patterns, it will be necessary to commit to and act throughout the entire food system from consumers to manufacturers, retailers and government. To have a realistic chance to change dietary behavior, future guidelines for sustainable diets should take into account modern lifestyles, cultural and social expectations, and the food environment in which food choices are made [117].

4.3 CHOICE OF MINIMAL PROCESSED FOOD

Grinding, heating and sorting of grains can damage substances that are good for health. Minimal processed foods usually contain more of the health-beneficial substances. They also have higher nutrient density and lower energy density. Ready, processed foods usually contain high amounts of fat, sugar and salt as well as food additives such as preservatives, coloring and flavoring substances. During the processing of food, too much energy which causes pollutant emissions is needed. Moreover, too much water is needed during the processing of foodstuffs [6].

4.4.ORGANIC FOOD

Organic foods are produced according to natural cycles, which have a variety of ecological benefits. In the case study, organic farming was found to reduce greenhouse gas emissions by 25% compared to conventional farming. Other benefits of organic farming include reducing soil erosion, increasing biodiversity, and reducing harmful residues such as nitrates, pesticides and animal drugs in the soil and waters. In addition, organic agriculture also prevents the use of mineral nitrogenous fertilizer, which requires high energy for production [6].

Excessive fertilization of the soil causes high N₂O emissions, which is a serious greenhouse potential. When N₂O emissions of traditional farming and organic farming are compared, the emission of organic farming is found to be 40% lower [6].

When viewed from a health standpoint, organic foods may contain phytochemicals at higher levels. They usually contain lesser amounts of insecticides, nitrates, animal drugs and food additives. Also, potentially harmful technologies such as genetic engineering or radiation therapy are not allowed in organic food processing. However, artificial colorants, sweeteners, stabilizers and flavor enhancers are not found in organic foods [6].

When organic food is culturally viewed, consumers consider organic foods as having a more intense flavor. However, organic agriculture often meets the growing needs of the naturalness of the consumer [6]

Farmers need additional training to be able to do organic farming. In addition, organic products are sold in higher prices than other products [6].

4.5 FAIR TRADE PRODUCTS

Fair trade products lead to higher incomes for producers in low-income countries. Local farmers need fair and stable prices to cover their costs. The fair trade system increases planning security due to long-term guaranteed purchases and prepayments. The reduction in the intermediary trade provides reduction in costs. The global concentration process at large companies in the fields of agriculture, processing and retailing is a big problem for small and medium sized enterprises. Because they can not compete with low prices. Fair prices will contribute to the livelihoods of rural residents and create new business areas. Fair trade usually involves environmental requirements such as reducing chemicals, afforestation or drinking water protection in producer countries. In low-income countries, improved health and safety measures implemented in fair trade standards also reduce the risk of exposure to potentially harmful pesticides [6].

4.6. SOURCE SAVING HOUSEHOLD

Switching to renewable energy instead of using coal, natural gas and nuclear energy: Production, processing and marketing, cooling, cooking, dishwashing or use of electrical appliances require a lot of energy. Electricity generated by fossil energy, such as coal, petrol or natural gas, produces high levels of greenhouse gases. Energy production with renewable energy is generally more climate friendly and safe [6].

Saving energy in the kitchen: In addition to energy use from renewable sources, energy efficient appliances are required. In Europe, there are labels for devices ranging from A +++ for high efficiency to G for low efficiency. These labels provide information on energy and water consumption [6].

5.SUSTAINABILITY, DIET CHANGE AND THE ROLE OF DIETITIANS

For most people in the western world, it's unlikely that red meat will completely be removed from the diet. Because consumption of such kind of products gives people a great deal of pleasure [81].

Nutritional changes for healthier meat consumption are expected to reduce greenhouse gas emissions in half. However, meat consumption accounts for only 15-25% of the required emission target. This target also should include emissions from other activities such as housing, transport, as well as dairy products that lead to greenhouse gas emissions [10]. In Europe, a parallel decrease in livestock production is expected by reducing the consumption of meat, eggs and milk [26].

In plant-based dietary scenarios, meat is usually replaced by unprocessed foods such as legumes, cereals, bread, cucumbers, vegetables, fruit, nuts and seeds. Vegetarian diets are generally characterized by a higher proportion of these food groups. However, processed plant-based meat substitutes such as tofu, tzai and tempeh increase the diversity in modern plant-based diets [81, 120]. The environmental impact of such processed meat substitutes used in vegetarian feeding has been explored only to a limited extent until now. The results demonstrate that these products require relatively higher energy due to the higher degree of processing, and the climate and general environmental impact may be lower compared to most meat products [120].

For some segments of consumers, meat-free food may be preferred for meals. In fact, many campaigns can be launched on this subject. Global Non-meaty Monday might be an example of this [120]. Another strategy to encourage dietary changes is to focus on the amount of meat per serving [121]. With these strategies, consumption of smaller portions of meat pieces or smaller meat and more vegetable protein can be encouraged [87].

Findings in studies show that a significant number of consumers are motivated internally to change their behavior in a responsible way. Parallel to this motivation, there must be considerations about how meaningful it is to contribute to the environment than to regard it as "sacrificing themselves" while changing their behavior. Nevertheless, participants who were serious about climate change did not see the option of eating less meat as a significant opportunity to help with the reduction process. One

reason for this is that the link between eating meat and climate change is too vague and too complicated to increase the sense of urgency of people [122, 123]. Another reason is the perception that "livestock production" may be a less important cause of climate change than "people who use their cars" [124].

The dietician is the professional group of health professionals who are required to inform the public about healthy food choices and who are required to give advice on sustainable food choices as part of this information [125]. If the dietitians are authorized in food and nutrition in countries, diet education should include the ecological, political, social and economic impacts of a healthy diet. Public health tendencies and medical expenses are a reflection of livability. The sustainability of the food system and the adoption of an ecological approach to nutrition can improve the health of the nation and the world [126].

From ecological perspective: Inputs are used in ways that conserve, regenerate or enhance natural resources, and genetic biodiversity should be preserved. Renewable energy sources should be used. However, waste should be limited and recycled [127].

From social perspective: The distribution of resources should be equitable. The food system should not exploit anyone or anything. Food should be produced to benefit human health, be culturally acceptable, and economically accessible. The system should function with regard for future generations [127].

From economical perspective : The food system should support the livelihood of families. It should contribute to the local economic developments. No one should have a disproportionate share of economic control over food production, transformation, distribution, access or consumption [127].

Food choices not only affect people's health directly, but also deeply influence the health of our world [126]. Healthy soil is at the center of all living things. Plants depend on the soil for their nutrients. And animals and humanbeings depend on healthy plants. Healthy soil provides clean water and air [126].

Biodiversity is the diversity of life on Earth, including genes, species, populations and ecosystems [128]. Biodiversity is often used as a measure of the health of biological systems [129]. In terms of the food system, biodiversity is a part of the natural resource basis that deeply impacts food supply [126]. The following examples illustrate the severe degradation of biodiversity within the food system.

- 1) According to the Living Planet Report, there has been a 31% decline in terrestrial species, a 27% decline in marine species, and a 28% decline in freshwater species since 1970 [126].
- 2) Only 12 plant species provide approximately 75% of the world's total food supply, and only 15 mammals and birds account for 90% of global livestock production [126].
- 3) In 2006, up to 70% of native bee loss was reported in approximately 24 states. Although the cause of the Collapse Deterioration of the Colon is not yet determined, it can significantly affect the plants that depend on pollination. For example, about 80% of plants cultivated as crops in the European Union depend on pollination. Researchers predicted that 33% of the diet consisted of food depending on pollination [130].

Food diversity and quality in human nutrition is decreasing as the ecosystem has been destroyed in unprecedented proportions and biodiversity of natural resources and agricultural products has decreased due to genetic erosion and pollution. The task of dietitians is to encourage as much as possible species diversity in the diet so that essential nutrients are consumed in sufficient quantities for optimal health [126].

Dietitians can develop sustainable diets that contribute to human health, support local agriculture, protect natural resources, minimize solid wastes. Dietitians' roles in supporting sustainable food systems are:

- 1) Diet Guidance: Dietitians are the key points in the consumption sector of the sustainable food system. They have the potential to affect food choices, mindscapes, food behavior, participation in local and global food system of the patients [131].
- 2) Community Nutrition: Dietitians can contribute to local food systems by working on food projects linking local producers and consumers. Examples include from farm-to-school projects, community-supported farms project, and farmers' market nutrition education project [131].
- 3) Research and teaching: Educator dietitians can include concepts of sustainable food systems in university lectures, internships, and research agendas [131].
- 4) Food supply: The supply, preparation and presentation of sustainable foods in hospitals, schools, restaurants and other facilities play an important role in distribution, access and consumption of the sustainable food system [131].

- 5) Institutional Practices and Policy: Dietitians working for food companies are effective in the development of sustainable products, efficient use of raw materials in terms of energy, providing useful information about labels to consumers, and directing nutrients to food banks or foods [131].

5. MATERIAL AND METHOD

The research was conducted at Yeditepe University Faculty of Health Sciences (Nutrition and Dietetics Department, Physiotherapy and Rehabilitation Department and Nursing Department). Approval of the Ethics Committee of the study was taken from İstanbul Yeditepe Hospital on 15.02.2018 (Appendix 1) .

Between March 2018 and April 2018, students studying at Yeditepe University Faculty of Health Sciences (Nutrition and Dietetics Department, Physiotherapy and Rehabilitation Department and Nursing Department) constitute the universe of the study. The research was conducted with 310 people who agreed to participate in the study. 276 of the participants are female, 34 are male. Participants are between the ages of 18-25.

Data Form for Information on “Animal and Plant-Based Diets” was used to collect the data of the study. The informed Volunteer Consent Form has been read and signed before filling out the data form for volunteers who agree to participate in the study (Appendix 2). This form of information includes the name, surname, age, gender, grade and the department of the participant, marital status, the place of residence, country of origin, reasons for choosing animal-based and plant-based products, how often they consume these products, protein quality of these products, and questions about ecological effects of animal based and plant based diets (Appendix 3).

Data Form for Animal-based and plant-based diets was conducted between March 2018 and April 2018 at Yeditepe University Faculty of Health Sciences.

This study was performed using statistical data analysis program called IBM SPSS Statistics 24. Frequency tables and descriptive statistics were also used in the interpretation of findings.

In the analysis of the relations between two qualitative variables, " χ^2 -cross tables" were used according to the expected value levels (Pearson, Yates-continuity correction). Significance in the study was accepted as $p < 0.05$.

6. FINDINGS

DEMOGRAPHIC FINDINGS

It was determined that, 92 (92%) of the survey participants were under 20, 182 (58.7%) were between 21-22 , 36 (11.6%) were over 23 years of age, and the mean age of the participants was $21,16 \pm 1.22$ (years). 116 of the participants (37.4%) who participated in the study, were in Nutrition and Dietetics Department; 119 (38.4%) in Physiotherapy and Rehabilitation Department and 75 (24.2%) in the Nursing Department. 41 students (13,2) were freshmen, 104 students (33,5) were sophomores, 164 students (52,9%) were third graders and one student was a final year student (0,3%). 276 participants (89.0%) were females and 34 participants (11.0%) were males. 309 participants (99.7%) were single and 1 (0.3%) was married. It was stated in the table 7.1 that 193 participants (44,8%) live with their familieis, 116 (37,4%) live in the student houses and 55 (17,8%) in the dormitories.

Table 7.1. Distribution of findings related to research

Variable (N=310)	n	%
Age [$\bar{X} \pm S.S. \rightarrow 21,16 \pm 1,22$ (yıl)]		
20 years and below	92	29,7
21-22 years	182	58,7
23 years and over	36	11,6
Department		
Dietetics	116	37,4
Physiotherapy and Rehabilitation	119	38,4
Nursing	75	24,2
Grade		
Freshmen	41	13,2
Sophmores	104	33,5
3rd Graders	164	52,9
Final Year	1	0,3
Gender		
Female	276	89,0
Male	34	11,0
Marital Status		
Married	1	0,3
Single	309	99,7
Place of Residence		
Family	193	44,8
Students house	116	37,4
Dormitory	55	17,8

As seen in Table 7.2, 303 people (97.7%) who participated in the study had a mixed eating pattern. 197 (63.5%) of the participants responded the question of healthy eating pattern as animal-based, while 113 (36.5) of them responded the same question as plant-based products. As the reason for choosing animal-based products, 197 participants (%63,5) stated that they were healthy, 63 participants (%20,3) said that they like the taste of animal-based products, 34 participants (%11) stated that they did not feel satiety when eating other products, and 16 participants (%5,2) stated that it was a family habit. 7 of the participants (2.3%) stated the reason for preferring plant-based products because they are popular, 112 (%36,1) for weight control, 156 (%50,3) because they like the taste, 35 (%11,3) because it's a family habit. Of the 170

participants (56.1%) who participated in the study, it was determined that the most commonly consumed meat group was chicken. It was found that 223 participants (73.6%) consumed their preferred meat products most frequently several times a week and that 300 participants (96.8%) consumed animal milk as dairy products. It was determined that 255 participants (82.3%) did not consume meat substitutes such as soybean, 222 participants (71.6%) consumed nutrients such as legumes and cereals a few times a week. In terms of protein quality, 291 (93.9%) of the participants believed that animal-based products are richest and 19 (6.1%) believed that plant-based products are richest in protein. It was reported that 206 participants (66,5%) prefer meat products, 37 people (11,9%) preferred dairy products and 67 people (21,6%) preferred egg as rich animal-based protein supply.

Table 7.2. Distribution of findings related to research

Variable (N=310)	n	%
Diet Pattern		
Mixed Feeding	303	97,7
Vegetarian	7	2,3
Vegeterian subclass		
Lakto	2	28,6
Ova	1	14,3
Lakto – Ova	4	57,1
Healthy eating Pattern		
Animal-based	197	63,5
Plant-based	113	36,5
Reason for preferring animal-based products		
Considering as healthy	197	63,5
Like the taste	63	20,3
Not feeling sense of satiety	34	11,0
Family factors	16	5,2
Reason for preferring plant-based products		
Being popular	7	2,3
Weight control	112	36,1
Like the taste	156	50,3
Family habit	35	11,3
Most frequently consumed meat group		
Red meat	118	39,1
Chicken	170	56,1
Fish	15	5,0
Frequency of the most consumed meat products		
Every day	57	18,8
Several times a week	223	73,6
Several times a month	23	7,6

Preference of diary products consumption		
Animal milk	300	96,8
Plant milk	10	3,2
Consumption of meat substitutes like soybean		
Yes	55	17,7
No	255	82,3
Consumption of food items like Legumes, cereals		
Every day	43	13,9
Several times a week	222	71,6
Several times a month	45	14,5
The richest food in protein		
Animal-based	291	93,9
Plant-based	19	6,1
Animal-based food that is richer in protein		
Meat products	206	66,5
Dairy	37	11,9
Egg	67	21,6

As it can be seen in the Table 7. 3, in terms of protein contents; 57 of the participants (18.4%) said soybeans, 200 participants (64.5%) said legumes, 10 participants (3.2%) said bulghur(cracked wheat), 21 participants (6.8%) said kinoa, 22 participants (7,1%) said chia seeds are the richest plant-based products in protein. 181 participants(61.0%) supported the idea that the foods they consumed were not harmful to nature, and 121 people (39%) supported the idea that the foods they consumed harmed nature. It was determined that 242 participants (79.7%) preferred animal-based products that cause more harm to the environment. 168 participants (55.3%) claimed cattle, 31 participants (10.2%) claimed sheep, 45 participants (24.8%) claimed chickens, 60 participants (19.7%) claimed fish to be animals with the largest environmental impact of the animal-based products. In terms of protein sources, 177 participants (58.2%) stated animal milk, 177 (24.0%) stated cheese, and 54 (17.8%) stated eggs to be environmentally harmful products. It is stated that 202 participants (67,3%) chose rice, 22 participants (7,4%) chose bulghur, 76 participants (25,3%) chose legumes as harmful plant-based product. It was determined that 206 participants (66.5%) could change the way of feeding for less harm to nature. It was determined that 128 participants (71.2%) believed that the eating pattern to be preferred for less harm to the nature was plant-based.

Table 7.3. Distribution of findings related to research

Variable (N=310)	n	%
Plant-based product richer in protein		
Soybeans	57	18,4
Legumes	200	64,5
Bulghur	10	3,2
Kinoa	21	6,8
Chia	22	7,1
Consumed foods' damage to the nature of		
Yes	121	39,0
No	189	61,0
Products that cause more damage to nature		
Animal-based	242	79,7
Plant-based	63	20,3
Environmentally more harmful meat group products		
Cattle	168	55,3
Sheep	31	10,2
Chicken	45	14,8
Fish	60	19,7
Environmentally harmful protein sources		
Cheese	73	24,0
Animal milk	177	58,2
Egg	54	17,8
Environmentally more harmful plant-based product		
Rice	202	67,3
Bulghur	22	7,4
Legumes	76	25,3
Change of diet for less harm to nature		
Yes	206	66,5
No	104	33,5
Eating pattern that should be preferred for less harm to the nature		
Animal-based	63	20,6
Only herbal	25	8,2
Plant based	128	71,2

A statistically significant relationship was found between the healthy eating pattern and the choice of the richest food group in terms of protein quality ($\chi^2 = 5,064$, $p = 0,024$). It has been determined that 190 (96.4%) of the participants who think that healthy eating pattern is animal-based, regard animal-based products as the richest in terms of protein quality. It was determined that 12 participants (10.6%) who think that healthy eating pattern is plant-based, consider plant-based products as the richest in terms of protein quality.

There is no statistically significant relationship between the healthy eating pattern and animal and plant-based products that are richer in terms of protein quality and animal and plant-based products that are more harmful to nature in terms of protein($p > 0,05$).

A statistically significant relationship was detected between the healthy eating pattern and the choice of food group that causes more harm to the nature ($\chi^2 = 11,286$; $p = 0.001$). It has been found that 142 participants(73,2%), whose choice of healthy eating pattern was animal-based, selected food product that harms the nature more as animal-based products; and 52 participants (26,8%) stated that plant-based products are more harmful to the nature.

A statistically significant relationship was found between the healthy eating pattern and environmentally more harmful meat group products. . ($\chi^2 = 12,757$; $p = 0,005$). It was found that 95 participants (49.0%) who chose animal-based products as the healthy eating pattern, regard cattle; and 38 (19,5%) of them regard fish products more harmful. It was found that 6 (5.4%) participants who selected plant-based diet as the healthy eating pattern, regard sheep, and 9 (8.2%) participants regard poultry products as less harmful.

A statistically significant relationship was found between the healthy eating pattern and the selection of the food group to be preferred for less harm to the nature ($\chi^2=25,490$; $p=0,000$). It has been determined that 57 participants (29.2%) who chose animal-based products to be preferred for less harm to the nature, chose animal-based diet as the healthy eating pattern. It has been determined that 13 participants (11.7%) who marked the product to be preferred for less harm to the nature as only herbal products, chose plant-based diet as the healthy eating pattern (Table 7.4.)

Table 7.4. Investigation of some findings related to research

Variable (N=310)	Healthy Eating Pattern			Statistical analysis * Probability
	Animal-based	Plant-based	Total	
The richest in terms of protein quality				
Animal-based	190(%96,4)	101(%89,4)	291 (%93,9)	$\chi^2=5,064$ p=0,024
Plant-based	7 (%3,6)	12 (%10,6)	19 (%6,1)	
Animal-based products richer in protein				

Meat products	137 (%69,5)	69 (%61,1)	206 (%66,5)	$\chi^2=2,812$
Milk	23 (%11,7)	14 (%12,4)	37 (%11,9)	$p=0,245$
Egg	37 (%18,8)	30 (%26,5)	67 (%21,6)	
Plant-based products richer in protein				
Soybean	31 (%15,7)	26 (%23,0)	57 (%18,4)	$\chi^2=6,875$
Legume	125(%63,5)	75 (%66,5)	200 (%64,5)	$p=0,143$
Bulghur	7 (%3,6)	3 (%2,7)	10 (%3,2)	
Kinoa	17 (%8,6)	4 (%3,5)	21 (%6,8)	
Chia	17 (%8,6)	5 (%4,3)	22 (%7,1)	
The kind of food that gives more harm to the nature				
Animal-based	142(%73,2)	100(%90,1)	242 (%79,3)	$\chi^2=11,286$
Plant-based	52 (%26,8)	11 (%9,9)	63 (%20,7)	$p=0,001$
Environmentally more harmful of the meat group products				
Cattle	95 (%49,0)	73 (%66,4)	168 (%55,3)	$\chi^2=12,756$
Sheep	25 (%12,9)	6 (%5,4)	31 (%10,2)	$p=0,005$
Chicken	36 (%18,6)	9 (%8,2)	45 (%14,8)	
Fish	38 (%19,5)	22 (%20,0)	60 (%19,7)	
More harmful to nature in terms of protein				
Cheese	53 (%27,5)	20 (%18,0)	73 (%24,0)	$\chi^2=5,347$
Animal milk	103(%53,4)	74 (%66,7)	177 (%58,2)	$p=0,069$
Egg	37 (%19,1)	17 (%15,3)	54 (%17,8)	
Plant-based product more harmful to the nature				
Rice	127 (%66,5)	75 (%68,8)	202 (%67,3)	$\chi^2=0,271$
Bulghur	15 (%7,9)	7 (%6,4)	22 (%7,3)	$p=0,873$
Legume	49 (%25,6)	27 (%24,8)	76 (%25,4)	
The product that should be preferred for less harm to the environment				
Animal-based	57 (%29,2)	6 (%5,4)	63 (%20,6)	$\chi^2=25,490$
Only Herbal	12 (%6,2)	13 (%11,7)	25 (%8,2)	$p=0,000$
Plant based	126(%64,6)	92 (%82,9)	218 (%71,2)	

*In the investigation of relations between two qualitative variables " χ^2 -cross tables" were used according to their expected value levels.

Table 7.5. Investigation of some findings related to research

Variable (N=310)	Eating Pattern that causes more harm to the nature			Statistical analysis * Probability
	Animal-based	Plant-based	Total	
Environmentally more harmful meat group products				
Cattle	151 (%62,7)	17 (%27,0)	168 (%55,3)	$\chi^2=26,332$ p=0,000
Sheep	19 (%7,9)	12 (%19,0)	31 (%10,2)	
Chicken	30 (%12,4)	15 (%23,8)	45 (%14,8)	
Fish	41 (%17,0)	19 (%30,2)	60 (%19,7)	
More harmful to nature in terms of protein sources				
Cheese	54 (%22,5)	19 (%30,2)	73 (%24,1)	$\chi^2=3,579$ p=0,167
Animal milk	146(%60,8)	30 (%47,6)	176 (%58,1)	
Egg	40 (%16,7)	14 (%22,2)	54 (%17,8)	
Plant-based product more harmful to the nature				
Rice	162(%68,3)	40 (%63,5)	202 (%76,3)	$\chi^2=1,013$ p=0,603
Bulghur	18 (%7,6)	4 (%6,3)	22 (%7,3)	
Legume	57 (%24,1)	19 (%30,2)	76 (%25,4)	
The product to prefer for less harm to the nature				
Animal-based	35 (%14,5)	28 (%45,2)	63 (%20,8)	$\chi^2=28,760$ p=0,000
Only Herbal	23 (%9,6)	2 (%3,2)	25 (%8,2)	
Plant based	183(%75,9)	32 (%51,6)	215 (%71,0)	

*In the investigation of relations between two qualitative variables " χ^2 -cross tables" were used according to their expected value levels.

Statistically, there is no significant relationship between the eating pattern that causes more harm to the nature and the animal and plant-based products that are more harmful to nature in terms of protein ($p > 0,05$).

As shown in Table 7.5, there is a statistically significant relationship between the eating pattern that causes more harm to the nature and the environmentally more harmful meat group products ($\chi^2 = 26,332$; $p = 0,000$). It was determined that 151 participants (62.7%) who think that cattle products are the meat group products that have the greatest harm to the nature, indicated that the most harmful eating pattern is animal-based diet. It was determined that 12 participants (19.0%) who think that sheep

products are the meat group products that do more harm to the nature indicated that the most harmful eating pattern to the nature is plant-based diet.

There is a statistically significant relationship between the eating pattern that is more harmful to nature and the eating pattern that should be preferred for less harm to nature (n = 28,760; p = 0,000). The participants who think that the product that should be preferred for less harm to the environment is only herbal, or plant based, at a very high rate state that the most harmful eating pattern to the nature is animal-based diet. It was stated that 28 participants (45.2%) who think that animal-based products should be preferred for less harm to the nature regard plant-based products to be more harmful to the nature. (Table 7.5).

Table 7.6. Investigation of some findings related to research

Variable (N=310)	Gender		Total	Statistical analysis * Probability
	Female	Male		
Foods that cause more harm to the nature				
Animal-based				
Plant-based	223(%81,7)	19 (%59,4)	242 (%79,3)	$\chi^2=8,699$ p=0,003
	50 (%18,3)	13 (%40,6)	63 (%20,7)	
Environmentally more harmful meat group product				
Cattle	158 (%58,1)	10 (%31,3)	168 (%55,3)	$\chi^2=19,906$ p=0,000
Sheep	21 (%7,7)	10 (%31,3)	31 (%10,2)	
Chicken	41 (%15,1)	4 (%12,4)	45 (%14,8)	
Fish	52 (%19,1)	8 (%25,0)	60 (%19,7)	
More harmful to nature in terms of protein sources				
Cheese	64 (%23,4)	9 (%29,0)	73 (%24,0)	$\chi^2=0,482$ p=0,786
Animal milk	160(%58,7)	17 (%54,8)	177 (%58,2)	
Egg	49 (%17,9)	5 (%16,2)	54 (%17,8)	
Plant-based product more harmful to the nature				
Rice	184(%68,4)	18 (%58,1)	202 (%67,3)	$\chi^2=1,884$ p=0,390
Bulghur	20 (%7,4)	2 (%6,4)	22 (%7,3)	
Legume	65 (%24,2)	11 (%35,5)	76 (%25,4)	
Change of eating pattern for less harm to the nature				
Yes	191(%69,7)	13 (%38,2)	204 (%66,2)	$\chi^2=13,396$ p=0,000
No	83 (%30,3)	21 (%61,8)	104 (%33,8)	

*In the investigation of relations between two qualitative variables "χ²-cross tables" were used according to their expected value levels.

As it can be seen in Table 7.6., There is no statistically significant relationship between animal and plant-based products which are more harmful to nature in terms of gender and protein (p> 0.05).

A statistically significant relationship was found between gender and the type of food that is more harmful to the nature (χ² = 8,699; p = 0.003). It was determined that 223 women (81.7%) and 19 men (59.4%) participating in the survey thought that animal-based products cause more harm to the nature .

A statistically significant relationship was detected between gender and environmentally more harmful meat group product (χ² = 19,906; p = 0,000). It was determined that 158 women (58.1%) participating in the survey think products of cattle meat , and 10 men (31.3%) think products of both cattle and sheep are more harmful to the nature. (Table 7.6)

A statistically significant relationship was found between gender and change of eating pattern status for less harm to nature (χ² = 13,396; p = 0,000). It was determined that 191 women participating in the survey (69.7%) could support this change and 21 men (61.8%) would not.

Table 7.7. Investigation of some findings related to research

Variable (N=310)	Department			Total	Statistical analysis * Probability
	Dietetics	Physiotherapy and Rehabilitation	Nursing		
Nutrition that is more harmful to the nature					
Animal-based	100(%87,0)	85(%73,9)	57(%76,0)	242(%79,3)	χ ² =6,648 p=0,036
Plant-based	15 (%13,0)	30(%26,1)	18(%24,0)	63 (%20,7)	
Environmentally more harmful meat group product					
Cattle	67 (%58,3)	58(%50,9)	43(%57,3)	168(%55,3)	χ ² =11,811 p=0,066
Sheep	5 (%4,3)	20(%17,5)	6 (%8,0)	31 (%10,2)	
Chicken	19 (%16,5)	14(%12,3)	12(%16,0)	45 (%14,8)	

Fish	24 (%20,9)	22(%19,3)	14(%18,7)	60 (%19,7)	
Product more harmful to the nature in terms of protein sources					
Cheese	23 (%20,2)	33(%28,7)	17(%22,7)	73 (%24,0)	$\chi^2=4,351$ p=0,361
Animal milk	74 (%64,9)	61(%53,0)	42(%56,0)	177(%58,2)	
Egg	17 (%14,9)	21(%18,3)	16(%21,3)	54 (%17,8)	
Plant-based product more harmful to the nature					
Rice	77 (%67,5)	76(%68,5)	49 (%65,3)	202 (%67,3)	$\chi^2=1,358$ p=0,851
Bulghur	7 (%6,2)	10 (%9,0)	5 (%6,7)	22 (%7,3)	
Legume	30 (%26,3)	25(%22,5)	21 (%28,0)	76 (%25,4)	
Change of eating pattern for less harm to the nature					
Yes	81 (%70,4)	73(%61,9)	50 (%66,7)	204 (%66,2)	$\chi^2=1,921$ p=0,383
No	34 (%29,6)	45(%38,1)	25 (%33,3)	104 (%33,8)	

*In the investigation of relations between two qualitative variables " χ^2 -cross tables" were used according to their expected value levels.

As shown in Table 7.7, there is a statistically significant relationship between the departments and environmentally more harmful nutritions ($\chi^2=6,648$;p=0,036). It was found that 100 participants (87.0%) who think that animal-based products are more harmful to the nature are in Dietetics Department, and 30 participants (26.1%) who think that plant-based products are more harmful to the nature are in the Physiotherapy and Rehabilitation Department.

7. DISCUSSION

The research was conducted on 310 participants studying at Yeditepe University Faculty of Health Sciences Nutrition and Dietetics Department, Physiotherapy and Rehabilitation Department and Nursing Department in March-April 2018, to determine their behaviours and opinions about Plant-based and animal-based diets and the data obtained were evaluated.

It was determined that 182 of the 310 participants were in the 21-22 age group and the mean age of the participants was 21.16 ± 1.22 (years). It was determined that 276 (89.0%) of the participants were female and 34 (11.0%) were male. The participants' being women in majority, is related to the fact that the number of female students studying at the Faculty of Health Sciences is higher than male students.

It was stated that 303 of the participants (97.7%) who attended the study had mixed nutrition style, and 7 participants (2.3%) were vegetarians. As a reason for this, western diet can be addressed as it is widespread in our country. Among the vegetarians, 4 (57.1%) were detected to be in the Lacto – Ova subclass of vegetarianism. The widespread use of lacto-ova diet can be attributed to the consumption of milk and dairy products as well as the consumption of eggs, which is more common in our country and easier to apply. It was seen that 255 participants (82.3%) joining the study did not consume meat substitutes like soybean. Several studies investigating consumer acceptance of alternatives to environmental sustainability have shown that the majority of the consumers are not willing to prefer meat substitutes (such as soy) [132-134]. Situations such as the lower sensory appealings of these products are described as critical obstacles of consumer acceptance [132, 133].

It was determined that 197 participants (63.5%) stated the reason for choosing animal-based products because they are healthier. Animal-based products contain high levels of protein in high biological value and high amounts of saturated fatty acids, as well as significant amounts of micronutrients [88]. As noted in Schönfeldt et al.'s work, the dietary contribution of products obtained from animals can be beneficial or harmful [88]. The role of meat in healthy diet is not clear. In many healthy nutrition perception, meat consumption is required to be limited. In a study conducted in Canada, participants

were reported to try to limit the intake of meat, particularly red meat, to redirect healthy eating by replacing red meat with chicken or fish [135].

Of the 170 participants (56.1%) who participated in the study, it was determined that chicken meat was the most commonly consumed meat group . As the reason for this, it can be said that prices of red meat in our country is rather high and purchasing power is lower compared to chicken meat. In addition, since the study was conducted on university students, it can also be associated with the fact that chicken is served more often than red meat in the cafeteria of the university.

It was determined that dairy product preference of 300 participants (96.8%) was animal milk. As stated by Güler in her study of Culinary Culture and Eating and Drinking Habits (Mutfak Kültürü ve Yeme İçme Alışkanlıkları) the formation of Turkish food culture dates back to the Central Asian Turks. Sheep and dairy products are among the basic nutrients of ancient Turks. Sheep, goat and cattle are used for milk production [136]. Preference of animal milk which is an ancestral habit, is related to Turkish eating and drinking taste and culture.

It was determined that 291 of the participants (93.9%) thought that the richest nutritional product in terms of protein quality was animal-based products, and 206 of them (66.5%) preferred meat products as richer protein sources. In a conference about "excessive and inadequate nutrition: challenges and approaches"it was directly related to the amount of protein intake and protein quality of animal-based products. However, it has been reported that meat products contain all the amino acids such as lysine, isoleucine, valine, threonine; and amino acid scores of animal-based proteins are very high [90]. According to De Boer, Helms and Aiking, the premier protein source of Europe is meat [106]. Also, PDCAAS is 0.92 for beef and 1.00 for eggs and milk [111]. According to the PDCAAS value, black bean is 0.75 while soy is 1.00 [111]. Among the plant-based proteins, soy is the richest in terms of protein quality. In addition, animal metabolism uses an average of 6 kg of plant-based protein to produce 1 kg of meat protein; which means that only 15% of the protein in the feed crops is converted to food for human consumption, and 85% is spent in this process [137].

It was shown in the survey that 189 participants (61.0%) suggested the notion that the products they consume did not harm the nature, 242 participants (79.7%) stated that animal-based products are more harmful to the nature. Recent reports by the Pew Commission for the United Nations (2006) and Industrial Livestock Production (2008) have shown that livestock cause more global warming, by 40% , than all transport

combined[138]. The United Nations report has described the livestock industry as one of the most important causes of various environmental problems such as biodiversity loss, water shortage and pollution [138]. Ulaszewska et al. reported in their study that factors such as greenhouse gas, land use, water pollution during food production adversely affect the environment. In the same study, it was also stated that eating habits of the consumers increase the environmental effects of food production [3]. In addition, according to LCA studies, the greenhouse effect of grains, legumes, soy, fruit and vegetables is lower than that of red meat, chicken, fish and dairy products [29].

It was determined that 168 of the participants (55.3%) stated that animals who have the greatest harm to the environment are cattle, 177 participants (58.2%) stated animal milk as the most harmful animal-based protein source for the nature. Cattle beef is the product with the highest greenhouse effect among all the animal-based products, [52]. De Vries and De Boer reported in their studies that higher use of soil and energy is required for the production of 1 kg of beef, than for production of 1 kg of pork, eggs and milk [74]. Schiessl and Schwagerl have shown in their study that those who eat meat contribute 7 times more to greenhouse gas emissions than vegans [139]. In Carlsson-Kanyama et al.'s study of carbon dioxide, methane and nitrogen oxide emissions from farm to table for 22 commonly consumed products in Sweden, the total CO₂, NO₂ and CH₄ equivalents of cheese were found to be 11 and 1.00 for milk [63]. It was determined that 202 participants (67.3%) chose rice to be the plant-based product which causes more harm to the nature. The CH₄ gas is released when it is resolved from the rice grown under water conditions [27]. CH₄ emissions of most of the plant-based products are very low, except for rice [72].

A statistically significant relationship was detected between the healthy eating pattern and the choice of the richest food group in terms of protein quality ($\chi^2 = 5,064$, $p = 0,024$). It has been determined that 190 of the participants (96.4%) who think that animal-based diet is the healthy eating pattern, also think that animal-based products are the richest in terms of protein quality. It was determined that 12 participants (10.6%) who think that plant-based diet is the healthy eating pattern, also think that plant-based products are the richest in terms of protein quality. The Pew Commission for Industrial Livestock Production has announced the issue of a number of public health problems caused by meat production and consumption. Meat production exposes us to a number of adverse health conditions such as increasing the potential for pathogenic and transmissible disease transmission, increasing the risk of foodborne infections, non-

therapeutic antimicrobial use and increasing resistance [138]. Multidrug resistance in the bacterium can be caused by the fact that antibiotics are widely used in animal production. Foodborne epidemics and exposure of humans to dioxins and exogenous hormones are often associated with intensive meat production [140].

It has also been stated in a conference on Sustainable Food Consumption that excessive meat consumption can lead to obesity, diabetes, cardiovascular diseases and cancer [81]. As mentioned in the conference on "sustainable food consumption", plant-based products have a much more positive contribution to health than animal-based products, due to the high levels of complex carbohydrates, and low levels of saturated fat, cholesterol and purine content [6]. As stated by Rogerson in his study, cardiovascular disease, hypertension, type 2 diabetes, cholesterol and cancer are less common in vegans [91].

There is no statistically significant relationship between the healthy eating style and animal and plant-based products that are richer in protein and animal and plant-based products which are more harmful to nature in terms of protein ($p > 0,05$).

A statistically significant relationship was found between the healthy eating style and preference for food group that is harmful to the nature. ($\chi^2 = 11,286$; $p = 0.001$). It has been determined that 142 participants (73.2%), whose healthy eating pattern is animal-based, chose animal based-products as harmful to nature, and 52 participants (26.8%) stated the notion that plant-based products cause more harm to the nature.

A statistically significant relationship was detected between healthy eating pattern and choice of food group for less harm to the nature ($\chi^2 = 25,490$; $p = 0,000$). It has been determined that 126 participants (64.6%) who responded the products to be preferred for less harm to the nature as plant-based products, chose the healthy eating pattern as animal-based. It has been determined that 13 participants (11.7%) who chose only herbal for the products to prefer for less harm to the nature, also chose plant-based diet for healthy eating pattern.

There is a statistically significant relationship between the eating pattern that causes more harm to the nature and products to be preferred for less harm to the nature, ($\chi^2 = 28,760$; $p = 0,000$). Those who think that the products to be preferred for less harm to the nature are only herbal products or plant-based products, in grate rate, have marked animal-based products to be more harmful to the nature. The questions assessed in this section used positive and negative statements of similar questions to determine whether the participants would respond consistently. As a result of the evaluation, the

participants gave consistent responses that gave statistically significant results. Westhoek et al. in their study of switching 25-50% of animal-based products with plant-based products in European Union to examine effects on the basis of dietary energy, have found that reducing the consumption of meat, dairy products and eggs by half, provides significant benefits both in terms of environment and health. It has been observed that there were decreases in nitrogen emissions by 40 % and in greenhouse emissions by 25-40%. In the same study there was a 40% reduction in saturated fat intake which would lead to a decrease in cardiovascular mortality. As a result of the work, it is expected that such a dietary change will have a substantial improvement in both air and water quality in the European Union [26].

A statistically significant relationship was found between the healthy eating pattern and the environmentally more harmful meat group product ($\chi^2 = 12,757$; $p = 0,005$). It was found that 95 participants (49.0%) whose healthy eating pattern is animal-based and 73 participants (66.4%) whose healthy eating pattern is plant-based regard cattle as more harmful to the nature. Beef production has impacts such as climate change, acidifying and consumption of natural resources [82]. While milk production produces less greenhouse effect compared to beef production, land and water use is greater than egg, poultry and pork production. Reducing beef consumption and preferring plant-based products instead of beef could reduce the greenhouse effect by 35% [53].

There is a statistically significant relationship between environmentally more harmful eating pattern and environmentally more harmful meat group product ($\chi^2 = 26,332$; $p = 0,000$). It was determined that 151 participants (62.7%) who think that meat group products have the greatest harm to the environment indicated that the most harmful eating pattern was animal-based diet. Hallström et al. found that the most effective way to reduce greenhouse gas effect was the vegan diet. In the study, it was stated that vegan diets reduced the greenhouse effect by 50%. In the same study, it was stated that lacto-ova is second in reducing greenhouse effect among vegetarian diets [38]. In addition, other studies have also indicated that more global-based transition towards plant-based dieting is vital for reducing the ecological footprint of food systems, and for meeting the regulatory capacity of the earth [140].

There is no statistically significant relationship between animal and plant-based product conditions which are more harmful to nature in terms of gender and protein ($p >$

0,05). The reason can be related to the fact that not all of the participants marked the relevant question in the data form used for information.

A statistically significant relationship was found between gender and the type of food that is more harmful to nature ($\chi^2 = 8,699$; $p = 0.003$). 223 female (81,7%) and 19 male(59,4%) participants were found to have the notion that animal-based products cause more harm to the nature. A statistically significant relationship was found between gender and meat group products that are more harmful to the nature ($\chi^2 = 19,906$; $p = 0,000$). 158 female (58.1%) participants thought that products of cattle, and 10 male (31.3%) participants thought that products of both cattle and sheep were more harmful meat group products.

A statistically significant relationship was found between gender and Change of eating pattern status for less harm to the nature ($\chi^2 = 13,396$; $p = 0,000$). It was determined that 191 female (69.7%) participants could support this change and 21 male participants(61.8%) would not support this change. As environmental, personal and ethical concepts for vegetarians become more conspicuous, there is evidence that some of the people eating meat have been interested in this case for the last few years. Harris Poll has stated that 10% of Americans follow a "vegetarian inclined" diet, and 5% will have a "definite interest" in the future after a vegetarian diet [138]. In a survey of 1,046 UK citizens, more than 25% of respondents said that they were thinking of reducing meat consumption. However, less than 25% of those claiming to reduce meat consumption actually do so [141]. Likewise in Denmark, negative attitudes towards meat are increasing, but no changes in the behaviour has been reported. [142]. Chin, Fisak, and Sims found low-level anti-vegetarian feelings in the study with American university students [143]. Gender is an outstanding factor in attitudes towards vegetarianism. Compared to males, females have stronger negative attitudes towards animal use [144].

Although the link between meat and the environmental impact is lacking as a result of the study of the perceptions of the environmental impact of the food system and the willingness to reduce environmental meat consumption with young people at five different schools in Scotland (ages 12-15), during the 2013-2014 period in which a total of 103 participants attended, when provided with this information, participants were still reluctant to consider reducing meat consumption. If the diet needs to be changed to improve health and reduce environmental impacts, cultural, social and personal values around the meat should be accepted and integrated into the scientific

debate on sustainable diets[145]. Gender is generally regarded as a strong indicator of meat consumption and shows that men generally have a higher consumption level than women [140]. Women have more negative attitudes like disgust towards consuming meat compared to men [146, 147]. On the other hand, many men in North America do not think that a meal without meat is a "real" meal [148]. In the world, men consume more meat than women, and in poorer countries women are not given the opportunity to consume meat [138]. Several studies have also shown that consumption of meat is related to male gender. For example, those who consume meat are perceived as more masculine than those who don't [140]. Stibbe's review of six issues related to Men's Health between June and December 2000 has linked the fact that meat, especially red meat, is associated with positive images of masculinity, as one of the characteristics of ideal man, especially with increasing muscle strength [138]. According to Adams' feminist-vegetarian critique, meat consumption is a symbol of patriarchalism stemming from the ongoing alliance with power and masculinity [138].

A statistically significant relationship was found between the Nutrition and Dietetics, Physical Therapy and Rehabilitation and Nursing Departments in terms of food products causing more harm to the nature ($\chi^2 = 6,648$; $p = 0,036$). It was found that 100 participants (87.0%) who are in Dietetic Department think that animal-based products do more harm to the nature, while 30 participants (26.1%) from Physical Therapy and Rehabilitation Department think that plant-based products do more harm to the nature. This result may stem from the fact that information about animal and plant-based eating patterns are referred during the training of the students of the Department of Nutrition and Dietetics .

8. CONCLUSION

It is understood from the resources consulted within the scope of the study people think that animal-based products are useful in terms of health and protein quality. The protein quality of red meat is considerably higher than that of plant-based products. Although legumes are thought to be higher in protein quality among plant based products, the protein quality of soy products is higher. When the information of participants in the study is evaluated, it is concluded that most people think that animal-based products are healthy but these products harm the nature. They are of the same opinion particularly on the notion that cattle harm the nature more. It also states that the harmful effects of plant-based products on the environment are less, and amongst them, rice causes more harm to the environment. Many of the participants say that they can change their eating habits to protect nature and lessen the harm to the environment. It is seen that men are more abstaining in this regard. Cultural influences and lifestyles can be effective in this. Students of Nutrition and Dietetic department are more conscious of the harmful effects of animal-based products on their environment than the students of other departments. Related information they receive during their training can be effective in this.

In short, it is obvious that the plant-based diet is more climate-friendly compared to the omnivorous diet. In order to achieve more sustainable consumption patterns, commitment and action are required throughout the entire food system from producers and retailers to government. It should be known that the concept of "Foodways" being used in the world is important here, and that every stage of food delivery to the consumer is important for sustainability. To have a realistic chance of modifying diet behavior, future guidelines for sustainable diets should take into account modern lifestyles, cultural and social expectations, and the food environment in which food choices are made.

9. RECOMMENDATIONS

The influence of food resource use on the global environment is great. To prevent this, sustainable food consumption should be increased. The complete removal of animal-based products from the diet, that is, the transition to a vegan diet is the greatest factor of reducing the greenhouse gas in the atmosphere. However, in cases where it is difficult to completely switch to a vegan or vegetarian diet due to cultural or personal reasons, it can still be effective on the reduction of the greenhouse effect if we shift to a healthy eating pattern in which animal-based products are reduced and plant-based products are increased. Consumers can be recommended to switch to the Mediterranean diet, where plant-based products are predominant and meat and animal-based products are few. Instead of beef widely used in hamburgers and sausages, proteins derived from the meat substitutes can be used instead of red meat. Another proposal may be to have meatless meal a day. Apart from this, the trend called "meatless Monday" claims that one day a week meatless feeding will be useful for sustainability. In fact, many campaigns can be launched on this issue. One of the other possible strategies to encourage dietary changes is to focus on the portion of the meat at each meal. With these strategies, consumption of smaller portions of meat along with more vegetable proteins can be encouraged. Precautions taken by governments other than individual precautions may be more effective. Governments can create policies and sustainable nutrition guidelines in this regard.

10. REFERENCES

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11. APPENDIX

APPENDIX -1: Ethics Committee Approval Form



T.C. YEDİTEPE ÜNİVERSİTESİ

Sayı : 37068608-6100-15-1447

15/02/2018

Konu: Klinik Araştırmalar
Etik kurul Başvurusu hk.

İlgili Makama (Açelya Gül)

Yeditepe Üniversitesi, Sağlık Bilimleri Fakültesi Beslenme ve Diyetetik Bölümü Yrd. Doç. Dr. Arzu Durukan'ın sorumlu olduğu "**Bir Vakıf Üniversitesi Öğrencilerinin Bitkisel ve Hayvansal Kaynaklı Beslenme ile İlgili Görüşlerinin Belirlenmesi**" isimli araştırma projesine ait Klinik Araştırmalar Etik Kurulu (KAEK) Başvuru Dosyası (**1419** kayıt Numaralı KAEK Başvuru Dosyası), Yeditepe Üniversitesi Klinik Araştırmalar Etik Kurulu tarafından **14.02.2018** tarihli toplantıda incelenmiştir.

Kurul tarafından yapılan inceleme sonucu, , yukarıdaki isimi belirtilen çalışmanın yapılmasının etik ve bilimsel açıdan uygun olduğuna karar verilmiştir (**KAEK Karar No: 808**).

Prof. Dr. Turgay ÇELİK

Yeditepe Üniversitesi
Klinik Araştırmalar Etik Kurulu Başkanı

12. APPENDIX -2: Informed Consent Form

Katılımınızı talep ettiğim bu çalışma, bir araştırmadır.

İstanbul Yeditepe Üniversitesi Sağlık Bilimleri Fakültesinde eğitim görmekte olan öğrencilerin bitkisel kaynaklı beslenmeye yeni kuşakların yaklaşımının belirlenmesi ve bunun sürdürülebilir gıdaya katkısının incelenmesi amaçlı Bitkisel ve Hayvansal Kaynaklı Beslenmeye ilişkin bilgi edinme amaçlı veri formu uygulanacaktır.

Çalışmada kesinlikle yaşadıklarınız (özeliniz) sorulmayacaktır. Genel olarak sürdürülebilir gıda, hayvansal kaynaklı beslenme ve bitkisel kaynaklı beslenme ile ilgili yaklaşımlarınız konuşulacaktır.

Araştırmada alınacak yaş, eğitim durumu gibi bilgiler araştırma kapsamı dışında hiçbir kişiyle kesinlikle paylaşılmayacaktır. Elde edilecek olan bilgiler, Etik Kurul, kurum ve diğer sağlık otoritelerinin orijinal tıbbi kayıtlarına doğrudan erişimleri olacaktır. Fakat, bu gönüllü onam formunun imzalanmasıyla bu bilgiler gizli tutulacaktır.

Bu çalışmaya katılmayı reddedebilirsiniz. Çalışmanın herhangi aşamasında da katılım onayınızdan vazgeçebilirsiniz.

Araştırmaya katılımınız için sizden herhangi bir ücret istenmeyecek ve katılımınız karşılığında size herhangi bir ücret ödenmeyecektir. Sizden beklenen, bilgilendirilmiş onam formunu doldurup, bu araştırmaya katkı sağlamayı kabul ettikten sonra, doldurmanızı talep edilecek olan veri formunun doldurulmasıdır.

Elde edilen veriler ile bitkisel kaynaklı beslenmeye yeni kuşakların yaklaşımının belirlenmesi ve bunun sürdürülebilir gıdaya katkısının incelenmesi hedeflenmektedir.

Danışman: Yrd. Doç. Dr. Arzu DURUKAN
Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü Beslenme ve Diyetetik Bölümü Öğretim Üyesi

Araştırmacı: Dyt. Açelya GÜL
Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü
Beslenme ve Diyetetik Yüksek Lisans Programı öğrencisi
Yeditepe Üniversitesi Beslenme ve Diyetetik Bölüm Asistanı

Bilgilendirilmiş Gönüllü Olur Formundaki tüm açıklamaları okudum. Bana, yukarıda konusu ve amacı belirtilen araştırma ile ilgili açıklamalar, yukarıda adı belirtilen diyetisyen tarafından yapıldı. Araştırmaya gönüllü olarak katıldığımı, istediğim zaman gerekçeli veya gerekçesiz olarak araştırmadan ayrılabileceğimi biliyorum. Söz konusu araştırmaya, hiçbir baskı ve zorlama olmaksızın kendi rızamla katılmayı kabul ediyorum.

13. APPENDIX -3:

BİTKİSEL VE HAYVANSAL KAYNAKLI BESLENMEYE İLİŞKİN BİLGİ EDİNME AMAÇLI VERİ FORMU

ADINIZ SOYADINIZ:

YAŞINIZ:

OKUDUĞUNUZ BÖLÜM VE SINIFI:

CİNSİYETİNİZ: KADIN :

ERKEK:

MEDENİ HALİNİZ: EVLİ:

BEKAR:

Yaşadığınız Yer: AİLE İLE BİRLİKTE:

ÖĞRENCİ EVİNDE:

YURTTA:

MEMLEKETİNİZ:

1. Beslenme tarzınız hakkında bilgilendirir misiniz?

- Karışık beslenme (etçil v otçul beslenme bir arada)
- Vejeteryan beslenme
(EĞER VEJETERYANSANIZ 4., 6., 7. SORULARI ATLAYINIZ)

2. Eğer vejeteryan besleniyorsanız vejeteryanlığın hangi alt sınıfındasınız?

- Lacto vejeteryan
- Ova vejeteryan
- Lacto ova vejeteryan
- Vegan

3. Sizce sađlıđınız aısından hangi beslenme tarzı daha FAYDALIDIR?

- Hayvansal ađırlıklı beslenme(et/balık/yumurta/süt ve süt ürünleri/peynir)
- Bitkisel ađırlıklı beslenme(kurubaklagiller, tahıllar, meyve ve sebzeler)

4. Neden hayvansal kaynaklı ürünleri(et/tavuk/balık/süt ürünleri/yumurta/peynir) tüketmeyi tercih ediyorsunuz?

- Tüm besin öğelerini yeterli miktarda içeriyor. Bu yüzden sađlıklı olduğunu düşünüyorum
- Tadını seviyorum
- Bu ürünleri tüketmeyince doydüğümü hissetmiyorum
- Ailesel alışkanlıklar

5. Neden bitkisel kaynaklı ürünleri (meyve/sebze/kurubaklagiller/tahıllar/bitkisel süt ürünleri/) tüketmeyi tercih ediyorsunuz?

- Son zamanlarda bitkisel beslenmenin popüler olmasından dolayı
- Kilo kontrolünde yardımcı olduğu için
- Tadını seviyorum
- Ailesel alışkanlıklar

6. Beslenmenizde aşağıdaki et gruplarından hangisini daha sık tüketiyorsunuz?

- Kırmızı et
- Tavuk eti
- Balık eti

7. Yukarıda belirtmiş olduğumuz et gruplarını ne sıklıkta tüketmektesiniz?

- Her gün
- Haftada birkaç kez
- Ayda birkaç kez

8. Süt türlerinden hangisini tüketmeyi tercih ediyorsunuz?

- İnek sütü/keçi sütü/koyun sütü/manda sütü (hayvansal kaynaklı süt)
- Soya sütü/badem sütü/hindistancevizi sütü (bitkisel kaynaklı süt)

9. Soya kıyması gibi et yerine geçen ürünlerden yapılan gıdaları tüketir misiniz?

- Evet
- Hayır

10. Kurubaklagil, tahıl gibi bitkisel kaynaklı ürünleri ne sıklıkla tüketiyorsunuz?

- Her gün
- Haftada birkaç kez
- Ayda birkaç kez

11. Sizce protein kalitesi açısından aşağıdaki besin kaynaklarından hangisi daha zengindir?

- Hayvansal kaynaklı ürünler
- Bitkisel kaynaklı ürünler

12. Sizce aşağıdaki hayvansal kaynaklı ürünlerin hangisi protein bakımından daha zengindir?

- Kırmızı et/tavuk eti/ balık
- Süt ve süt ürünleri
- Yumurta

13. Sizce aşağıdaki bitkisel kaynaklı ürünlerin hangisi protein bakımından daha zengindir?

- Soya ürünleri
- Kurubaklagiller
- Bulgur
- Kinoa
- Chia tohumu

14. Tükettiğimiz besinlerin doğaya zarar verdiğini düşünüyor musunuz?

- Evet
- Hayır

15. Sizce hangi beslenme tarzı doğaya daha fazla zarar vermektedir?

- Hayvansal Kaynaklı beslenme
- Bitkisel kaynaklı beslenme

16. Sizce aşağıdaki et gurubu ürünlerden hangisinin çevreye zarar verme etkisi daha fazladır?

- Büyük baş hayvan eti

- Küçük baş hayvan eti
- Tavuk eti
- Balık eti

17. Sizce aşağıdaki protein kaynaklarından hangisi doğaya daha fazla zarar vermektedir.

- Peynir
- Hayvansal kaynaklı sütler
- Yumurta

18. Sizce aşağıdaki bitkisel kaynaklı ürünlerden hangisi doğaya daha fazla zarar vermektedir.

- Pirinç
- Bulgur
- Kurubaklagiller

19. Doğaya daha az zarar vermek/doğayı korumak için beslenme tarzı değiştirilebilir mi?

- Evet
- Hayır

20. Doğaya daha az zarar vermek/doğayı korumak için beslenme tarzlarından hangisi tercih edilebilir.

- Et gruplarından süt gruplarından zengin bir beslenme tarzı
- Tamamen bitkisel beslenme tarzı/ Vejeteryanlık
- Bitkisel kaynaklı beslerin miktarlarının artırılıp hayvansal kaynaklı besinlerin miktarının azaltıldığı karışık bir beslenme tarzı

14. APPENDIX -4: CURRICULUM VITAE

Kişisel Bilgiler

Adı	Açelya	Soyadı	Gül
Doğum Yeri	Hatay	Doğum Tarihi	09.03.1992
Uyruğu	T.C	TC Kimlik No	
E-mail	acegul788mail.com	Tel	0535 964 86 20

Öğrenim Durumu

Derece	Alan	Mezun Olduğu Kurumun Adı	Mezuniyet Yılı
Doktora			
Yüksek Lisans	Beslenme ve Diyetetik	Yeditepe Üniversitesi	2018
Lisans	Beslenme ve Diyetetik	Yeditepe Üniversitesi	2016
Lise		İstiklal Makzume Anadolu Lisesi	2010

Bildiği Yabancı Dilleri	Yabancı Dil Sınav Notu (#)
İngilizce	84

#Başarılımış birden fazla sınav varsa(KPDS, ÜDS, TOEFL; EELTS vs), tüm sonuçlar yazılmalıdır

İngilizce	İyi
Almanca	Literatür düzeyinde

İş Deneyimi (Sondan geçmişe doğru sıralayın)

Görevi	Kurum	Süre (Yıl - Yıl)
Araştırma Görevlisi	Yeditepe Üniversitesi	2018 Haziran- devam etmekte
Beslenme Diyetetik Bölüm Asistanı	Yeditepe Üniversitesi	2016 Ocak- 2018 Haziran

Uluslararası diğer hakemli dergilerde yayınlanan makaleler

Açelya GÜL, Binnur Okan Bakır. Danger of the era: environmental obesogens. *Adv Obes Weight Manag Control*. 2018;8(1): 00223