

# Impact of westernisation and industrialisation on traditional African and Mediterranean diet pattern and health

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**Oghotomo, Joyce Ejiroghene**

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UNIVERSITY OF ZAGREB  
FACULTY OF FOOD TECHNOLOGY AND BIOTECHNOLOGY

# GRADUATED THESIS

Zagreb, November 2017

Oghotomo Joyce Ejiroghene

501/N

**IMPACT OF WESTERNISATION  
AND INDUSTRIALISATION ON  
TRADITIONAL AFRICAN AND  
MEDITERRANEAN DIET PATTERN  
AND HEALTH**

This Graduated Thesis has been done in the Laboratory for Nutrition Science, at the Department of Food Quality Control, Faculty of Food Technology and Biotechnology, University of Zagreb, under the leadership of PhD Irena Colić Barić, Full professor, from Faculty of Food Technology and Biotechnology, University of Zagreb.

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### UTJECAJ ZAPADNJAČKOG NAČINA PREHRANE I INDUSTRIJAZIACIJE NA TRADICIONALNI AFRIČKI I MEDIETERANSKI NAČIN PREHRANE I NA ZDRAVLJE

Oghotomo Joyce Ejiroghene, 501/N

**Sažetak:** Pod tradicionalnim načinom prehrane najčešće se obuhvaća obrazac prehrane koji se temelji na neprerađenoj prirodno uzgojenoj hrani. Cilj ovog istraživanja bio je utvrditi utjecaje zapadnjačkog obrasca prehrane i industrijalizacije na tradicionalni način prehrane i zdravlja ispitanika iz Afrike (Nigerija) i s Mediterana (Hrvatska). Istraživanje je provedeno primjenom on-line upitnika tijekom 2016. godine. U istraživanje su uključena 292 ispitanika (46% iz Nigerije, 54% iz Hrvatske). Prikupljeni podaci obrađeni su pomoću statističkog paketa SPSS v 20. Ovim istraživanjem utvrđene su sličnosti između obrasca prehrane u ispitanika iz Nigerije i Hrvatske s obzirom na hranu koja doprinosi zdravlju. Statistički značajna razlika između ispitanika iz Nigerije i Hrvatske utvrđena je za tjelesnu masu ( $p < 0,001$ ) i za indeks tjelesne mase ( $\text{kg} / \text{m}^2$ ) ( $p < 0,001$ ), ali ne i za tjelesnu visinu. Ovo je prvo istraživanje u kojemu se uspoređuju tradicionalni obrasci prehrane Hrvatske i Nigerije i unatoč nedostacima, dobra je osnova za daljnje istraživanje na većem broju ispitanika iz Hrvatske i Nigerije.

**Ključne riječi:** tradicionalna prehrana, Afrička prehrana, Mediteranska prehrana, zapadnjačka prehrana, industrijalizacija

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**Mentor:** prof.dr.sc. Irena Colić Barić

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**Stručno povjerenstvo za ocjenu i obranu:**

1. Doc.dr.sc. Irena Keser
2. Prof.dr.sc. Irena Colić Barić
3. Prof.dr.sc. Mauro Serafini
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### **IMPACT OF WESTERNISATION AND INDUSTRIALISATION ON TRADITIONAL AFRICAN AND MEDITERRANEAN DIET PATTERN AND HEALTH**

*Oghotomo Joyce Ejiroghene, 501/N*

**Abstract:** Traditional eating habits are commonly referred as a diet that is based on non-processed naturally-fed foods. The aim of this study was to evaluate the influence of the Western diet and industrialization pattern on the traditional diet and health of subjects from Africa (Nigeria) and the Mediterranean (Croatia). The survey was conducted using an on-line questionnaire during y 2016. 292 respondents (46% Nigeria vs. 54% Croatia) are included in the study. The collected data were processed using the SPSS v.20 statistical package. This research identifies similarities among Nigerian and Croatian diet pattern with regard to food that contributes to health. The statistically significant difference between the respondents from Nigeria and Croatia was determined for the body mass, and the body mass index ( $\text{kg}/\text{m}^2$ ), but not for body height. This is the first study comparing the traditional food patterns between Croatian and Nigerian subjects and despite the shortcomings, it is a good basis for further research on significantly larger number of subjects.

**Key words:** traditional diet, African diet, Mediterranean diet, industrialization, westernisation

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**Mentor:** *Irena Colić Barić*, PhD Full Professor

**Technical support and assistance:** Irena Keser, PhD Assistant Professor

#### **Reviewers:**

1. PhD. *Irena Keser*, Assistant Professor
2. PhD. *Irena Colić Barić*, Full Professor
3. PhD. *Mauro Serafini*, Full Professor
4. PhD. *Irena Landeka Jurčić* Full Professor (substitute)

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# 1. INTRODUCTION

Long time ago human diets have been and are still shaped according to climate, seasons, location, culture, and even technology. Some dietary pattern is described as healthy eating model while others are generally unhealthy.

Indigenous people have pattern of illness very different from Western civilization; yet, they rapidly develop diseases once exposed to western foods and lifestyles (Lipski, 2010). This shows the strong connection between food and medicine/health.

Traditional foods are the main element for dietary pattern in different countries. They include foods that have been consumed locally or regionally for an extensive period. Traditional dietary pattern includes African diet, Mediterranean diet, Asian diet and etc. but this thesis is focusing more on the African and the Mediterranean diet. Amongst all dietary types studies has shown that the Mediterranean diet is considered as one of the healthiest dietary model which is due to its positive effect on health and wellness. Scientific studies have shown that today's diseases such as diabetes, heart disease, cancer, and obesity, were much less common with traditional diets in earlier times.

The term "Nutritional Transition" signifies a major shift from traditional diet to a more westernized diet which basically consists of high refined sugar, fats and mainly of animal origin.

According to Sera Baer-Sinnott of Oldways, traditional eating pattern such as Mediterranean, Asian, Latin-American, Vegetarian, and Africa heritage diet share a common focus on vegetables, legumes, healthy fats like olive oil, nut, and avocados and whole grains with spices giving each dish a distinctive cultural identity. Westernisation of diet has led to a health crisis, so the Mediterraneanisation or Easternisation of dietary practices worldwide is needed (Ogce et al., 2008).

The aim of this study is to note the health benefits and the problems found in consuming today's traditional African diets as compared to the traditional Mediterranean diet and to assess the nutritional status of adults living in Africa and in Croatia being a part of the Mediterranean region. In this study, modified questionnaire assessing thoughts about food habits/nutrition, general dietary habits, nutritional related health problems, and food security was used for data collection.

## **2. THEORETICAL PART**

### **2.1. Relationship between diet and health**

Certain eating patterns are significantly associated with better nutritional health (Schwerin et al., 1982). Even though diet and health are interwoven, the relationship between diet and health is very much unclear. Many people believe that what we eat affects the way we feel and behave (Levine and Labuza, 1990). Meanwhile from various literature reviews there are lot of involvement of food in health problems like migraine headaches, hyperactivity in young boys, anorexia, aggressive behaviour etc.

A healthy diet should contain all the required nutrients and sufficient calories to balance energy expenditure and provide for growth and maintenance throughout the life cycle (Bidlack, 1996). Generally, the major health problems that can be caused by diet includes coronary heart diseases, atherosclerosis, obesity, some type of cancer, diabetes mellitus, hypertension, osteoporosis etc. Studies has revealed that some recommendations for each health issue caused by diet includes a decrease in dietary fat, awareness of caloric intake and enhancement of nutrient density including an increase in fruit and vegetables, diet intake containing some elements like calcium, etc.

According to ‘‘Bidlack1996’’, as the population of elderly increase in number and greater age, nutritional needs must be met to minimize certain disease states and assure the quality of life. Conclusively, the food choices we make can have an important impact on our health.

### **2.2. Westernized diet**

According to "Segen's Medical Dictionary, 2012", western pattern of diet is a diet mainly defined as one high in saturated fats, red meat, "empty" carbohydrates (junk food) and low in fresh fruits and vegetables, whole grains, seafood and poultry. The Western diet has been linked to hypetension, heart disease, hypercholesterolemia, diabetes, obesity, and colorectal cancer.

Research has shown that traditional eating pattern such as Mediterranean, African, etc. are much healthier than the typical westernized diet which comprises of highly processed foods. Traditional foods are generally plant-based, i.e vegetables, fruit, whole grain, healthy oil, nuts, seeds, and legumes, with a very minute portion of lean meats and fish (Anonymous 1, 2017)

In the 1970s, it was noted that developed Western Countries have diets rich in animal products, fat, and sugar, and high rate of cancer of the colorectal, breast, and prostate. On the other hand, developing countries have diets based on one or two starchy staples, low intake of animal products, fat and sugar and low rate of western cancer although sometimes high rate of other types of cancer such as cancer of the oesophagus, stomach, and liver (Ogce et al., 2008). The prevalence of non-communicable diseases such as cardiovascular disorder, type 2 diabetes and certain cancer types are more rampant in the western societies as compared to the other parts.

Investigators have focused on environmental factors in the attempt to explain the temporal trends or international differences in cancer rates. Migrant's studies strongly suggest that lifestyle related diets can affect the promotion of the above-mentioned cancer. For example, colorectal cancer rate for Japanese who migrated to the United States increase rapidly to surpass the level of host population. Study has shown that the rate for colorectal cancer have increase in Japan as a result of the westernisation of diet (Michels, 2003).

### **2.3. Traditional African diet**

Traditional African foods are dishes made from unrefined natural food items such as cassava, millet, rice, beans, fish, meat, vegetables and fruits which are easily grown at subsistence farms not far away from home. They are mainly starch based, with generous amount of vegetables and fresh or roasted fish or meat. This means that they are devoid of refined sugars and excess food additives and rich in bulk and fibre. Also, 90% or more of African foods are organic (Anonymous 2, 2017).

#### **2.3.1. Characteristic of traditional African diet**

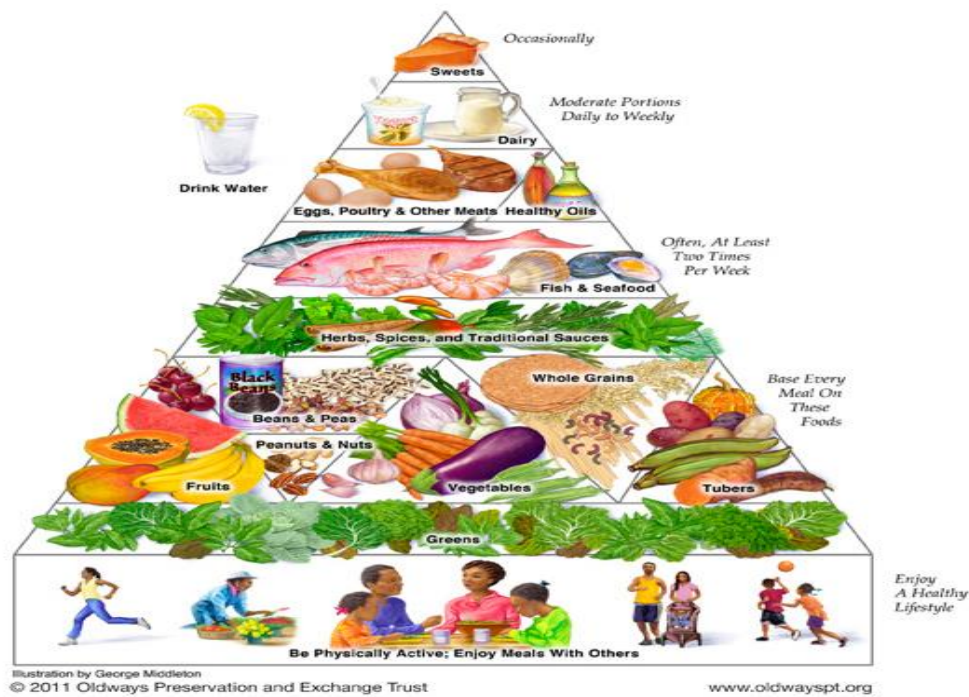
The major characteristic features of the traditional African diet are that it is mainly plant based colourful diet which is based on vegetables, fruits, tubers, grains, nuts, healthy oil, etc. It is flavourful, simple, and affordable and it naturally meets the dietary guidelines that health professionals promote today. Traditional African diet is nutrient dense and naturally low in processed sugar, unhealthy fats and sodium (Anonymous 1, 2017).

#### **2.3.2. Traditional African diet pyramid**

The Traditional African food pyramid (figure 1) is divided into sections containing food which is been grouped according to their recommended portion starting from large to small as we climb upward to the top of the pyramid.

**OLDWAYS**  
HEALTH THROUGH HERITAGE

## African Heritage Diet Pyramid



**Figure 1.** Traditional African diet pyramid (Anonymous 1,2017)

Food groups at the bottom section of the pyramid are those which should take in large quantities and as you go upward, the section gets smaller, indicating that they should be consumed in smaller portions, less often, and even occasionally.

### 2.3.3. The health benefit of traditional African diet

Today's non-communicable diseases like diabetes, cardiovascular diseases, cancer and obesity were less common with traditional diets in earlier times. Scientific studies have shown that the above conditions became rampant as traditional diet was left behind.

Scientific research has shown that there are a lot of health benefits eating traditionally, some of which are:

- It lowers the risk of heart disease, high blood pressure and stroke
- It aids in prevention of diabetes
- It fights against cancer and certain chronic diseases

- It aids in achieving healthy weight thereby avoiding obesity
- And lot more

#### 2.3.4. Epidemiology of non-communicable disease in Africa

Non-communicable diseases are diseases which are not contagious. That is, they cannot be transmitted from one person to another. They include diabetes mellitus, cancers, chronic respiratory diseases, cardiovascular disease and musculoskeletal disorders.

Recent epidemiological data suggest increasing burden of non-communicable diseases in many African countries, but these diseases have not been given adequate attention due to the overwhelming burden of infectious diseases (Omoleke, 2013). According to a cross sectional studies conducted by Ekpenyong, C. E *et al.* (2012) in Uyo Metropolis, in 2009/2010; with 2780 participants (1447 males and 1333 females) aged 18-60 years. The overall prevalence of non-communicable diseases was 32.8%. Disease specific prevalence was as follows: 25%, 14.4%, 12.7%, 20.1% and 10% for obesity, hypertension, diabetes mellitus, musculoskeletal disorders and respiratory disorders respectively. Males' versus females' prevalence were: 20.7% vs. 29.5%; 12.6% vs. 12.2%; 9.7% vs. 16.0%; 14.0% vs. 26.5% and 8.6% vs. 7.6% for obesity, hypertension, diabetes mellitus, musculoskeletal disorders and respiratory disorders respectively.

In Africa, most countries have not conducted risk factor surveys to establish the national based line prevalence rates (Ekpenyong *et al.*, 2012). Data from health management information systems is used to estimate the national prevalence status (Ekpenyong *et al.*, 2012;).

Numerous scientific studies / research have shown that:

- Over 80% of deaths from non-communicable diseases worldwide are estimated to occur in low- and middle-income countries;
- The World Health Organization projects that the number of deaths from ischaemic heart disease in the African region will double by 2030;
- In 2004 stroke was estimated to cause 3% of all deaths in Africa and 52% of vascular deaths;
- The prevalence of diabetes mellitus in Africa is predicted to increase by 80% in 20 years;
- One in five deaths from non-communicable diseases in adults over 45 years in Africa is estimated to be caused by cancer.

## **2.4. Traditional Mediterranean diet**

Mediterranean Diet is a way of eating based on the traditional foods and drinks of the countries surrounding the Mediterranean Sea. This diet has existed for since ancient time and has found its way to the top since noticed by dr. Ancel Keys of the mayo foundation and described in the seven countries studies. According to cultural and religious differences, Mediterranean diet has various types and characteristics including some beneficial health benefits.

### **2.4.1. Characteristics of Traditional Mediterranean diet**

Scientifically, Mediterranean diet has been considered as one of the healthiest form of diet and the most recommended choice of lifestyle. However, researchers have noticed that the Mediterranean people had something in common that might be contributing to their good health which is their dietary patterns. These dietary patterns share characteristics that have been associated with low rates of chronic diseases and long-life expectancies in many studies conducted throughout the world.

Some traditional Mediterranean diet characteristics according to Oldways includes:

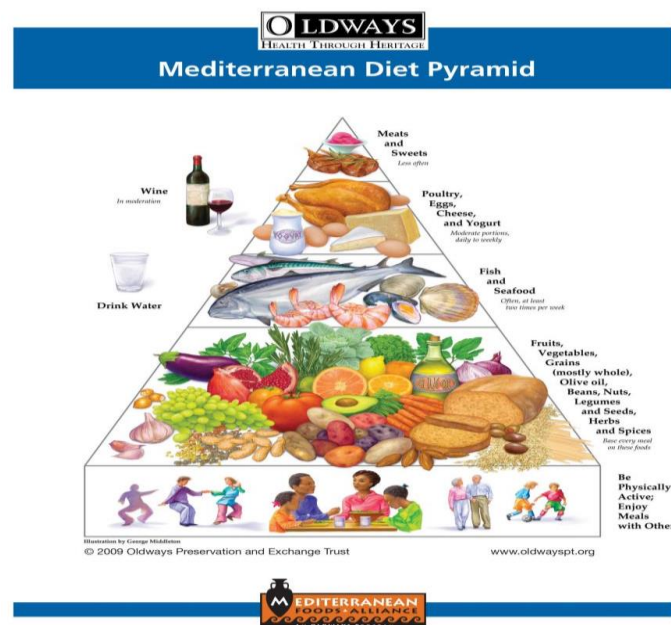
- Abundance of food of plant origin such as fruits, vegetables, potatoes, whole grains, seeds, and nuts;
- Variety of minimally processed foods, preferably those that are seasonally and locally grown within the Mediterranean region;
- The use of olive oil as the principal fat source in the diet, replacing other types of fats and oils;
- Low-to-moderate daily amounts of cheese and yogurt (preferably low-fat and non-fat variety);
- Fish and poultry at least twice per week;
- Fresh fruit as the typical daily dessert;
- Red meat only a few times per month (choose lean cuts and smaller portions and avoid sausage, bacon, and other meats that are high in fat and salted).

The Mediterranean diet is a healthy eating pattern with protective effects on chronic diseases (Schroder et al., 2004).

## 2.4.2. Traditional Mediterranean diet pyramid

Key component of the traditional Mediterranean diet pyramid (figure 2) according to Mayo clinic are:

- Eating of primarily plant based food like fruits, vegetables, whole grains, legumes and nuts;
- Replacing butter with healthy fats such as olive oil;
- Using herbs and spices instead of salt to flavour foods;
- Limiting the intake of red meat to not more than few times in a month;
- Eating fish and poultry at least twice a week;
- Optional drinking of red wine in moderation;
- Mediterranean diet recognizes the importance of being physically active and enjoying meals with families and friends.



**Figure 2.** Traditional Mediterranean diet (Anonymous 1, 2017)

## 2.4.3. The health benefits of traditional Mediterranean diet

The Mediterranean diet has long been reported to be the optimal diet for preventing non-communicable diseases and preserving good health (Sofi et al., 2010). It reduces risk of non-communicable diseases like heart diseases, some cancer types, diabetes, obesity, Parkinson and

Alzheimer diseases etc. this is due to the fact that it basically contains food of plant origin coupled with physical activities.

More specifically, Mediterranean diet protect against type 2 diabetes because it is very rich in fibres and in this diet type digestion is been slowed down thereby preventing huge swings of blood sugar. Refined breads, highly processed foods, and excess consumption of red meat are discouraged in the Mediterranean diet also, intake of red wine is encouraged instead of hard liquor this has been linked to cardiovascular diseases and stroke prevention.

Research has shown that Mediterranean diet may improve cholesterol and blood sugar level and overall blood vessel health and these factors may reduce the risk of Alzheimer diseases and dementia. Also, antioxidant contained in high quantity in the diet prevents cells from undergoing damage process (oxidative stress) thereby cutting down the risk of Parkinson's diseases by half.

Conclusively, previous analysis of over 1.5 million health adults shows that following Mediterranean diet was associated with a reduced risk of death from heart diseases and cancer as well as reducing the incidence of Parkinson and Alzheimer diseases.

## **2.5. Overview of nutritional assessment status**

Nutritional assessment is the evaluation of and individual food and nutrient intake, lifestyle, and the medical history. It is influenced by food intake, quantity and quality, and physical health. Nutritional assessment status is aimed to identify individuals or group of population at risk of becoming malnourished, and those who are already deficient.

The two main methods of nutritional assessment status are:

1. Indirect methods which uses community indices that reflect the community nutritional status such as ecological variables (agricultural crop production), ecological factors (incomes, population density, food availability and prices), cultural and social habits, and vital health statistic such as morbidity, mortality etc.
2. Direct methods which is summarized as ABCD (anthropometric, biochemical, clinical and dietary evaluation) measures individual and objective criteria.

Anthropometry is the measurement of body height, weight and proportion.

Biochemical assessment measures the level of essential dietary constituents such as metabolites and nutrient concentration in the body fluids.



Clinical assessment checks for specific and non-specific physical/clinical signs that are associated with malnutrition and deficiencies of vitamins and micronutrients

Dietary assessment uses methods like 24 hours dietary recall, food frequency questionnaire, dietary history, food diary technique, and observed food consumption to assess nutritional intake of humans.

### 3. EXPERIMENTAL PART

#### 3.1. Subjects

An investigation was carried out amongst 293 subject which include 134 healthy African adults (83 men and 51 females) between the ages of 18 and 56 and, 159 healthy Croatian adults (11 males and 148 females) between the ages 19 and 47 (Table 1 and Table 2).

Modified questionnaire Google link which was in English and in Croatian version was sent *via* various social medias and they comprises of the investigation population. Croatian version is used to represent the Mediterranean region.

**Table 1.** African subjects (who live in and outside of Africa) defined by age and gender (n=134)

| PARAMETERS     | 18-28 years |      | 29-39 years |      | 40-50 years |     | 51-61 years |     | Not-specified |     |
|----------------|-------------|------|-------------|------|-------------|-----|-------------|-----|---------------|-----|
|                | M           | F    | M           | F    | M           | F   | M           | F   | M             | F   |
| NUMBER (n=134) | 12          | 25   | 62          | 21   | 8           | 2   | 0           | 2   | 1             | 1   |
| PERCENT (100%) | 8.9         | 18.7 | 46.3        | 15.7 | 6.0         | 1.5 | 0           | 1.5 | 0.7           | 0.7 |

**Table 2.** Mediterranean (Croatia) subjects defined by age and gender (n=159)

| PARAMETERS     | 18-28 years |      | 29-39 years |     | 40-50 years |     | 51-61 years |   | Not-specified |   |
|----------------|-------------|------|-------------|-----|-------------|-----|-------------|---|---------------|---|
|                | M           | F    | M           | F   | M           | F   | M           | F | M             | F |
| NUMBER (n=159) | 10          | 139  | 1           | 7   | 0           | 2   | 0           | 0 | 0             | 0 |
| PERCENT (100%) | 6.3         | 87.4 | 0.6         | 4.4 | 0           | 1.3 | 0           | 0 | 0             | 0 |

#### 3.2. Methods

The assessment of food /habits in Africa and Croatia, general nutritional/dietary habits, nutritional related health problems and food security was done by the use of a modified questionnaire sent *via* social medias (Appendix 1 and 2 modified African and Croatia food habit questionnaires respectively) designed and created from the combination of two main sources/samples (Anonymous 3,2017; Anonymous 4, 2017).

Information was obtained from adults by filling in the questionnaire google link which was sent *via* social medias and asking people to fill it up. There was a total of 72 questions which was further broken down into 6 parts and a total of 62 questions in the Croatian version and it was divided into 5 parts which was modified and translated from the questionnaire made for the Africans to fit into the Mediterranean style.

For the African version, the 1<sup>st</sup> part which is the initial demographics part comprises of 4 questions which are gender, age, country of residence, and level of education.

The 2<sup>nd</sup> part contains question only for people that lives in Africa. It contains 6 questions which are, the region or provinces of origin, opinion about traditional diet in home region with options of health and unhealthy, past main staple food in home region, and present main staple food in home region, past main dishes in home region, and today's main dishes in home region.

The 3<sup>rd</sup> part consist of general questions about African diet (for Africans living within and outside Africa). It contains 14 questions which seek for opinion about African traditional diets if they are healthy and the options are yes/no, reasons for above answer, if new westernized African diet is better with option yes/no, if majority of African people still stick to the traditional African diet options are yes/no, specific major problem of today's African diet, if nutritional transition is happening throughout Africa with option yes/no, areas in Africans where affected if above answer is yes, if nutrition transition lead to major shift in dietary pattern with option yes/no. opinion about the main causes of change in African food habit, opinion about traditional knowledge about African food culture been lost option are yes/no the reason if above answer is yes and major causes of double burden in present day Africa.

The 4<sup>th</sup> part is mainly about dietary habits generally and it contains 29 questions which are number of meals eaten daily, if the meal is on a regular basis, skipping of meal, if yes which meal is been skipped, and reason for skipping, question about breakfast, lunch and dinner frequency knowledge about food pyramid guide or DASH eating plan, habits of snacking question of when and frequency. Question about drinking soda or sugared beverages on a regular bases, the frequency, also frequency of smoking, question about alcohol intake, quantity and frequency per week, type of milk/yogurt consumed question about frequent intake of lean meat, frequency of vegetable intake, fruit intake frequency, type of spread mostly used, type of cooking fat or oil used, frequency of salt usage after food has been cooked, fat preferences, frequency of patronizing fast food, frequency of sweet and confectionary intake, question about

food supplement usage to complete diet, individual opinion about personal eating habits, opinion about why it's important to have a healthy eating habits.

The 5<sup>th</sup> part has to do with nutritionally related question its 13 in numbers the 1<sup>st</sup> two questions were about heart attack, third was about angina, 4<sup>th</sup> is about stroke, 5<sup>th</sup> diabetes and 6<sup>th</sup> was about age when diabetes was confirmed if above question is yes 7<sup>th</sup> is about treatment type, 8<sup>th</sup> is about osteoporosis, 9<sup>th</sup> is about high blood pressure, 10<sup>th</sup> is about high cholesterol level. these questions above have responses of yes/no, the 11<sup>th</sup> and 12<sup>th</sup> questions are about weight and height of body respectively and finally the 13<sup>th</sup> is about cancer.

The final part which is the 6<sup>th</sup> part is about food security question has 6 questions and all are about the availability and affordability of food. For the Croatian version, its same as the African version except that the part where Africa is written it is replaced with Mediterranean and some other minute changes. For the Croatian version, the whole of part 2 of the African version was skipped, also part 3 question numbers 16,17,18 and 22 of the African version were omitted. Every other question is the exact translation of the African version.

### **3.3. Statistical analysis**

The responds where statistically analysed using Microsoft excel and SPSS v. 20.0.

## 4. RESULTS AND DISCUSSIONS

This chapter basically consist of compare of response between both versions of the modified questionnaire (African *vs.* Croatian). All part of the questionnaire where answered although there are few questions that were omitted or not properly answered But because of the voluminous questionnaire, only useful questions and response will be selectively used.

Africa is a very large continent with a lot of traditional food perceptions which differs from country to country and culture to culture even within the same country likewise the Mediterranean regions. Therefore, for this thesis since about 80.6% of the African participant reside in Nigeria and about 90% are Nigerians while about 98.1% of Mediterranean participant resides in Croatia and are Croatians, my scope will be reduced to more of Nigerian/west African food perception *vs.* Croatian food perception.

Some questions contained in African questionnaire i.e. 2<sup>nd</sup> part (question 5-10), 3<sup>rd</sup> part (question 16-18, and 22) where skipped in the Croatian version these parts will therefore be compared with relevant articles as necessary.

### 4.1. Demography

The total numbers of participants according to age groups and gender are shown in table 1 and 2 which indicated that all participants for both versions are adults. All of participants representing both Africa and Mediterranean are well educated. In Table 3 and Table 4 is shown that 98.1% of the Mediterranean participants resides in Croatia while 80.6% of African participant resides in Nigeria.

**Table 3.** Country of residence for Mediterranean participants (n=159)

| COUNTRY                | N   | %    |
|------------------------|-----|------|
| Croatia                | 156 | 98.1 |
| Bosnia and Herzegovina | 1   | 0.6  |
| Slovenia               | 1   | 0.6  |
| Ireland                | 1   | 0.6  |

**Table 4.** Country of residence for African participants (n=134)

| COUNTRY        | N   | %    |
|----------------|-----|------|
| Nigeria        | 108 | 80.6 |
| Benin Republic | 1   | 0.7  |
| Ghana          | 2   | 1.5  |
| Croatia        | 6   | 4.5  |
| Serbia         | 1   | 0.7  |
| Slovenia       | 2   | 1.5  |
| United Kingdom | 2   | 1.5  |
| Poland         | 1   | 0.7  |
| Ukraine        | 6   | 4.5  |
| America        | 3   | 2.2  |
| Taiwan         | 2   | 1.5  |

#### 4.2. Response/research about African vs. Mediterranean staples and main dishes

For the African version, this part was meant to be answered by Africans currently living in Africa, but as presented in Table 4 on the questionnaire were answered Africans who currently living outside of the Africa.

A total of 126 participant answered this part of the questionnaire and 93.7% (n=118) claimed that traditional diet in their home region is healthy while only 6.3% (n=8) choose unhealthy option for the traditional diet in their home region.

In the Croatian version, this part was omitted mistakenly but nevertheless, researchers have considered Mediterranean diet to be one of the healthiest form of diet and the most recommended choice of lifestyle. Traditional Mediterranean diet form the basis of eating habit throughout the region until mid-20<sup>th</sup> century, but now gradually being lost due to spread of western type economy and urban and technological society as well as globalisation of production and consumption (Renna et al., 2015).

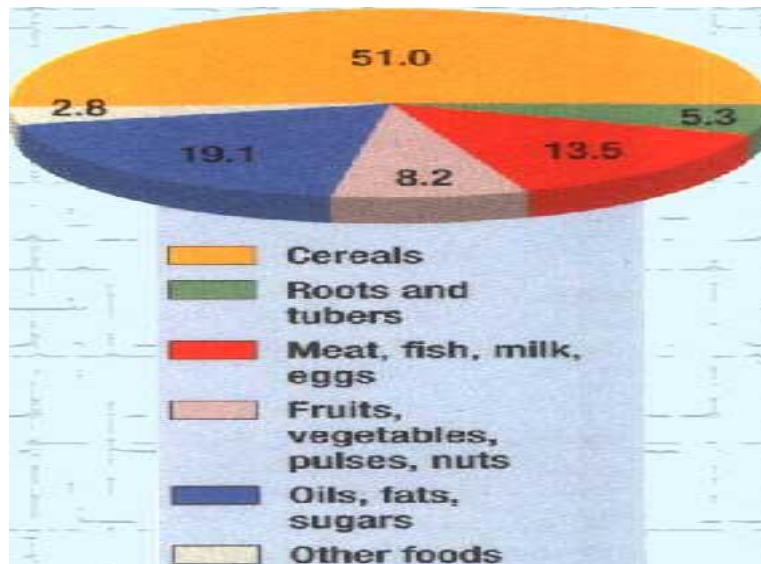
For response about main staple food today and in the past, it was picked the most common and most relevant and appropriate response and group them in a tabular form. Staple food is food eaten routinely and in such quantities, that constitute the main portion/main energy source of a diet.

The main food staple in the average African diet in term of energy according to FAO are cereal (46%), root and tuber (20%) and animal product (7%). Specifically, they are rice, millet, wheat, yam, sorghum, palm oil, etc. which follows the listed staples in Table 5 selected from African response.

**Table 5.** Food grouping for African main staple

| Parameters   | Staple food groups  |                                       |                                 |                         |
|--|---|---------------------------------------|---------------------------------|-------------------------|
|  | Source of carbohydrates (cereal, roots and tubers)                          | Source of proteins (plant and animal) | Source of vitamins and minerals | Source of fats and oils |
| Today the main staple food items in my home region are?        | rice<br>wheat<br>maize<br>plantain<br>cocoyam<br>cassava<br>potatoes<br>yam | beans<br>meat<br>fish                 | vegetables                      | palm oil                |
| In the past the main staples food item in my home region were? | rice<br>maize<br>plantain<br>yam<br>cassava<br>cocoyam<br>potatoes          | beans<br>meat<br>fish                 | vegetables                      | palm oil                |

According to FAO, some of the staples in the Mediterranean region are beetroot, cabbage, celery, bean, grape, lettuce, oats, olive, radish, wheat, etc. other sources included rice, millet, cucumber, eggplant, nuts, chickpeas etc. (FAO, 2017a). There was no response from the Croatian version to be compared with, therefore, is used the source from FAO (Figure 3).



**Figure 3.** World average staple diet (FAO, 2017a)

Mediterranean diet can conveniently be defined as a plant-based pattern where vegetable, fruit, cereal (preferably whole grain), legume and nuts are consumed in high amount and frequency. Also, moderate consumption of fish, white meat, egg, and dairy product which are principally yogurt and cheese (Renna et al., 2015; Willet et al., 1995) but on the contrary, consumption of red meat, processed meat, sweets, saturated fat should be small in both quantity and frequency. Also, adequate intake of water as well as moderate consumption of red wine is recommended (Renna et al., 2015; Willet et al., 1995).

In most part of Africa, the main dishes are generally grouped into rice-based, bean-based, root and tuber-based, soups/sauce (which usually include vegetables, fish, meat, and a lot of spice and herbs) other groups are (side-dishes, dessert/snacks) breakfast.

In this section about main dish, due to the varieties and complexity of the dishes which are most consumed is listed in Table 6.

The Mediterranean region main dishes are potatoes salad, grilled vegetable pie, grilled whole Mediterranean fish, prawn wraps, Mediterranean tuna wrap and Mediterranean chickpea stew (Anonymous 5, 2017 ).



**Table 6.** African region main dishes

| Parameters  | Staple food groups  |  |  |   |   |  |
|---|---|--|--|---|---|--|
|   | Rice-based  | Beans-based  | Root and tubers  | Soup/sauce  | Side dishes   | Snacks   |
| Today the main dish in my home region are?        | Boiled rice<br>Pounded rice<br>Joll of rice<br>Pasta<br>Noodles | Boiled beans<br>Bean pudding<br>Bean cake<br>Bean porridge | Pounded yam<br>Eba (cassava purée)<br>Starch (cassava)<br>Fried yam<br>Boiled potatoes | Tomatoes sauce/stew<br>Vegetable sauce<br>Eguis/melon soup<br>Banga/palmtree soup | Plantain<br>Potatoes chips<br>Salad<br>Abacha (African salad/cassava) | Bread<br>Bean cake<br>Meat pie<br>Puffy pastry<br>Chinchin |
| In the past the main dish in my home region were? | Rice meal   | Beans meal   | Pounded yam<br>Eba (cassava purée)<br>Boiled yam<br>Starch (cassava)                   | Tomatoes sauce/stew<br>Vegetable sauce<br>Eguis/melon soup<br>Banga/palmtree soup | Plantain<br>Potatoes chips<br>Salad<br>Abacha (African salad/cassava) | Bread<br>Bean cake<br>Bean pudding                         |

### **4.3. General response/research about African diet vs. Mediterranean diet**

The 3<sup>rd</sup> part of the African version which is actually the 2<sup>nd</sup> part of the Croatian version consist of 14 and 10 questions respectively. Questions about nutritional transition and double burden were the least appropriately answered and was also by error omitted in the Croatian version.

In this section, the yes/no response will be compared in a tabular form before the selective response with personal opinions. Also, response about nutrition transition and double burden will be compared with relevant articles along with more information about nutrition transition and double burden in both Africa and Mediterranean.

In Table 7 is shown that over 80% of both African and Croatia participants thinks that traditional diet was healthy. Over 70% of both African and Croatia participants thinks that their new westernised diet is not better and less than 50% of participants (African and Croatian) thinks that traditional knowledge about African/Mediterranean food culture is lost.

Meanwhile, this section also seeks the individual opinion of participants about why they think that the traditional African/Mediterranean diet was healthy; what is the major problem of African/Mediterranean diet, which is the main reason for change in traditional food habits, and reason why traditional food knowledge is been lost and also listing some nutritious food in Africa/Mediterranean region etc. Collected answers are presented in Table 8 showing the questions and some selected most common and relevant responses (Appendix 1 and 2).

**Table 7.** General thought about African/Mediterranean diet

| PARAMETERS  | AFRICAN POPULATION<br>(n=134) |            |           |           |       | CROATIAN /MEDITERRANEAN<br>POPULATION (n=159) |            |           |           |       |
|---|-------------------------------|------------|-----------|-----------|-------|---|------------|-----------|-----------|-------|
|   | YES<br>(n)                    | YES<br>(%) | NO<br>(n) | NO<br>(%) | TOTAL | YES<br>(n)                                    | YES<br>(%) | NO<br>(n) | NO<br>(%) | TOTAL |
| Do you think traditional Africa/Mediterranean diet was healthy?   | 121                           | 94.5       | 7         | 5.5       | 128   | 134   | 89.3       | 16        | 10.7      | 150   |
| Do you think new westernized African/Mediterranean diet is better?  | 29                            | 22.8       | 98        | 77.2      | 127   | 30  | 19.9       | 121       | 80.1      | 151   |
| Do you think that the majority of people in Africa/Croatia still eat traditional African/ Mediterranean diet? | 94                            | 74         | 33        | 26        | 127   | 41  | 27.3       | 110       | 73.3      | 151   |
| Is the nutrition transition happening throughout Africa/ Mediterranean?                                       | 45                            | 35.7       | 82        | 65.1      | 127   | /   | /          | /         | /         | /     |
| Does the nutrition transition lead to a major shift in dietary pattern?                                       | 45                            | 35.7       | 82        | 65.1      | 127   | /   | /          | /         | /         | /     |
| Do you think that the traditional knowledge about the Africa food /Mediterranean food culture is being lost?  | 59                            | 48         | 64        | 52        | 123   | 67  | 45.3       | 84        | 56.8      | 151   |

**Table 8.** Selected opinions of African and Croatian populations about African/Mediterranean diet

| PARAMETERS  | AFRICAN POPULATION<br>(n=134)  | MEDITERRANEAN<br>POPULATION (n=159)  |
|---|--|--|
| If you think that the traditional African/Mediterranean diet was healthy specify why?                           | <ul style="list-style-type: none"> <li>• it was <u>non-refined</u></li> <li>• it was organic</li> <li>• <u>freshly</u> and locally prepared</li> <li>• our forefathers <u>lived long</u> and didn't have any diet related health issues</li> </ul>   | <ul style="list-style-type: none"> <li>• it was <u>non-refined</u>/not processed</li> <li>• it was rich in healthy fat</li> <li>• it had some beneficial effect on the cardiovascular system</li> <li>• it was <u>fresh</u> and naturally prepared</li> <li>• the <u>longevity</u> of the Mediterranean's forefathers</li> </ul> |
| I think the major problem in African/Mediterranean diet are?  | <ul style="list-style-type: none"> <li>• <u>excessive carbohydrate</u> and fat</li> <li>• large portion size</li> <li>• modification and processing of the traditional diet (i.e canning) thereby adding some artificial preservatives</li> <li>• adaptation of <u>westernised</u> mode of nutrition</li> </ul>  | <ul style="list-style-type: none"> <li>• lack of time to cook</li> <li>• <u>westernization</u></li> <li>• high prices of fish and olive oil</li> <li>• excess food processing</li> <li>• GMO</li> <li>• excess saturated fat</li> <li>• <u>excess refined carbohydrate</u></li> </ul>  |
| What are the main reason for change in African/Mediterranean food habits?                                       | <ul style="list-style-type: none"> <li>• <u>westernisation</u>, civilization and <u>globalization</u></li> <li>• travel and tourism</li> <li>• major shift in agricultural activities</li> <li>• technology</li> <li>• <u>lack of time</u> to prepare traditional diet</li> <li>• high prices of healthy foodstuffs</li> <li>• urbanisation</li> </ul> | <ul style="list-style-type: none"> <li>• <u>lack of time</u></li> <li>• <u>globalization</u></li> <li>• transition</li> <li>• economic situation</li> <li>• <u>western influence</u></li> <li>• urbanisation</li> <li>• ignorance/negligence</li> <li>• influence of advertisement</li> </ul>                                    |
| If you think that traditional knowledge about the African/Mediterranean food culture is being lost specify why? | <ul style="list-style-type: none"> <li>• western education</li> <li>• <u>modernisation</u></li> <li>• <u>western influence</u></li> <li>• gradual nutrition transition</li> <li>• <u>urbanisation</u></li> </ul>   | <ul style="list-style-type: none"> <li>• lack of nutrition education</li> <li>• lack of interest</li> <li>• <u>modern influence</u></li> <li>• <u>western influence</u></li> <li>• globalisation</li> <li>• <u>urbanization</u></li> <li>• ignoring tradition</li> <li>• fast food influence</li> </ul>                          |

List 3 nutritious African / Mediterranean foods

- rice, beans, and plantain
- tam porridge, fresh fish pepper soup
- Eba (cassava) and vegetable
- fish
- olive oil
- vegetables
- legumes
- potatoes

Underlined words similarity in some response between the opinion of African and Croatian population

According to Popkin (2006) nutrition transition is a major shift in dietary and physical activities, patterns and body composition. About 65.1% of African participant denied the fact that nutrition transition is happening throughout Africa (Table 7). About 35.7% of African participant agreed that transition lead to a major shift in dietary pattern (Table 7). Which is in compliance with the definition according to Popkins' definition (Popkin, 2006).

According to FAO, nutrition transition affects the urban areas more when compared with rural areas because the urban area experience higher rates of obesity, cities offers greater range of food choices which are generally of lower prices, urban work often requires less physical exertion than rural area (FAO 2017b).

#### 4.4. Dietary habits

This section is about dietary habit which is aimed to access the nutritional knowledge of the participants base on 29 questions which consist of all about meals, food pyramid guide / dash eating plan, snacking, drinking behaviour, smoking, milk type, meat, vegetable, fruit, non-core food intake, fast-food frequency intake, salt, fat and oil, etc.

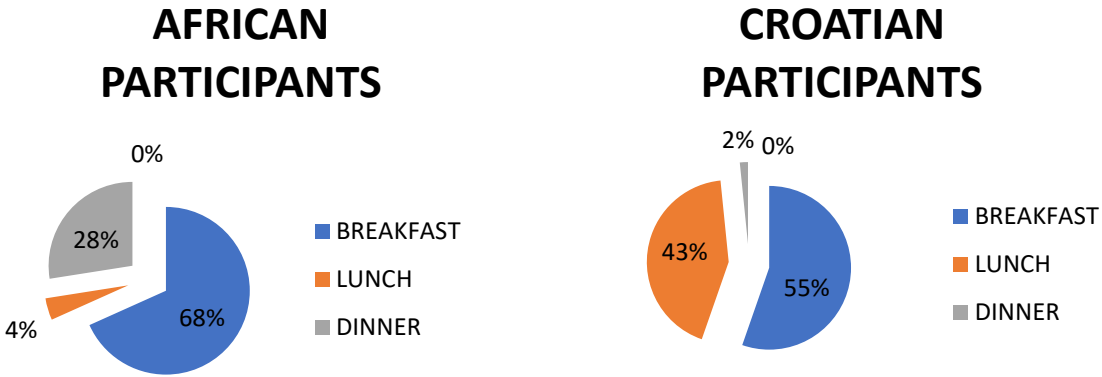
The questions were the same for both versions of the questionnaire therefore both response is being directly compared. The numbers of meal consumed daily with regard to gender are presented in Table 9. About 66.9% of the African participants takes 3 meals daily followed by 32.3% which is for twice daily while for the Croatian version, taking meal 3 times daily is also the majority (38%) followed by 4 daily meals (30%).

Three squared meal (Table 9) has the highest percentage for both Africans (66.9%) and Croatians (38%) and this was also same according to gender. According to the African response, 61.2% have meals on a regular basis, 27.9% said sometimes while 12.4% doesn't have meal regularly. Also, in the Croatian version, 59.7% do have meal on a regular basis while 26.2% said sometimes while 14.1% doesn't have regular meal.

**Table 9.** Number of daily meals according to gender

| NO. OF MEALS PER DAY | AFRICAN PARTICIPANTS (n=134) |           |             |          |               |            | CROATIAN PARTICIPANTS (n=159) |           |             |          |                |            |
|----------------------|------------------------------|-----------|-------------|----------|---------------|------------|-------------------------------|-----------|-------------|----------|----------------|------------|
|                      | TOTAL (N=130)                | TOTAL (%) | MALE (N=79) | MALE (%) | FEMALE (N=51) | FEMALE (%) | TOTAL (N=150)                 | TOTAL (%) | MALE (N=10) | MALE (%) | FEMALE (N=140) | FEMALE (%) |
| 1                    | 1                            | 0.8       | 0           | 0        | 1             | 2.0        | 1                             | 0.7       | 0           | 0        | 1              | 0.7        |
| 2                    | 33                           | 25.4      | 23          | 30.4     | 10            | 19.6       | 21                            | 14        | 1           | 10       | 20             | 14.3       |
| 3                    | 77                           | 59.2      | 43          | 54.4     | 34            | 66.7       | 57                            | 38        | 4           | 40       | 53             | 37.9       |
| 4                    | 9                            | 6.9       | 5           | 6.3      | 4             | 7.9        | 45                            | 30        | 2           | 20       | 43             | 30.7       |
| 5                    | 0                            | 0         | 0           | 0        | 0             | 0          | 21                            | 14        | 3           | 30       | 18             | 12.9       |
| 6                    | 0                            | 0         | 0           | 0        | 0             | 0          | 5                             | 3.3       | 0           | /        | 5              | 3.6        |
| 2-3                  | 7                            | 5.4       | 5           | 6.3      | 2             | 3.9        | /                             | /         | /           | /        | /              | /          |
| 3-4                  | 2                            | 1.5       | 2           | 2.5      | 0             | /          | /                             | /         | /           | /        | /              | /          |
| 2-5                  | 1                            | 0.8       | 1           | 1.3      | 0             | /          | /                             | /         | /           | /        | /              | /          |

54.3% of African population skip meals while only 12.6% doesn't skip meal while on the other hand, 51.3% of Croatian participant skips meals sometimes, 26.7% don't while 22% do skip meals. Skipping of breakfast (figure 4) was the most frequent answers from both the African and the Croatian participants (68.3% and 55% respectively). Among African participants, lunch is the least skipped meal (4.23%) while for Croatian population, dinner (2%) is the least skipped meal.

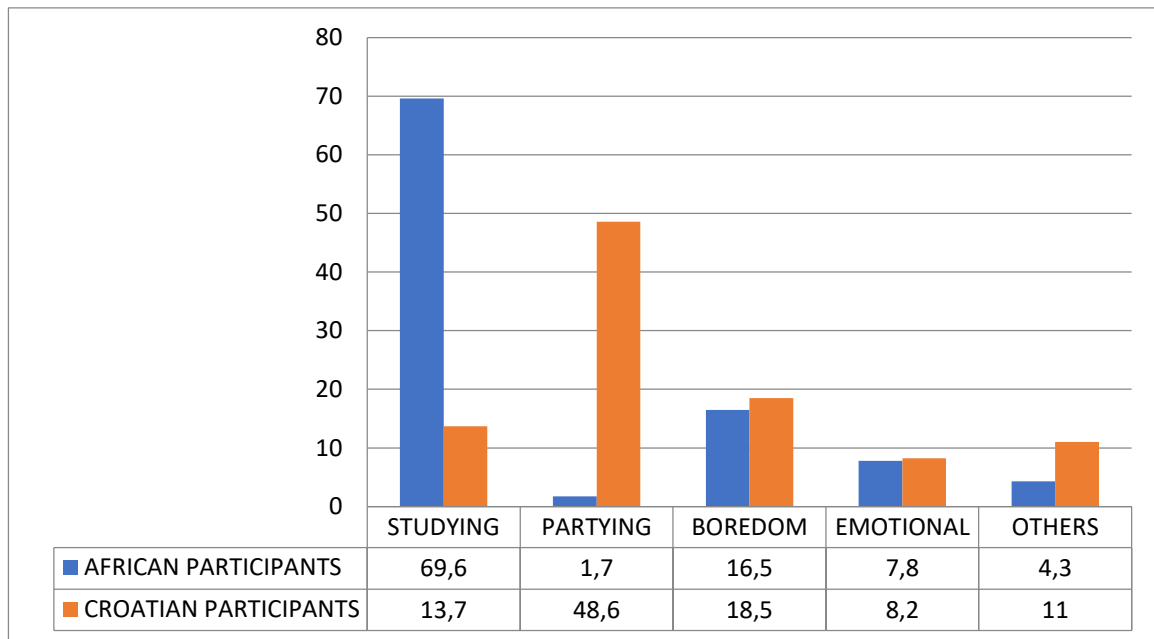


**Figure 4.** Average percent of participants who skipped meal during the day

Various reasons for skipping meals was given of which lack of time was the most common and similar reason given by both the African participants and the Croatian participant.

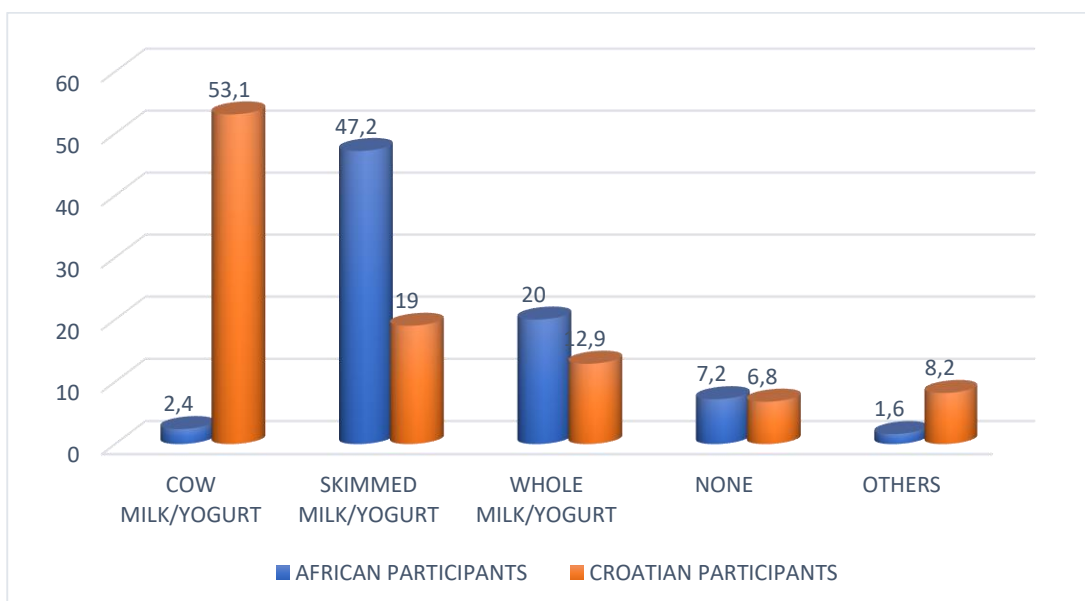
Knowledge about food pyramid guide /DASH eating plan is less for African participant compared to the Croatian participants. About 60.8% of African participant haven't heard about the food pyramid guide/DASH eating plan while for Croatian participant, only 13.3% haven't heard about them.

Snacking behaviour (Figure 5) was accessed based on various situations such as studying, partying, boredom, emotions, and others. For African participants, the highest percentage of snacking was during study (69.6%) followed by boredom which is 16.5 %. While for Croatian participant, the highest percentage of snacking was during partying (48.6%) followed by boredom which is 18.5%.



**Figure 5.** Snacking behaviour of African and Croatian participants (% of participants)

56% of African participant drink soda and sugared beverages regularly while only 13.4% of Croatian participant drink soda or other sugared drink regularly. Only 26.6% of African participant drink alcohol while 69.1% of Croatian participant drink alcohol regularly. With regard to bad habit of smoking frequency more Croatian participant do smoke compare to the African participants. For African participants, skimmed milk or yogurt was the most consumed (47.2%) while for Croatian participants, cow milk/yogurt was the most consumed (53.1%) (Figure 6).



**Figure 6.** Various type of dairy products consumed by African and Croatian participants (% of participants)



The Table 10 and Table 11 respectively indicates that lean meat, vegetables, and fruits are frequently consumed by both Africans and Croatian participants. Amongst the African participants, lean meat (70.2%) is most consumed while in the Croatian participant, vegetables (78.4%) are mostly consumed.

**Table 10.** Frequency of consumption of meats, vegetables and fruits for African participants (n=134)

| Frequency      | How often do you eat meat? | How often do you eat vegetables? | How often do you eat fruits? |
|----------------|----------------------------|----------------------------------|------------------------------|
| Total (n)      | 124                        | 124                              | 124                          |
| Never (n)      | 3                          | 0                                | 0                            |
| Never (%)      | 2.4                        | 0                                | 0                            |
| Rarely (n)     | 11                         | 13                               | 17                           |
| Rarely (%)     | 8.9                        | 10.5                             | 13.7                         |
| Sparingly (n)  | 23                         | 35                               | 41                           |
| Sparingly (%)  | 18.5                       | 28.5                             | 33.1                         |
| Frequently (n) | 87                         | 76                               | 66                           |
| Frequently (%) | 70.2                       | 61.3                             | 53.2                         |

**Table 11.** Frequency of consumption of meats, vegetables and fruits for Croatian participants (n=159)

| Frequency      | How often do you eat meat? | How often do you eat vegetables? | How often do you eat fruits? |
|----------------|----------------------------|----------------------------------|------------------------------|
| Total (n)      | 148                        | 148                              | 148                          |
| Never (n)      | 9                          | 0                                | 1                            |
| Never (%)      | 6.1                        | 0                                | 0.7                          |
| Rarely (n)     | 11                         | 3                                | 16                           |
| Rarely (%)     | 7.4                        | 2                                | 10.9                         |
| Sparingly (n)  | 51                         | 29                               | 42                           |
| Sparingly (%)  | 34.5                       | 19.6                             | 28.6                         |
| Frequently (n) | 77                         | 116                              | 88                           |
| Frequently (%) | 52                         | 78.4                             | 59.9                         |

Tables 12 and 13 respectively indicates that a greater percentage of both African and Croatian participants rarely /never add salt to their food after it is being prepared. 50.4% of African participants and 27.6% of Croatian participant never choose low or reduced fat variety of food. Only a very few participants frequently choose low or reduced fat variety of food. 38.8% of African participant frequently eat fast food while surprisingly only 2.3% of Croatian participants eat fast food. 60.9% of African participants rarely eat non-core food like chocolate, sweets etc. while a greater percentage (43.1%) of Croatian participants have the habit of frequently eating non-core food.

**Table 12.** General food habits of African participants (n=159)

| Frequency      | How often do you add salt to your food after it has been prepared / cooked? | How often do you choose low or reduced fat variety of foods instead of the standard variety? | How often do you eat fast food or takeaways from places like (mr biggs, KFC etc.)? | How often do you eat lollies, sweets, chocolate, and confectionary (non-core food)? |
|----------------|---|--|--|---|
| Total (n)      | 116   | 115  | 116  | 115   |
| Never (n)      | 45  | 58   | 5  | 7   |
| Never (%)      | 38.8  | 50.4   | 4.31   | 6.1   |
| Rarely (n)     | 48  | 15   | 31   | 70  |
| Rarely (%)     | 41.4  | 13.4   | 26.7   | 60.9  |
| Sparingly (n)  | 9   | 8  | 35   | 30  |
| Sparingly (%)  | 7.8   | 6.95   | 30.2   | 26.1  |
| Frequently (n) | 14  | 34   | 45   | 8   |
| Frequently (%) | 12.1  | 29.6   | 38.8   | 6.9   |

**Table 13.** General food habits of Croatian participants (n=159)

| Frequency      | How often do you add salt to your food after it has been prepared / cooked? | How often do you choose low or reduced fat variety of foods instead of the standard variety? | How often do you eat fast food or takeaways from places like (mr biggs, KFC etc.)? | How often do you eat lollies, sweets, chocolate, and confectionary (non-core food)? |
|----------------|---|--|--|---|
| Total (n)      | 132   | 126  | 130  | 130   |
| Never (n)      | 41  | 35   | 37   | 2   |
| Never (%)      | 31.1  | 27.8   | 28.5   | 1.5   |
| Rarely (n)     | 47  | 46   | 38   | 21  |
| Rarely (%)     | 35.6  | 36.5   | 29.2   | 16.2  |
| Sparingly (n)  | 24  | 17   | 52   | 51  |
| Sparingly (%)  | 18.2  | 13.4   | 40.0   | 39.2  |
| Frequently (n) | 20  | 28   | 3  | 56  |
| Frequently (%) | 15.2  | 22.2   | 2.3  | 43.1  |

Food supplement are concentrated source of nutrition. They are substance (pills, tablets, capsules etc.) that has nutritional effects which can be used to complete a diet. 59.5% of African participants uses food supplement to complete their diet while only 24.8% of Croatian participant do complete their diet with food supplement. 83.5% of African participants thinks they have a healthy eating habit while 45.8% of Croatian participants thinks their eating habits are healthy.

As regards the importance of healthy eating habit in my opinion, healthy diet is important for maintenance of good health. Meanwhile healthy diet means that the intake of difference variety of food that contains all the nutrient in the right quantity necessary for maintaining good health. Majority of both African and Croatian participants think that it is important to have healthy diet/eating habit to maintain good health.

#### **4.5. Nutritional related health segment**

According to collected data nutritional related health parameters presented in Table 14 for both Africans and Croatian participants 2.5% of African participants has been told by the doctor that they have angina while 16.6% of Croatian participants has been told same. None of the African participant has been told by doctor that they have stroke but 0.7% of Croatian participants has been told. None of the African participant has been told by doctor that they have diabetes but 0.7% of Croatian participants has been told. 0.8% of the African participant has been told by doctor that they have osteoporosis while none of Croatian participants has been told. 7.4% of the African participant has been told by doctor that they have high BP while 6.3% of Croatian participants has been told 15% of the African participant has been told by doctor that they have high blood cholesterol level while 6.3% of Croatian participants has also been told. None of the African participant has been told by doctor that they have cancer while 0.7% of Croatian participants has also been told.

**Table 14.** Nutritional health status of both African and Croatian participants

| PARAMETERS   | AFRICAN POPULATION (n=134) |         |        |        |       | CROATIAN /MEDITERRANEAN POPULATION (n=159) |         |        |        |       |
|--|----------------------------|---------|--------|--------|-------|--|---------|--------|--------|-------|
|  | YES (n)                    | YES (%) | NO (n) | NO (%) | TOTAL | YES (n)                                    | YES (%) | NO (n) | NO (%) | TOTAL |
| Have you ever been told by a doctor that you had heart attack?                                     | 0                          | 0       | 121    | 100    | 121   | 0  | 0       | 145    | 100    | 145   |
| Have you ever been admitted to hospital with a heart attack?                                       | 0                          | 0       | 121    | 100    | 0     | 0  | 0       | 145    | 100    | 145   |
| Have you ever been told by a doctor that you have angina (chest pain while walking or exercising)? | 3                          | 2.5     | 119    | 97.5   | 122   | 24   | 16.6    | 121    | 83.4   | 145   |
| Have you ever been told by a doctor that you have had stroke?                                      | 0                          | 0       | 122    | 100    | 122   | 1  | 0.7     | 143    | 99.3   | 144   |
| Have you ever been told by a doctor that you have diabetes?  | 0                          | 0       | 121    | 100    | 121   | 1  | 0.7     | 143    | 99.3   | 144   |

**Table 14.** Nutritional health status of both African and Croatian participants (continue)

| PARAMETERS   | AFRICAN POPULATION (n=134) |         |        |        |       | CROATIAN /MEDITERRANEAN POPULATION (n=159) |         |        |        |       |
|--|----------------------------|---------|--------|--------|-------|--|---------|--------|--------|-------|
|  | YES (n)                    | YES (%) | NO (%) | NO (n) | TOTAL | YES (n)                                    | YES (%) | NO (n) | NO (%) | TOTAL |
| Have you ever been told by a doctor that you have osteoporosis?                          | 1                          | 0.8     | 120    | 99.2   | 121   | 0  | 0       | 145    | 100    | 145   |
| Have you ever been told by a doctor that you have high blood pressure?                   | 9                          | 7.4     | 113    | 93.4   | 122   | 1  | 0.7     | 141    | 99.3   | 142   |
| Have you ever been told by a doctor that you have high cholesterol levels in your blood? | 18                         | 15      | 102    | 85     | 120   | 9  | 6.3     | 135    | 93.8   | 144   |
| Have you ever been diagnosed of any form of cancer?                                      | 0                          | 0       | 121    | 100    | 121   | 1  | 0.7     | 143    | 99.3   | 144   |

The dictionary meaning of body weight is the force due to the effect of gravity on the body mass. Body height is the vertical distance between the top and the bottom. Body mass index (BMI) is a person's weight in kg divided by the person's height in squared meters. A healthy body weight with regards to BMI is between  $18.5\text{kg m}^{-2}$  and  $25\text{kg m}^{-2}$ .

BMI less than  $18.5\text{kg m}^{-2}$  is underweight while BMI between  $25\text{kg m}^{-2}$  and  $30\text{kg m}^{-2}$  is overweight. And when BMI is above  $30\text{kg m}^{-2}$  it is obesity (Anonymous 6, 2017).

From the response, participants used different units ranging from kilogram, pounds, etc. for weight and meters, feet, inches, centimetres etc. for height therefore all the various range of units for weight are converted to kilogram and height to meters for easy usability and calculation purpose.

**Table 15.** Anthropometric parameters in African population according to gender

| Parameters                 | African males    | African females |
|----------------------------|------------------|-----------------|
| Body weight (kg)           | $78.5 \pm 10.9$  | $74.1 \pm 15.4$ |
| Min                        | 50.0             | 45.0            |
| Max                        | 110.0            | 125.0           |
| Body height (cm)           | $172.6 \pm 12.9$ | $168.6 \pm 8.4$ |
| Min                        | 120.0            | 152.4           |
| Max                        | 195.0            | 183.0           |
| BMI ( $\text{kg m}^{-2}$ ) | $26.8 \pm 5.9$   | $26.4 \pm 6.4$  |
| Min                        | 17.1             | 14.9            |
| Max                        | 48.6             | 42.2            |

**Table 16.** Anthropometric parameters in Croatian population according to gender

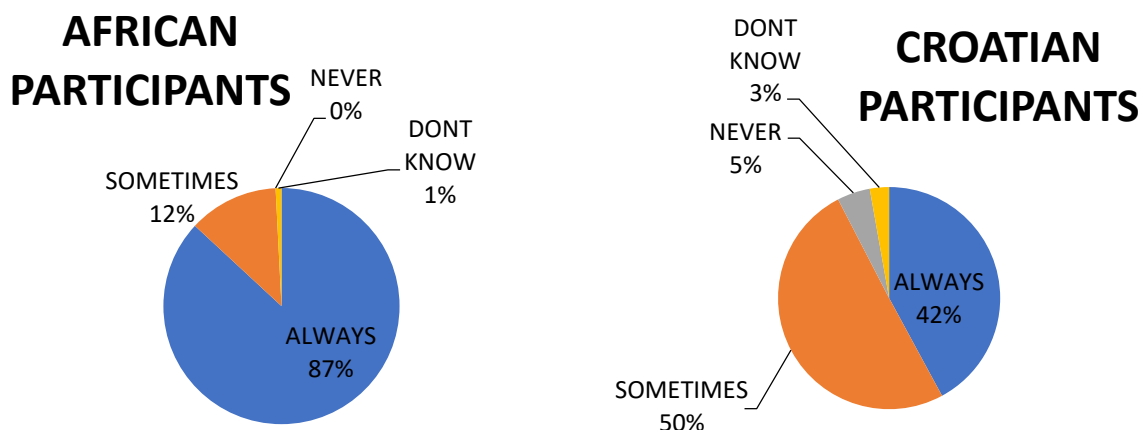
| Parameters                 | Croatian males  | Croatian females |
|----------------------------|-----------------|------------------|
| Body weight (kg)           | $71.7 \pm 3.9$  | $62.2 \pm 9.7$   |
| Min                        | 65.0            | 41.0             |
| Max                        | 77.0            | 103.0            |
| Body height (cm)           | $177.7 \pm 6.5$ | $168.0 \pm 6.8$  |
| Min                        | 166.0           | 153.0            |
| Max                        | 192.0           | 192.0            |
| BMI ( $\text{kg m}^{-2}$ ) | $22.7 \pm 1.1$  | $22.0 \pm 3.1$   |
| Min                        | 20.3            | 16.5             |
| Max                        | 23.8            | 34.9             |

**Table 17.** Anthropometric parameters in African and Croatian population

| Parameters                | African      | Croatian    | p      |
|---------------------------|--------------|-------------|--------|
| Body weight (kg)          | 80.2 ± 24.0  | 62.9 ± 9.7  | <0.001 |
| Min                       | 45           | 41          |        |
| Max                       | 125          | 103         |        |
| Body height (cm)          | 171.0 ± 11.4 | 168.7 ± 7.2 | 0.068  |
| Min                       | 120          | 153         |        |
| Max                       | 195          | 192         |        |
| BMI (kg m <sup>-2</sup> ) | 28.0 ± 11.0  | 22.1 ± 3.0  | <0.001 |
| Min                       | 14.9         | 16.5        |        |
| Max                       | 48.9         | 34.9        |        |

#### 4.6. Food security section

The results showed (Figure 7) that 87% of African participant can always afford to eat properly while only 42 % of Croatian participant can always afford to eat properly. Also, 12% of African participant sometimes afford to eat properly while 50% of Croatian participant sometimes afford to eat properly.



**Figure 7.** Affordability of proper eating frequency (% participants)

Results in Tables 15 and 16 shows the various financial factors that affect the quantity and quality of food intake/availability for both African and Croatian participants. 13.1% of African participant agreed that food runs out of their household due to lack of money while it is true for



22.8% of Croatian participants. Only 12.4% of African participant eat less due to lack of money while it's true for 25.5% of Croatian participants. 14.9% of African participants has limited variety of food due to lack of money while 49.3% of Croatian participant has limited food variety due to lack of money. 8.2% of African participants rely on others for food when there is no enough money while 23.4% of Croatian participants rely on others when there is no enough money. Only 8.3% of African participants uses special food grants/food bank when they don't have enough money while it's true for 47.6% of Croatian participants.

**Table 18.** Financial factors affecting food intake for African participants (n=134)

| PARAMETER   | TRUE<br>(N) | TRUE<br>(%) | FALSE<br>(N) | FALSE<br>(%) | TOTAL |
|---|-------------|-------------|--------------|--------------|-------|
| Food runs out of my /our household due to lack of money   | 16          | 13.1        | 107          | 87.7         | 123   |
| I/we eat less because of lack of money  | 15          | 12.4        | 106          | 87.6         | 121   |
| The variety of food I am (we are) able to eat is limited by lack of money   | 18          | 14.9        | 103          | 85.1         | 121   |
| I/we rely on others to provide food and or money for food for my /our household when I/we don't have enough money | 10          | 8.2         | 112          | 91.8         | 122   |
| I/we make use of special food grants or food bank when I/we don't have enough money for food                      | 10          | 8.3         | 110          | 91.7         | 120   |

**Table 19.** Financial factors affecting food intake for Croatian participants (n=159)

| PARAMETER  | TRUE<br>(N) | TRUE<br>(%) | FALSE<br>(N) | FALSE<br>(%) | TOTAL |
|--|-------------|-------------|--------------|--------------|-------|
| Food runs out of my /our household due to lack of money  | 33          | 22.8        | 112          | 77.2         | 145   |
| I/we eat less because of lack of money   | 37          | 25.5        | 109          | 75.2         | 146   |
| The variety of food I am (we are) able to eat is limited by lack of money  | 71          | 49.3        | 73           | 50.7         | 144   |
| I/we rely on others to provide food and or money for food for my /our household when I /we don't have enough money | 34          | 23.4        | 111          | 76.6         | 145   |
| I/we make use of special food grants or food bank when I/we don't have enough money for food                       | 69          | 47.6        | 77           | 53.1         | 146   |

## 5. SUMMARY

The aim of this study is to note the health benefits and also the problems found in consuming today's traditional African diets as compared to the traditional Mediterranean diet and also to assess the nutritional status of adult participants of African origin and in Croatia being part of the Mediterranean region.

- The subjects are 134 healthy African adults between the age of 18 and 56, consisting of 83 males and 51 females. Also, 159 healthy Croatian adults between the age of 19 and 47 consisting of 11 males and 148 females which is in total 293 subject.

According to the result:

- Over 80% of both African and Croatian participant thinks that traditional diet was healthy.
- Over 50% of both African and Croatian participants have meals on a regular basis meanwhile breakfast was the most skipped meal for almost all participants with a common reason of lack of time.
- For assessment of lean meat, vegetable, and fruit consumption frequency, over 70% of African participant indicate lean meat as the most frequently consumed while over 70% of Croatian participants indicated vegetables.
- One of the most common thought between the African and the Croatian participant is that they think it is important to have a healthy diet/eating habits so as to maintain good health.
- For the nutritional health related segment, over 90% of both African and Croatian participants are free of nutritional related health problems. This therefore brings to my conclusion that the more we honour cultural/traditional differences in eating the healthier we will be.
- The statistically significant differences between the respondents from Nigeria and Croatia was determined for the body mass and the body mass index, but not for body height.

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## 7. APPENDIX

### 7.1. Modified African food habit questionnaire in English language

#### Questionnaire about dietary habits in Africa

This is a questionnaire about dietary habits in Africa, nutrition related health questionnaire, and food security questionnaire. This questionnaire will be used for master thesis in nutrition at University of Zagreb (Croatia). The master thesis is based on traditional African diet/food culture, the benefits and the health implications of westernization and industrialization on today's diets.

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#### PART 1 - Initial Demographics

Gender

Male

Female

Age

Country of residence:

Highest level of education:

#### PART 2 - Questions only for people who live in Africa

Which region/province are you from?

Do you think that the traditional diet of your home region is

- healthy
- unhealthy

Today, the main staple food items in my home region are

In the past, the main staple food items in my home region were

Today, the main dishes in my home region are

In the past, the main dishes in my home region were

**PART 3 - General questions about African diet (for people who live in and outside Africa)**

Do you think that the traditional African diet was healthy?

- Yes
- No

If you think that the traditional African diet was healthy, specify why?

Do you think the “new, westernized” African diet is better?

- Yes
- No

Do you think that the majority of people in Africa still eat the traditional African diet?

- Yes



- No

I think the major problems of the African diet today are (specify 3)

Is the “Nutrition transition” happening throughout Africa?

- Yes
- No

If you think that the “Nutrition transition” happening throughout Africa, the most affected areas are

Does the “Nutrition transition” lead to a major shift in dietary patterns?

- Yes
- No

What are the main reasons for a change in African food habits? Specify 3.

Do you think that the traditional knowledge about the African food cultures is being lost?

- Yes
- No

If you think that the traditional knowledge about the African food cultures is being lost, specify why.

The major causes of the “double burden” in Africa today are (specify 3)

List 3 nutritious African foods

Do African food cultures contain any health protective foods (based on scientific evidence) or potentially protective which requires testing?

#### **PART 4 - Dietary habits questionnaire**

How many meals do you have every day?

- 1
- 2
- 3
- 4
- 5
- 6

Do you have your meals on regular bases?

- Yes
- No
- Sometimes

Do you skip meals?

- Yes
- No

- Sometimes

If you skip meals, which do you skip the most?

- Breakfast
- Lunch
- Dinner

If you skip meals, why do you skip meals?

What do you often have for breakfast?

What do you often have for lunch?

What do you often have for dinner?

Have you heard of the food pyramid guide or the DASH eating plan?

- Yes
- No

Are you more inclined to snacking during any of the following situations?

- Studying
- Partying
- Boredom
- Emotional
- Other:

What type of food do you often snack on?

Do you drink soda or other sugared beverages regularly?

- Yes
- No

If you drink soda or other sugared beverages regularly, how often?

How often do you currently smoke?

Do you drink alcohol?

- Yes
- No

If you drink alcohol, how many shot in a week?

What type of milk or yogurt do you consume?

- Cow milk /yogurt
- Skimmed milk/or 1% milk or yogurt
- Whole milk/yogurt
- None
- Other:

How often do you eat lean meat (lean beef, chicken, turkey, fish)?

- Never
- Rarely
- Sparingly
- Frequently

How often do you eat vegetables?

- Never
- Rarely
- Sparingly
- Frequently

How often do you eat fruits?

- Never
- Rarely

- Sparingly
- Frequently

What type of butter or margarine spread do you use the most often?

What type of fat or oil do you use the most often when cooking?

How often do you add salt to your food after it has been cooked or prepared?

How often do you choose low or reduced fat varieties of foods instead of the standard variety?

How often do you eat fast food or takeaways from places like Mr Biggs, KFC etc.

How often do you eat lollies, sweets, chocolate and confectionary?

Do you use food supplement to complete your diet?

- Yes
- No

Do you think you have a healthy diet/eating habits?

- Yes
- No

What do you think why is important to have a healthy diet/eating habits?

## **PART 5 - Nutrition Related Health Questionnaire**

Have you ever been told by a doctor that you have had a heart attack?

- Yes
- No

Have you ever been admitted to hospital with a heart attack?

- Yes
- No

Have you ever been told by a doctor that you have angina (chest pain while walking or exercising)?

- Yes
- No

Have you ever been told by a doctor that you have had a stroke?

- Yes
- No

Have you ever been told by a doctor that you have diabetes?

- Yes
- No

If yes, how old were you when a doctor first told you that you had diabetes?

What treatments do you now have for your diabetes?

- No treatment
- Insulin injections
- Medicines, tablets or pills
- Diet
- Exercise
- Don't know
- Other:

Have you ever been told by a doctor that you have osteoporosis?

- Yes
- No

Have you ever been told by a doctor that you have high blood pressure?

- Yes
- No

Have you ever been told by a doctor that you have high cholesterol levels in your blood?

- Yes
- No

What is your body weight?

What is your body height?

Have you ever been diagnosed of any form of cancer?

- Yes
- No

### **PART 6 - Food Security Questionnaire**

I / we can afford to eat properly

- Always
- Sometimes
- Never
- Don't know

Food runs out in my/our household due to lack of money.

- True
- False

I / we eat less because of lack of money.

- True
- False

The variety of foods I am (we are) able to eat is limited by a lack of money.

- True
- False

I / we rely on others to provide food and/or money for food, for my/our household, when I / we don't have enough money.

- True
- False

I / we make use of special food grants or food banks when I / we do not have enough money for food.

- True
- False

## 7.2. Modified Croatian food habit questionnaire in Croatian language

### Upitnik o prehrambenim navikama u Hrvatskoj

Ovaj upitnik će se koristiti za izradu diplomskog rad na studiju Nutricionizam na Sveučilištu u Zagrebu. Diplomski rad se temelji na tradicionalnoj afričkoj i mediteranskoj prehrani, prednostima i utjecaju na zdravlje te utjecaju industrijalizacije na današnju prehranu.

\*Required

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#### 1. DIO - Demografski podaci \*

Spol

- muški
- ženski

Zemlja prebivališta

Dob \*

Najviša razina obrazovanja

#### 2. DIO - Mediteranska prehrana

Smatrate li da je tradicionalna mediteranska prehrana imala povoljne učinke na zdravlje?

- Da
- Ne

Ako smatrate da je tradicionalna mediteranska prehrana imala povoljne učinke na zdravlje navedite zašto.

Smatrate li da je današnja mediteranska prehrana, koja je pod utjecajem zapadnoeuropske prehrane, bolja od tradicionalne?

- Da
- Ne

Smatrate li da većina ljudi u Hrvatskoj još uvijek ima tradicionalnu mediteransku prehranu?



- Da
- Ne

Mislim da su glavni problemi mediteranske prehrane danas (navedi 3)



Navedi koji su po Vašem mišljenju glavni razlozi promjena prehrambenih navika u Hrvatskoj (navedi 3).



Smatrate li da se tradicionalno znanje o mediteranskoj prehrani izgubilo?

- Da
- Ne

Ako je Vaš odgovor da na prethodno pitanje navedite zašto.



Navedite 3 nutritivno vrijedne namirnice mediteranske prehrane.



Da li mediteransku prehranu čine namirnice koje imaju pozitivne učinke na zdravlje (površeno znanstvenim istraživanjima)?

### 3. DIO - Prehrambene navike

Koliko obroka imate obično svaki dan?

- 1
- 2
- 3
- 4
- 5
- 6

Imate li obroke redovito?

- Da
- Ne
- Ponekad

Preskačete li obroke?

- Da
- Ne
- Ponekad

Ako preskačete obroke koji najčešće?

- Doručak
- Ručak
- Večeru

Ako preskačete obroke navedite zašto

Što obično konzumirate za doručak?

Što obično konzumirate za ručak?

Što obično konzumirate za večeru?

Jeste li čuli za piramidu pravilne prehrane ili za DASH dijetu?

- Da
- Ne

Da li više konzumirate grickalice tijekom neke od sljedećih situacija?

- učenje
- proslava
- dosada
- emocionalne situacije
- druge situacije

Koju vrstu grickalica obično konzumirate?

Konzumirate li gazirana pića ili druga pića s visokim udjelom šećera redovito?

- Da
- Ne

Ako konzumirate gazirana pića navedite koliko često.

Koliko često pušite?

Konzumirate li alkoholna pića?

- Da
- Ne

Ako konzumirate alkoholna pića navedite koliko pića tjedno.

Koju vrstu mlijeka ili jogurta konzumirate?

- kravlje mlijeko/jogurt
- obrano mlijeko/ili mlijeko s 1% m.m. ili jogurt
- punomasno mlijeko/jogurt
- ništa od navedenog
- druge proizvode

Koliko često konzumirate nemasno meso (nemasna govedina, piletina, puretina, riba)?

- nikada
- rijetko
- povremeno
- često

Koliko često konzumirate povrće?

- nikada
- rijetko
- povremeno
- često

Koliko često konzumirate voće?

- nikada
- rijetko
- povremeno
- često

Koju vrstu maslaca ili margarinskog namaza konzumirate najčešće?

Koju vrstu masti ili ulja koristite najčešće za pripremu hrane?

Koliko često dodajete sol u hranu nakon što je već kuhana ili pripremljena?

Koliko često birate namirnice s reduciranom količinom masti umjesto uobičajenih vrsta?

Koliko često konzumirate brzu hranu iz restorana kao što su McDonald's ili KFC?

Koliko često konzumirate slatkiše i čokoladu?

Uzimate li dodatke prehrani da upotpunite svoju prehranu?

- Da
- Ne

Mislite li da je Vaša prehrana pravilna?

- Da
- Ne

Ako je Vaša prehrana pravilna, što mislite zašto je važno imati pravilnu prehranu?

#### **4. DIO - Upitnik o zdravstvenom stanju povezanom s prehranom**

Jeste li ikada imali srčani udar?

- Da
- Ne

Jeste li ikada bili primljeni u bolnicu sa srčanim udarom?

- Da
- Ne

Jeste li ikada imali anginu pektoris (bol u prsima dok hodate ili vježbate)?

- Da
- Ne

Jeste li ikada imali moždani udar?

- Da
- Ne

Bolujete li od dijabetesa?

- Da
- Ne

Ako bolujete od dijabetesa, koliko godina ste imali kada ste saznali da imate dijabetes?

Koji način liječenja za dijabetes sada imate?

- bez liječenja
- injekcije inzulina
- lijekovi
- prehrana
- tjelesna aktivnost
- drugi
- ne znam

Jeste li ikada bolovali ili bolujete od osteoporoze?

- Da
- Ne

Bolujete li od visokog krvnog tlaka?

- Da
- Ne

Imate li ili ste imali povišenu razinu kolesterola u krvi?

- Da
- Ne

Kolika je Vaša tjelesna masa?

Kolika je Vaša tjelesna visina?

Je li Vam ikada dijagnosticiran neki oblik karcinoma?

- Da
- Ne

## 5. DIO

Ja/Mi si mogu/možemo priuštiti da se hranimo pravilno

- uvijek
- ponekad
- nikada
- ne znam

Hrane ponestane u mojem/našem domaćinstvu zbog nedostatka novca.

- Točno

- Netočno

Ja/Mi konzumiram/o manje hrane zbog manjka novca.

- Točno
- Netočno

Raznolikost hrane koju ja mogu/mi možemo konzumirati je ograničena zbog manjka novca.

- Točno
- Netočno

Ja/Mi se oslanjam/o na druge da bi osigurali hranu i/ili novac za hranu za moje/naše domaćinstvo kada ja/mi nemam/o dovoljno novca.

- Točno
- Netočno

Ja/Mi konzumiram/o hranu u menzi ili primam/o socijalnu pomoć za hranu.

- Točno
- Netočno