Food intake and eating out of home patterns amongst university students of Tirana, Albania

Erand LLANAJ

Promotor: Prof. dr. ir. Marijke D’Haese
           Prof. dr. ir. Carl Lachat

Tutor:    Prof. dr. ir. Marijke D’Haese
           Prof. dr. ir. Carl Lachat

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Erand Llanaj
Promotors: Prof. dr. ir. Marijke D’Haese*
       Prof. dr. ir. Carl Lachat**

*Department of Agricultural Economics
**Department of food safety and food quality
Faculty of Bioscience Engineering
Universiteit Gent

Dean: Prof. dr. ir. Marc Van Meirvenne
Rector: Prof. dr. Anne De Paepe
Declaration of Authorship

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Ghent, 3rd June 2016

Promoter
Prof. dr. ir. Marijke D’Haese

Promoter
Prof. dr. ir. Carl Lachat

Signature

Prof. dr. ir. Marijke D’Haese
Prof. dr. ir. Carl Lachat

e-mail: Marijke.Dhaese@UGent.be
e-mail: Carl.Lachat@UGent.be

Student
Erand Llanaj

Signature

Erand Llanaj

e-mail: Erand.Llanaj@yahoo.com
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Thank you,
Erand
Abbreviations

AH – At Home

BMI – Body Mass Index

FAO – Food and Agriculture Organization

GDP – Gross Domestic Product

OH – Out of Home

PAL – Physical Activity Level

SD – Standard Deviation

SE – Standard Error

WHO – World Health Organization
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Summary

Background: Nutritional studies conducted in Albania, have not yet explored the potential of eating out of home, and even though eating out is a growing concern particularly among university students in Tirana. There is no evidence of food intake and composition of typical diet or for out of home eating practices and the public student restaurant infrastructure is not available yet.

Aim: The main aim of this study is to document food, macro-nutrient and energy intake and its link with eating out of home patterns among university students in Tirana.

Methodology: Cross-sectional design. We studied food intake amongst 289 students from three major universities in Tirana, Albania with a single 24 hours’ recall. Data were analyzed to compare food consumption OH to those AH and explore the differences between universities and sample characteristics. Mean dietary intakes were related to the proportion of OH eating, BMI, food items, food groups, etc. Study protocols and methods have been approved by the UZ Gent, Medical Ethical Committee with project number EC/2015/1118 and Belgian registration number B670201525967. This study is also approved by the Ministry of Health (Directorate of Health Care) and the University of Medicine Tirana Ethical Committee in Albania.

Results: The prevalence of energy intake of OH foods was generally high among all students. Average energy intake per gram from OH foods (2.7 kcal/g) was moderately related to BMI and higher energy per food item, compared to AH foods (1.7 kcal/g). The major sources of energy from OH foods were mainly foods high in sugar and fats, but the total contribution of sugars and fats was higher in AH foods. This is believed to be due to the high types of foods among AH traditionally consumed foods. Portions of meals were larger for AH foods, but energy density and contribution per meal was higher in OH foods.

Conclusions: Food intake and eating OH among the university students of Tirana, Albania, is a complex dietary practice, which is driven by several environmental, nutritional, psychosocial, political and economic factors. Eating OH among students is something common, but this research shows that eating OH has gained a significant role in the daily diet of students included in this study and in Albania in general. AH foods contain high amount of sugar and carbohydrates which is mainly attributed to the traditionally and widely high consumption of bread, particularly white bread that usually is eaten with jam. Regarding eating patterns, the findings show unhealthy foods, high in energy and saturated fats were more common in OH foods compared to AH foods, and variety, in terms of total number of different food items consumed, for OH foods was more limited compared to AH foods. Further research need to be done to explore further the potentials of OH eating in Albania.

Key words: Eating Out of Home, food intake, 24 hours’ recall, students, Albania
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Preface

Nutrition is a field of professional study and practice that has existed for a long time and an astonishing body of knowledge is enriching this field at an exponential rate. Now nutrition encompasses many disciplines that deal with a variety of factors affecting the food consumption and nutritional outcomes of populations, and it goes beyond the study of nutrition policies as it explores areas outside of health and food. It touches upon sustainability and energy issues, which were seen little by this perspective before. It somehow tries to keep awareness of the vulnerability that not only human species, but all the life on earth has towards food. We, humans, have just recently climbed the top of the food chain and have witnessed a rapid growth of productivity, but we still have not figured out the costs; and even if we have, our ambitions are not ignited enough, as the brightest of predictions are on a short-term basis and we still aim at reducing hunger, not eradicating it.

Furthermore, we are slowly approaching a transition, an evolution within cultures and the phenomenon of globalization has made possible the spread of awareness and information for a better health and nutrition, but at the same time it has promoted unwillingly many challenges. Eating out is slowly becoming more and more practiced and there is no so exact picture of what the implications of such practices are. Recent insights have shifted our perspectives and understanding towards what to consider, and our attention has been invested also towards the way we process foods and the degree of processing. Convenience is becoming a favorable trait and it is time to start considering how to make ‘the convenient’ healthy and at the same time how to effectively ‘arm’ people with information and comprehension in order to make well-informed and rational choices. On the other hand, we must consider another perspective and here is a simple way expressed by William James (1890):

“Picture a warm summer day at the beach, a pile of sand, and a bucket of sea water. If we pour some water on the top of the pile, we can watch how it finds its way down. The first wave seems undecided, constructing a winding path to ground level. Later waves, however, follow this path, and flow downwards in a seemingly effortless fashion: a habit has been born.”

Maybe eating out is becoming a societal habit. The political, social, economic, health-care, physical and mental environments are shaping our food choices and nutrition every day. A holistic approach is required to address and mitigate all these aspects. In the developed world, where the science of nutrition is somehow consolidated, these concerns are usually well documented and a vast body of knowledge is available, but in the developing world specific training programs in nutrition sometimes do not even exist. Even when they exist the elements of a curriculum in nutrition programs somehow exclude aspects that are crucial in understanding the challenges. Nutrition is a science and as such must apply scientific method. Science is a discipline of investigation and constructive doubt, questioning with evidence, logic and reason to draw conclusions. It proceeds by setting up hypothesis, ideas or models and try to disprove them, and being skeptical and asking questions. It seems that nutrition does not flourish when people accept its products but not its methods. Research in nutrition is not only a body of knowledge, but a way of thinking, an attitude. However, nutrition research is a great ocean and we've waded a little way out, maybe ankle-deep, and the water seems inviting…
1. Setting the scene … (Introduction)

Nutrition and lifestyle are two of the most important modifiable factors for maintaining a healthy life. They have an immensely important role in prevention and controlling of morbidity and mortality in populations, especially in the global burden of chronic diseases and disorders like obesity, diabetes, cardio-vascular diseases, arterial hypertension and some main types of malignant tumors (Danaei et al., 2009; Chiuve et al., 2006; Hu et al., 2001). Globalization is affecting food systems around the world by means of urbanization, increasing incomes, foreign investment and market liberalization (Inglis, 2015; Levin et al., 1999). Such effects are predicted and manifested in emerging countries (Vorster et al., 2016; Lobstein et al., 2015; Inglis, 2015; Popkin et al., 2004; Popkin, 2002; Drewnowski et al., 1997) as well as in Albania (Zhllima et al., 2012).

In 45 years of communist regime, Albania was under a rigid Stalinist-style governmental structure, staying in complete isolation and almost self-providing food for its people. After the collapse of this regime in 1990, a market-oriented economic system emerged involving major social, cultural and economic reforms. The Albanians moved from a hermetic self-reliant system into an open democratic society.

In 1997 due to failure of pyramid savings schemes, and after that in 1999, with the war in Kosovo, Albanian society experienced severe downfall in societal structure. The 1997 civil war had a considerable effect on the Albanian society for a very long time. This was reflected in downfall of almost all areas, including employment, welfare, asset endowment and massive emigration resulting from the poor economic conditions, limited domestic opportunities, poor nutrition and health status (Burazeri et al., 2008).

The economy started to rely majorly on remittances from migrants working abroad. Remittances constituted the largest source of foreign exchange and about 20% of GDP in Albania (WorldBank, 2015) and internally from migrants working in major cities and informal economy. After 2005 the economy started to take off again. In the last 25 years substantial lifestyle changes (diet, tobacco, alcohol consumption and physical exercise) have been clearly observed in Albania with an emerging “western” lifestyle and its effects (Burazeri et al., 2007; Gjonça et al., 1997), especially in Tirana.

A literature review shows that urban as opposed to rural diets are characterized by the consumption of polished grains (rice, wheat, rather than corn or millet), more fats and animal products, more sugar, more processed foods and more foods consumed away from home (Popkin et al., 1988). This whole situation has had some nutritional and health implications, which are evident in Albania as a country belonging to the developing world (Vorster & Bourne, 2016; Lobstein et al., 2015; Popkin, 2002, 2001; Drewnowski, 2000).

The few nutrition-related studies conducted in Albania in the past two decades, on food intake and diet composition topics, have left unexplored and uninvestigated the possible impact of eating out of home practices.
Generally the focus has been on measurement of basic anthropometric parameters and correlations with socio-economic factors (Mone et al., 2012; Burazeri et al., 2007). Recently there seems to be a greater tendency for eating out in general in Albania (Jaupi, 2015).

Tirana the capital city of Albania, has undergone a massive inflow of internal migrants, and in this context infrastructure, health, economy and education has been under stressful changes. From 2002 till 2010 private universities bloomed out of any control in Tirana combined with the reform in higher education 2007 and 2010 (EACEA, 2010). As a result, the inflow of students increased in the capital and this increased the population of the capital, with no improvement of health care facilities or basic nutrition services.

The small size of Albania (28,748 sq. km) and the relatively small population, nearly 2.9 million (INSTAT, 2016), combined with events described above, have put a considerable pressure on Tirana. Official figures estimate the residing population in Tirana to be 811,649 (INSTAT, 2016) inhabitants, but there are indications (Kapllani, 2007) that it can be up to 1 million. According to this data, almost one third of the entire population is residing in the capital region, making it almost impossible to provide access quality infrastructure, education, health services, employment, etc. for all.

In 2010 the first Baseline Nutrition and Food Security Survey (UNICEF, 2010) was conducted based on the Household Food Insecurity Access Scale methodology (Coates, 2007) and in 2013 a report on child malnutrition situation was published (Chiwara, 2013). Both reports did not explore the potentials of eating out-of-home (OH), even though Albania is facing a rapid increase in fast foods stores and eating out (Jaupi, 2015) and at the same time there has been an increase in eating out expenditure almost 10 times more in 2000 compared to 1994 (Vercuni, 2008).

Nutrition as a science and subject, was only recently introduced in Albania. As a result, it lacks the maturity and sophistication to conduct cutting-edge research and proper infrastructure for this research. The first time nutrition, was introduced in the University of Medicine Tirana, as a subject or course was in 2010. In the past 5 years it has gained interest, but still more is needed to document nutrition aspects and situation in Albania.

This study aims to document food, macronutrient and energy intake and its link with eating out of home patterns among university students in Tirana.
2. Literature review

2.1. Nutrition and development in Albania

Since the beginning of the transition from a central planned to a market oriented economy in early 1990s, economic growth, fast urbanization, regional trade liberalization and gradual integration to E.U., are contributing to a rapid evolution of consumption and lifestyle in Albania. These changes have resulted in a ‘switch’ from a restrictive environment towards an obesogenic environment (Townshend et al., 2015; Swinburn et al., 1999), and therefore the obese prone society experienced a steep rise in overweight and obesity, as food supply was less before 1990 and after that it became abundant [Figure 2.1.1].

In spite of the dramatic changes and developments, there is little or no data on food intake studies and furthermore no study has documented on eating out of home practices in Albania. The change from the group of low- and middle-income countries to upper-and middle income countries (WorldBank, 2013) is an indicator of fast developments in these past decades and this evolution of economy and society has affected significantly dietary patterns. Even though there are no critical issues with food security in Albania, food safety and nutrition quality is a major nutritional concern (Zhillima et al., 2015; FAO, 2010). The Global Nutrition Report (IFPRI, 2015) has documented that diet-related risks for chronic diseases are evident and emerging [Figure 2.1.2]. These trends are especially seen in Tirana, which is a representative conglomerate of Albanian culture. On the other hand, existing data need to be updated as it is not very recent and inherently it does not give a conclusive picture of the current situation.

Figure 2.1.1. Average number of calories available per capita/per day (kcal), HFA 2014 and average dietary adequacy (%), FAOSTAT 2016

Source: Recreated based on data from ‘European Health for All Database’, December 2015
Albanian’s fat intake patterns show a strong disproportionate consumption of animal fats (Marangoni et al., 2007). This has led to an estimate composition of 10.0% - 11.4% saturated fats, 0.75% - 0.99% trans fats and 234 mg - 266 mg of cholesterol in dietary intake per day/per capita (Micha et al., 2014). All this consumption pattern has not yet been examined for the contribution of OH foods in these data. In addition, there is a high prevalence of overweight and obesity, which has reached a 52.7% for both sexes and is higher in males (57.5%) compared to females (47.9%) [Figure 2.1.3].
2.2. Eating out of home practices

Similar to other countries, convenience has turned out to be a way of life for many Albanians in past few years. Foods and meals prepared away from home are an increasingly important part of the Albanian diet (Jaupi, 2015). This trend has coincided somehow with a dramatic rise in the prevalence of overweight and obesity.

While food, whatever the place of preparation, is not the sole factor that affects health and body weight, the increase of consumption of Out-of-Home (OH) foods should be an important consideration for people and policy makers aiming to improve health and nutritional situation.

A growing body of literature indicates that the eating OH foods influences energy intake. Well-informed choices pertaining to OH foods could help reduce calorie over-consumption and aid towards a better nutrition. Investigating food intake and dietary habits in early adulthood is critical as nutrition status in later stages of life is a confirmed predictor of adult nutritional status (Langley-Evans, 2015; Gordon-Larsen et al., 2004).

Young adulthood offers an important window of opportunity to prevent risk factors for diet-related non-communicable diseases, which can be tracked later into adulthood (Deforche et al., 2015; Alfaris et al., 2015). Consumption of foods prepared OH has been linked to increased energy intake (Bezerra et al., 2015), prehypertension in young adults (Seow et al., 2015) and increased BMI among those that consume these foods (Seguin et al., 2016; Nago et al., 2014; Lachat et al., 2012; Orfanos et al., 2007) and Albania has relatively high prevalence of adult overweight and obesity (WHO, 2014).

The evidence on eating OH contribution in diet is absent and the evidence for dietary patterns and place of consumption in Albania remains anecdotal, even though nutritionally the importance of eating out of home practices is crucial to determine dietary associations with health and disease (Kant et al., 2015; Ruel et al., 1999).

Eating OH has been commonly associated with a decreased intake of fruits and vegetables (Naska et al., 2015; Moreira et al., 2015; Satia et al., 2004; French et al., 2001), high energy density of food (Bezerra et al., 2015; Louzada et al., 2015) and a lower intake of micro-nutrients (Neumark-Sztainer et al., 2003; Guthrie et al., 2002).

A study conducted in the United Kingdom (Adamson et al., 1996) and another one in Brazil (Da Costa Louzada et al., 2015) demonstrated that OH foods contained less quantities of protein, iron, calcium and vitamin A and more sugars and fats in comparison with foods consumed at home.
2.3. Effect of Out-of-Home eating on nutrition and body weight

Eating OH foods generally have greater energy densities than at home foods (Prentice et al., 2003) and consumption of OH foods is linked directly with lower nutritional and dietary quality (Lachat et al., 2012). Studies in developing countries show that energy contribution of OH foods is relatively high (Nago et al., 2010; van't Riet et al., 2002; Tella, 1999). One of eating OH practices, fast-food consumption, is mainly observed in urban areas in Albania and are encouraged by the rapidly growing sector of fast-foods and it’s acceptance among consumers (Zhllima et al., 2012; Nicholson, 2001).

The uncontrollable growing number of fast-foods, kiosks, street food vendors, etc. may result in unhealthy food habits that numerous researchers have pointed out, concerning serving size (Bezerra et al., 2012; Rosenheck, 2008; Ledikwe et al., 2005), lack of consumer information and food safety standards (Blumenthal et al., 2010), which is a general problematic issue in Albania (Imami, 2011), limited unhealthy food options which have been discussed in Lachat et al. (2009) studies and which allegedly are evident in Albania’s fast-food industry, and eventually the issues of significantly higher loads of energy in OH foods (Prentice & Jebb, 2003). Additionally, a recent comprehensive systematic review (Rao et al., 2013) has concluded that healthier food options cost more than less-healthy food options, and the majority of the latter is comprised by OH foods. These major issues were expected to be observed in this study, as Albania fits the profile of a country in transition, with unexplored nutritional issues and potentials, particularly OH contribution in diet.

Previous (Beydoun et al., 2009; Kruger et al., 2008; Rosenheck, 2008; Boutelle et al., 2007; Chung et al., 2007; Duffey et al., 2007; Pereira et al., 2005) and recent research (Xue et al., 2016; Folkvord et al., 2016; Bellisle, 2014; Lachat et al., 2012) shows that eating out more frequently is associated with obesity, higher body fatness, or higher BMI.

The exact relationship though, between eating out and weight status remains unclear in the existing literature. Some research indicates a positive association while others do not (Shan et al., 2010; Rosenheck, 2008). Moreover, only a few cohort studies have tested the influence of eating out on obesity (Duffey et al., 2007; Pereira et al., 2005), but generally the evidence suggests that there is an evident effect of eating out frequency and composition on nutrition and body weight (Poulos et al., 2015; Nago et al., 2014; Lachat et al., 2012).

However, a new perspective is emerging pointing at the degree of food processing rather than eating patterns or food itself (Monteiro, 2009). This perspective goes further by analyzing the rapid growth of the production and consumption of ultra-processed foods globally (Monteiro et al., 2013; Monteiro et al., 2010). These new attitudes and perspectives towards eating out and nutrition are showing that fundamental elements of the new nutrition transition are indistinguishable across the continents.
The pursuit of scientific understanding of potential impacts and the need to intervene against possible unwanted consequences are aligned with the public and social interest and it is time for a new and a more creative paradigm or paradigms of thinking that will help us further advance public health nutrition as the nutrition transition pushes forward and more evidence is emerging (Fleming et al., 2016; Nazmi et al., 2013).

2.4. Food environment and context

This research study aims to document eating OH and in this attempt it is important to contextualize the OH food environment and structure. The typical foods that one can find around the faculties and that are most frequently consumed, are presented in Figure 5.1. The commonality of all these foods is the visual abundancy of foods rich in energy and the relative intensity of processing. These foods are found in many fast-food shops or restaurants and the prices seem to be relatively not cheap (3-4 € per meal) if we take into account the economical context; the average wage in Albania is around 357 € (49,130 ALL)\(^1\) and unemployment among students is almost 100% during studies during Bachelor studies.

At the same time employment rate for people aged 15-64 is 52,3\(^%\)\(^1\), which means that 1 in 2 parents that supports these students is, on average unemployed. The wage of 357 € are technically supporting partially the students and their families. If we take into consideration that in the three universities, we conducted the study, around 80% of the students are coming from other cities and have rent costs (private market – 150-200€/month and student residencies – 300-400€/year). If we further consider the proximity to fast-food convenience, the lack of time to prepare food and the density of different private food services around the universities, then food choices are somehow very limited OH and at the same time in a practical sense, fixed and attractive. The environment can be seen into the eating environment (Stroebele et al., 2004) and the food environment (see Figure 5.2).

The eating environment may refer to the external factors associated food consumption, but are independent of food, such as atmospherics, the proximity and effort of obtaining food, the social interactions that occur, and the distractions that may be taking place (Wansink, 2004). On the other hand, the food environment includes factors that may directly relate to the way food is provided or presented, such as its convenience, structure, package or portion size, whether it is fast, and how it is served (Cohen et al., 2015; Wansink, 2004).

Both environments may potentially contribute directly to consumption patterns, particularly for OH foods; they can also contribute indirectly by suggesting consumption norms and choices. The clustering of the fast foods vendors around residencies and streets that usually students live and interact is an indication of the constrains that a healthy food choice faces. It is important to also consider the lack of nutrition education and knowledge among these students, even when we talk about students that come from the University of Medicine, Tirana.

\(^1\) Albanian Statistical Institute; http://www.instat.gov.al/
2.5. Justification of the study

During the past decades there have been noticeable dietary changes in developing countries mainly characterized as “westernization” of the traditional diet, which results in more fat and less fiber intake (Vorster & Bourne, 2016; Popkin, 2001). In Balkans, the change is happening in food-service sector, chains of cafes and fast food restaurants (Witkowski, 2008), and this can shift the diets to be oriented more towards fast-food consumption or eating OH. This has led to diet pattern rich in animal based foods, which has been documented in Albania (Simopoulos et al., 2007).

Evidence is needed in Albania to indicate establishment and improved surveillance of nutritional quality and energy available from foods and beverages consumed OH, especially by young adults as concluded also by recent reviews (Lachat et al., 2012).

The impact of these dietary changes on the nutrition status have not been assessed yet for Albania. The focus of nutritional studies in Albania has traditionally been on food security, due to the strong orientation of donors and governments towards Millennium Development Goals (WHO, 2000).

The fast rapid increase in fast foods stores and eating out (Jaupi, 2015) as well as an increase in eating out expenditure almost 10 times more in 2000 compared to 1994 (Vercuni, 2008), calls for a need to explore and document the potentials, patterns and influences of these practices. Yet there is no evidence on how eating OH contributes to diet.

The study presented here, focuses on university students, where there is an absence of students’ restaurant infrastructure or any other regulated nutrition-related framework. This study’s objective should be the first step in analyzing the OH eating habits and should prepare for future larger-scale studies in the field of food intake in Albania.

It can inform current literature and policy makers on the potentials of eating OH in early adulthood. Furthermore, this study explored the poorly documented eating OH practices.

Albanian population and especially students have a consumer behavior, which is oriented towards eating out of home, most commonly fast foods (Muzi et al., 2015; Jaupi, 2015; Shabani et al., 2013). The foods that are available in these environments are mainly Greek souvlaki\(^2\), Bugrek\(^3\), pizzas, chips, soft drinks, a fixed variety of fruits (apples, banana, orange, pears and sometimes any seasonal fruit) and different types of sandwiches.

\(^2\) A popular Greek fast food consisting of small pieces of meat and sometimes vegetables grilled on a skewer. It is usually served for eating out of hand, in a pita sandwich with garnishes and sauces, or on a dinner plate, often with fried potatoes.
\(^3\) A kind of triangle pie in a family of baked filled pastries made of a thin flaky dough known as phyllo (or yufka) with different fillings, varying from the most common filling (curd) to meat and vegetables.
These foods are known to have high quantities of macronutrients (mainly fats and free sugars) and they comprise one of the main food categories consumed. In the universities indoor cafeterias there is only sodas, hot drinks and rarely any croissant. On the other hand rapid urbanization and high density of relatively inexpensive fast-food shops in Albania are believed to key drivers of eating out consumption (Zhllima et al., 2012).

Nutritional quality of foods consumed OH is shown to be lower in general, compared to at-home (AH) foods (Da Costa Louzada et al., 2015; Lozada et al., 2008). In Albania typically low quality foods are sold in kiosks around schools or universities, as there is no strategy for the regulation of this aspect of school life (Shabani et al., 2013).

A systematic review (Fleischhacker et al., 2011) found out that there was a strong association between living in areas and increased exposure to fast food and fast-food consumption as part of eating OH.

The evidence on eating OH contribution in diet is absent for Albania and the evidence for dietary patterns and place of consumption in Albania remains anecdotal, even though nutritionally the importance of eating OH practices is crucial to determine dietary associations with health and disease (Kant et al., 2015; Ruel et al., 1999).
3. Aim, objectives and research questions

3.1. Aim

The main aim of this study is to document food, macro-nutrient and energy intake and its link with eating out of home patterns among university students in Tirana.

The study focuses on a sample of university students in Tirana, as there is no university based or public student restaurant infrastructure present and a lack of data on intake and eating OH patterns among this population.

3.2. Specific objectives

The study tackles the following specific objectives, namely this research aims to:

- Assess food intake and study the eating patterns among university students;
- Explore gender differences on intake of major nutrients;
- Estimate differences of nutrient intake, energy and macronutrient contribution between AH vs. OH foods;
- Identify students’ dietary patterns when eating out, including meals, foods and nutrients
- Enhance knowledge on eating out in Albania

This study will provide up-to-date estimates of food intake and eating OH situation among university students. It should provide a starting point for future nutritional food intake studies in the country. Eventually the results and conclusions of this study should give some guidance to help navigate the wide range of OH food choices available in today’s Albanian food environment on a university perspective.

3.3. Research questions

The main research questions that guide this study are:

- What is the eating pattern regarding OH eating?
- Do out of home foods have higher energy contribution compared to at-home foods?
- What foods are the major sources of nutrients?
- Does the contribution of macronutrient differ between OH foods and at-home foods?
- Is portion size and energy density greater in OH foods or AH foods?

3.3.1. Null hypotheses

The following hypothesis are tested:

- The energy contribution between at home and out of home food intake does not differ.
- There is no difference in nutrient density between home and out of home food intake.
- A correlation may exist between energy intake from OH and overweight and obesity.
- Food consumption patterns are different between males and females.
4. Subjects and methods

4.1. Definition of Out of Home foods

A single, consensual and clear-cut definition of eating OH is not yet established and most researchers define eating OH based on the purpose of their research. Eating OH however is different and context depended. There are two main ways that researchers approach this issue: 1) based on place of consumption or 2) source of food.

In literature one commonly finds ‘eating out of home’ and ‘away from home eating’ to be used interchangeably. Both concepts however, refer to the same notion of practices involving foods prepared or consumed out of home, depending on the context and the chosen definition. Some studies define out of home eating as the consumption of food prepared or purchased away from home regardless of the place of consumption, whereas other studies and researchers define it as the consumption of food that is consumed not at home, independently from the place of purchase.

In this study, both definitions were taken into consideration and foods were defined in a case-by-case interrogation. So far, it is understood that choice of definition influences directly the estimates of eating out of home. Promoting healthy eating OH is a challenge that varies in its complexity due to the different contexts and maybe local, regional, national and cultural backgrounds. The findings of this research may offer insights that can serve as guidance to tackle eating OH in Albania. In addition, this can establish an approach in prospective studies which will try to investigate eating OH in Albania.

4.2. Ethical clearance

Study protocols and methods have been approved by the UZ Gent, Medical Ethical Committee with project number EC/2015/1118 and Belgian registration number B670201525967. This study is also approved by the Ministry of Health (Directorate of Health Care) in Albania (as the National Medical Committee of Albania is not yet functional due to legislative changes) and also the Ethical Committee of the University of Medicine Tirana. Every subject has been presented a written and read informed consent before participating and data is used in accordance to confidentiality and anonymity criteria (see Annex).

4.3. Study design

This study is a cross-sectional study which is appropriate for the purpose of the study with regard to practical aspects such as duration, cost and human resources. From this perspective, the choice of such a type of study is justified to evaluate nutritional situation and eating out of home practices among university students in Tirana, Albania.
4.4. Sampling

This study included university students of the three biggest and most representative universities in Albania, University of Tirana, University of Medicine Tirana and Polytechnic University of Tirana. Each university has respectively 7, 5 and 7 faculties. Based on this setting cluster sampling methods were used (Magnani, 1997). This sampling method is based on probabilistic sampling theory, meaning that every sampling unit has a known and non-zero probability of selection into the sample, and that random chance is the controlling factor in the selection of subjects. The sampling rationale and approach is detailed in Annex.

4.4.1. Eligibility criteria

For the study the subjects that were eligible:

1. Had to study in one of the three biggest and most representative universities in Albania: either University of Tirana, Polytechnic University of Tirana or University of Medicine Tirana. We are not taking into consideration students from the Agricultural University of Tirana because it is technically not in Tirana.

2. Had to study in any of the Bachelor programs their university is providing. We did not include Master and PhD students due to the fact that in Albania these programs are attended part-time and usually the lessons are symbolically short. Hence, these students are not really connected to the student life and are majorly working.

3. They had to be under 25 years old. Commonly there are students that have ‘finished’, their Bachelor degree in time terms, but they have failed exams and usually these students have no relation to student routine anymore, so they are not eligible to create an insight for this study.

4. Subjects that had signed the consent. No data from students that did not sign the informed consent will be included in the study.

5. Subjects that reported from the beginning that their intake was intake of a typical day:

   a. Intake of last 24 hours represents what typically you eat
   b. Last 10 days you have been eating more or less the same foods
   c. No disease prior or during this intake
   d. Not on a diet or special day
   e. Not any special event (birthday, party, etc.) prior or during this 24 hours’ intake

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4 Completed the normal duration of the program, but failed exams and are not attending school full-time.
4.4.2. General procedures

The students after being invited were introduced to the study and its objectives. After agreeing and signing, they filled out the questionnaire for the food intake, assisted by one of the trained interviewers.

4.4.3. Pre-examination procedures

The subject had to listen to the interviewer reading every sentence of the informed consent and they have to give their consent, otherwise they cannot be included in the study. They were able to withdraw from the study even after signing the informed consent without giving any further explanation.

4.5. Data collection

4.5.1. Anthropometric data

Height and weight were measured under the supervision and assistance of trained interviewers and for reliability, the measurements will be taken in duplicate. A third measurement was performed if the first two measurements differ by > 200 grams, for weight and > 2 cm for height. The average of measurements was taken into account and used for later analysis. BMI categories were defined based on classifications performed before in similar studies (Lachat et al., 2011; Cameron, 2007; Cole et al., 2000)

4.5.2. Food intake data

The 24-h dietary recalls were conducted by using the Automated Multiple-Pass Method (AMPM) (Moshfegh et al., 2008), which uses a standardized wording methodology to make recall of all possible foods as accurate as possible.

The subjects were first given a blank form to fill and then they will be called to explain in details food items. This method has five steps (detailed in Table 4.5.1). Students were interviewed three times with the AMPM in person. Interviews were distributed equally across all weekdays.

The process of data collection consisted of a 24-h recall, during which the subjects were presented different models of containers consisting of glasses, thickness sticks, bowls, circles, etc. in order to estimate the amounts of foods consumed. For more accuracy the booklet (see Annex) with life-size drawings of different containers and dishes facilitated the whole interview process in order to make it easier for the subjects to quantify the amount of food consumed.

A known 100 LEK Albanian life-size coin was attached to the models so it could increase accuracy of the estimated amount of food. Another issue concerning the establishment of these studies is the lack of national food composition tables.
Table 4.5.1. Outline of the 5 steps in the US Department of Agriculture Automated Multiple-Pass Method (AMPM) for collecting 24-h dietary recalls

<table>
<thead>
<tr>
<th>Step</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Quick list</td>
<td>To collect a list of foods consumed by the respondent in a 24-h period on the day before the interview. Gives cues to think about the day's events to help remember the foods eaten. Respondent uses own recall strategies.</td>
</tr>
<tr>
<td>2. Forgotten foods list</td>
<td>To elicit additional recall of foods by focusing respondent's attention on 9 categories of foods that are often forgotten: nonalcoholic beverages, alcoholic beverages, sweets, savory snacks, fruit, vegetables, cheeses, breads and rolls, and any other foods.</td>
</tr>
<tr>
<td>3. Time &amp; occasion</td>
<td>To collect information on the time at which the respondent ate each food and the name of the eating occasion. Sorts foods into chronological order and groups them by eating occasion for the Detail and review pass.</td>
</tr>
<tr>
<td>4. Detail and review</td>
<td>To collect a detailed description of each food reported (including additions to the food), amount eaten, its source (e.g., store or restaurant), and whether it was eaten at home. To review each eating occasion and the intervals between eating occasions to elicit additional recall.</td>
</tr>
<tr>
<td>5. Final models</td>
<td>To provide a final opportunity to recall foods. Gives cues about no salient situations when foods may be eaten and easily forgotten. Encourages reporting of small amounts of food that may have been regarded as not worth mentioning.</td>
</tr>
</tbody>
</table>

Source: Adapted from (Moshfegh et al. (2008))

Albania has not yet established a database for composition of foods, and also bordering countries do not have one. For this study we used the Greek Food Composition Database (HHF, 2007). The Greek database is the most comprehensive and complete food composition table in the region and at the same time Greek diet pattern is very similar to the Albanian, as part of Mediterranean diet (Gjonça & Bobak, 1997). In our study the days of the week were chosen randomly and the teams of interviewers would go to one of the universities and collect the data.

Except Greece
Instructions for multiple pass questionnaire for 24-hour recall food intake

The 24 h recall was processed through an in-depth interview for food intake. Multiple pass interview was comprised of 4 parts (4 passes):

a) Introduction (Invitation letter and informed consent)
The interviewer introduced the purpose of our study and the procedures that the subjects would potentially undergo and also communicate them the informed consent that they had to sign.

b) Quick list of food items (First pass)
At this point the interviewer started by just asking a list of foods consumed in past 24 hours, and tried to distinguish the meal, place of consumption and source and type of food. This was first pass.

c) Amount and details (Second pass)
After the first pass, the interviewer attempt to quantify the amounts of foods and also find out any details like brand, weight, etc. This was second pass.

d) Clarification review (Third pass)
Eventually an overview of all the unclear things that were potentially faced during the interview and any further information the subjects would require or the researchers. This was the third and last pass.

A more extensive explanation detailed and step-by-step description of all the question and possible information we required from the subjects is described in Annex.

4.5.3. Research team

All interviewers were students from Master of Science in Public Health program of the Faculty of Public Health at the University of Medicine, Tirana. They were selected on the basis of evident previous courses in nutrition or health studies and previous experiences conducting field research. In addition, they were trained by the principal investigator (Erand Llanaj) to ensure the correct implementation of the study protocol. The team was divided in sub-teams and materials were provided to all of them included probes, booklets, scales, stadiometers, and all other necessary materials.

Each team had a coordinator that was continuously in contact with the principal lead investigator in order to solve out in real time any issues concerning the classification of food or determination of method to measure the quantity consumed or to make sure informed consent was properly understood and signed. During the process of data collection, they were periodically monitored and questionnaire random-check was performed to assure fidelity to the instructions and protocol of data collection. (see Annex)

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6 From 6 am till 6 am next day.
4.5.4. Data analysis

Food intake data were entered and processed using LUCILLE Food Intake Software (© UGent). Statistical analyses were performed with SPSS ver. 21 (Statistical Package for Social Sciences, Chicago Illinois – © IBM 2013), and R Statistics/R Studio. Microsoft Excel 2013 was also used to perform different calculations and grouping and classifications of various variables to explore the contribution of OH foods in the diet.

The mean percentage of energy intake provided by OH foods was determined by tertiles and three groups were identified: low (everything below 25 percentile), moderate (everything between 25 and 75 percentile) and high (everything above 75 percentile) energy contribution from OH foods. These groups were compared for food and nutrient intakes and other differences considering gender and university.

Data were analyzed using independent t-test, paired samples t-test and one-way ANOVA procedures in SPSS ver. 21 and differences between groups were adjusted where applicable by residual method. All tests were two-sided and a significance level of 5% was used for all analyses. Significant level was considered 5%. Re-grouping and re-classification were performed with R Statistics and R Studio and graphical representations were done by Microsoft Excel 2013 and LineUp by Caleydo⁷ (open source).

Sensitivity analysis was performed and outliers were not excluded from as there was no effect on the results. For calculation of BMR a PAL value of 1.76 was selected as we consider students in these universities in Albania to be active or moderately active.

This was determined using FAO recommended value (FAO-WHO, 2004) for a set of activities which we consider relevant to this student population. This set of activities includes sleeping, personal care (dressing, showering), eating, standing, carrying light loads (waiting on tables, arranging merchandise), commuting to/from work on the bus, walking at varying paces without a load, low intensity aerobic exercise, light leisure activities (watching TV, chatting).

Kleiber’s BMR formula with temperature adjustment was used (Kleiber, 1961). To represent levels of eating OH spectrum-slider charts were created in Excel and used.

⁷ http://www.caleydo.org/downloads/
5. Results

To describe food intake and OH eating, and to put all the results into the context it is important to consider the context and the environment of Tirana, that shapes and influences potentially students’ food choices, in the absence of student restaurants designed to be student demand oriented and not profit oriented. At the same time the options that are available within the universities infrastructure are privately owned, profit-oriented and there are no standards or guidelines for healthy nutrition. In these ‘coffee bars’ within universities there are no food options.

Figure 5.1 and 5.2 show the typical foods, except the commercial croissants, industrially produced and available on every shop around university. These pictures make an attempt to create an idea of the surroundings and the availability of choices. Some of the foods are taken for breakfast or lunch, other are typical snacks.

Figure 5.1. Pictures of the foods and typical food sources around the universities. (1) Fast food that offers pizza and burek, (2) typical breakfast out of home with dhallë (yoghurt drink) and burek, (3) typical crepe (pancake), (4) coffee with 2 sugar packs (common), (5) qofte (meatballs of different shapes and fillings), (5) doner (meat-filled sandwich), (6) souvlaki, (7) gyros, and (9) typical shop next to school.

Source: Shot in Tirana, Albania. Faces and brands are blurred to avoid privacy.
There is also an exposure factor that is influencing the food choices in our population. To illustrate this, a mapping of all food sources in one of the universities included in this study (University of Medicine Tirana). The map shows the major food vendors and the proximity from residences and faculties. Although such environmental factors may appear unrelated initially, we believe that generally it may influence consumption choices and consumption patterns.

**Figure 5.2. Mapping of student residence and available sources of foods**

(University of Medicine Tirana)

*Source: Author’s elaboration. Erand Llanaj, 2016*
For instance, student seem to regularly take coffee most of the time on their way to the university or during breaks. The interesting part is that consumption of coffee is done by putting to sockets of sugar almost unconsciously, inside the cup of coffee and consuming it. When observed and afterward asked the students say that it is a habit that it has been like a norm, but they have no rationale behind it. These two pictures aim to underscore how small structural changes in personal environments can reduce the choice of food and the eating OH intensity or habit.

5.1. Sample characteristics

The study included 289 participants out of 361 approached, of which 87.2% were females and 12.8% were males. From the 361 total invited participants, 35 reported that the day they wanted to record was not representative of typical day and they were excluded. From the 326 remaining, 11 were excluded due to disease (flu, medication, etc.) during the past 24 hours. Eventually 26 refused to participate and were not included in the study. The high percentage of participating females is not due to a sampling error, but rather due to a greater proportion of females’ presence, in higher education in general, and particularly in these three universities we sampled from. We are not conscious of a systematic or over or underrepresenting females or males. The composition of our sample, in terms of membership to university is represented below, in Table 5.1.1 and Figure 5.1.1.

<table>
<thead>
<tr>
<th>University of Tirana</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Medicine</td>
<td>132</td>
<td>45.7</td>
</tr>
<tr>
<td>Polytechnic University of Tirana</td>
<td>60</td>
<td>20.8</td>
</tr>
<tr>
<td>Total</td>
<td>289</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on calculations, sampling errors were minimized and sampling interval made enabled a formal sampling. This is reflected also in the distribution of respondents by university. In the University of Tirana, the number of participants was 97 (33.6%), in University of Medicine Tirana 132 (45.7%) and Polytechnic University of Tirana 60 (20.8%). The majority of the subjects were students studying at University of Medicine Tirana.

Figure 5.1.1. Distribution of subjects by university
The distributions of days of intake recorded is represented in Figure 5.1.2. Sunday was not taken as a typical day, because as noted during the initial testing interviews, the meals and foods eaten on Sunday were not that of a typical day. Hence it was decided not to include the consumption of Sunday’s in the analyses. Most food intake data in this study is for Tuesday and Wednesday, respectively 28.0% and 28.4%.

![Figure 5.1.2. Distribution of intakes by day of week](image)

In Tables 5.1.2 and 5.1.3, a summary of characteristics of participating subjects is presented. These characteristics included Age, Height, Weight, BMI, amount of energy from OH foods or meals. There were notable differences between universities, except for BMI, total energy and amount of OH energy. These parameters are not statistically different from each other, implying somehow that intake and OH eating is similar in all three universities. All three student categories by university, have the same relatively healthy average BMI. Subjects from University of Tirana (BMI= 21.07±3.2), University of Medicine Tirana (BMI=21.25±3.1) and Polytechnic University of Tirana (BMI=22.45±3.1), with same BMI, total energy intake and OH amount of energy, do not have the same need, according to the Kleiber’s BMR calculated and adjusted for temperature.

Students of Polytechnic University of Tirana seem to have the highest energy requirements, and at the same time they do have the highest (compared to the two other universities) energy intake and BMI, however not statistically significant.

<table>
<thead>
<tr>
<th>Table 5.1.2. Characteristics of study subjects (N=289)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Height</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>BMI</td>
</tr>
<tr>
<td>Energy OH</td>
</tr>
<tr>
<td>Energy (kcal)</td>
</tr>
<tr>
<td>Kleiber BMR*</td>
</tr>
</tbody>
</table>
The distribution of energy requirements and energy intake, shown in the figure above, shows the expected consumption and the observed consumption. Energy intake is generally higher than energy required, calculated and adjusted with Kleiber’s formula.

Table 5.1.3. Characteristics of study subjects by university (N=289)

<table>
<thead>
<tr>
<th></th>
<th>University of Tirana (N=97)</th>
<th>University of Medicine (N=132)</th>
<th>Polytechnic University of Tirana (N=60)</th>
<th>p†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>19.3±1.0</td>
<td>19.9±1.3</td>
<td>19.8±1.5</td>
<td>0.001</td>
</tr>
<tr>
<td>Height</td>
<td>1.7±0.1</td>
<td>1.7±0.1</td>
<td>1.7±0.1</td>
<td>0.003</td>
</tr>
<tr>
<td>Weight</td>
<td>57.0±9.3</td>
<td>57.8±8.5</td>
<td>64.4±12.2</td>
<td>&gt;0.001</td>
</tr>
<tr>
<td>BMI</td>
<td>21.1±3.2</td>
<td>21.3±3.1</td>
<td>22.5±3.1</td>
<td>0.20</td>
</tr>
<tr>
<td>Energy OH</td>
<td>1132.0±628.4</td>
<td>1107.4±728.8</td>
<td>1228.4±852.9</td>
<td>0.536</td>
</tr>
<tr>
<td>Energy (kcal)</td>
<td>2340.4±517.0</td>
<td>2465.3±582.0</td>
<td>2532.8±598.8</td>
<td>0.088</td>
</tr>
<tr>
<td>Kleiber BMR*</td>
<td>2615.2±324.0</td>
<td>2626.2±273.6</td>
<td>2870.2±425.8</td>
<td>&gt;0.001</td>
</tr>
</tbody>
</table>

*Kleiber’s BMR value is adjusted for temperature and PAL
†One-Way ANOVA
When students are split by university and BMI, some differences between sexes become clear. In all three universities more females are found with underweight and obesity, but overweight has variations among both sexes. These results should be read with caution as the majority of the participants were females and this influences somehow the highest percentage of females in BMI categories as they risk to be over-represented, compared to male.

<table>
<thead>
<tr>
<th>University</th>
<th>Under-weight (BMI≤18.5)</th>
<th>Normal weight (18.5 &lt;BMI&lt; 24.9)</th>
<th>Over-weight (25&lt;BMI&lt;29.9)</th>
<th>Obesity (BMI≥30)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Tirana</td>
<td>♂ 0%</td>
<td>5.2%</td>
<td>4.1%</td>
<td>0%</td>
<td>9.3%</td>
</tr>
<tr>
<td></td>
<td>♀ 18.6%</td>
<td>67.0%</td>
<td>4.1%</td>
<td>1.0%</td>
<td>90.7%</td>
</tr>
<tr>
<td>Total</td>
<td>18.6%</td>
<td>72.2%</td>
<td>8.2%</td>
<td>1.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>University of Medicine</td>
<td>♂ 0%</td>
<td>6.1%</td>
<td>0%</td>
<td>0%</td>
<td>6.6%</td>
</tr>
<tr>
<td></td>
<td>♀ 15.9%</td>
<td>66.7%</td>
<td>8.3%</td>
<td>1.5%</td>
<td>92.4%</td>
</tr>
<tr>
<td>Total</td>
<td>16.7%</td>
<td>72.7%</td>
<td>9.1%</td>
<td>1.5%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Polytechnic University of Tirana</td>
<td>♂ 0%</td>
<td>15.0%</td>
<td>15.0%</td>
<td>0%</td>
<td>30.0%</td>
</tr>
<tr>
<td></td>
<td>♀ 5.0%</td>
<td>58.3%</td>
<td>5.0%</td>
<td>1.7%</td>
<td>70.0%</td>
</tr>
<tr>
<td>Total</td>
<td>5.0%</td>
<td>73.3%</td>
<td>20.0%</td>
<td>1.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total sample</td>
<td>♂ 0.3%</td>
<td>7.6%</td>
<td>4.8%</td>
<td>0%</td>
<td>12.8%</td>
</tr>
<tr>
<td></td>
<td>♀ 14.5%</td>
<td>65.1%</td>
<td>6.2%</td>
<td>1.4%</td>
<td>87.2%</td>
</tr>
<tr>
<td>Total</td>
<td>14.9%</td>
<td>72.7%</td>
<td>11.1%</td>
<td>1.4%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

5.2. Comparison of OH and AH eating patterns

Mean energy intake is higher at home, compared to out of home, and statistically this difference is significant (Table 5.2.1). Even though OH foods are commonly seen as having higher fat content, in our sample at-home (AH) foods have greater fat contribution, but statistically this difference is not significant. For carbohydrates AH foods had significantly higher contribution than OH foods. Sodium intake in both categories was relatively the same and no significant difference was observed.

<table>
<thead>
<tr>
<th>Total</th>
<th>OH†</th>
<th>AH¥</th>
<th>(P^*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SD</td>
<td>% TC£</td>
<td>Mean</td>
</tr>
<tr>
<td>Energy (kcal)</td>
<td>2437.4</td>
<td>565.7</td>
<td>45.8%</td>
</tr>
<tr>
<td>Fats (g)</td>
<td>95</td>
<td>29.6</td>
<td>47.6%</td>
</tr>
<tr>
<td>Carbohydrates (g)</td>
<td>315.3</td>
<td>87.9</td>
<td>44.5%</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>2376.5</td>
<td>1182.4</td>
<td>47.7%</td>
</tr>
<tr>
<td>Sugar (g)</td>
<td>110.3</td>
<td>54.8</td>
<td>35.8%</td>
</tr>
<tr>
<td>SAFA’s (g)</td>
<td>32.9</td>
<td>13.2</td>
<td>51.4%</td>
</tr>
<tr>
<td>Fibers (g)</td>
<td>31.4</td>
<td>14.7</td>
<td>44.8%</td>
</tr>
<tr>
<td>Proteins (g)</td>
<td>86.4</td>
<td>29.9</td>
<td>42.5%</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>18.4</td>
<td>7.9</td>
<td>33.5%</td>
</tr>
</tbody>
</table>

*Paired t-test – Differences adjusted with regression method,
†Out of home foods,
¥At home foods,
£Percentage of Total Contribution
AH foods had significantly higher contribution of sugar, fibers, proteins and iron, compared to OH foods. The only nutrient that OH foods had significantly higher contribution were saturated fatty acids, where OH foods had on average 17.9 ± 13.5 grams and AH foods 15.0 ± 9.9. This means that on average OH foods have 2.9 grams more saturated fats than AH foods.

Regarding the distribution of energy, macro- and micronutrients contribution, a greater contribution of energy can be seen from AH foods, but the standard deviation shows more fluctuations in energy contribution among foods consumed OH.

Carbohydrates, sugar, fibers, proteins and iron seem to have greater contribution again from AH foods. Saturated fats are in significantly greater density in OH foods. Eventually fats are in higher amounts in AH foods but there is no statistical significance observed and the same is for sodium, which is higher in OH foods, but no statistical significance is either observed in this case.

| Table 5.2.2. Percentage of meals by typology of food and food group* |
|-----------------------------------------------|-----------------|
|                                               | At-home         | Out-of-home    |
| Vegetables and legumes/beans                  | 93.3%           | 6.7%           |
| Fruits                                        | 94.7%           | 5.3%           |
| Grains (cereals) foods                       | 50.1%           | 49.9%          |
| Meats and poultry, fish, eggs, nuts and seeds | 71.5%           | 28.5%          |
| Milk, yoghurt, cheese and/or alternatives     | 75.9%           | 24.1%          |
| Sweets and drinks                            | 19.8%           | 80.2%          |

*Percentage of food types and food groups consumed as measured in the 24h recall

When the percentage of meals are stratified by the different predefined food groups in this study, we see that the vast majority of the fruit and vegetable products, meats, poultry, fish, eggs, nuts, seeds and milk and milk products come from AH foods, while sweets and drinks are consumed more OH. Grains coming from OH and AH are contributing rather evenly to the diet, with almost no relevant difference observed.

Yoghurt consumption was mainly homemade yoghurt which is traditionally and commonly practiced in Albanian households. When we observe the distribution of AH vs. OH of specific food items by number of meals (Table 5.2.4), by energy contribution (Table 5.2.5) and when we rank them according to nutrient density (Figure 5.2.1) it is seen that AH foods are healthier than OH foods. In the distribution by meal frequency (Table 5.2.4) we see that AH top 10 foods are qualitatively healthier than OH foods, based on the different food groups they represent.

<table>
<thead>
<tr>
<th>Table 5.2.3. Share of subjects by yoghurt meals consumed</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
</tr>
<tr>
<td>-------------------------------</td>
</tr>
<tr>
<td>Yoghurt home made</td>
</tr>
<tr>
<td>Yogurt (commercial)</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
Table 5.2.4. Frequency and mean of caloric consumption AH vs. OH by food item

<table>
<thead>
<tr>
<th>Rank</th>
<th>AH foods</th>
<th>OH foods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% TC†</td>
<td>Mean*</td>
</tr>
<tr>
<td>1</td>
<td>White bread, Wheat</td>
<td>37.1%</td>
</tr>
<tr>
<td>2</td>
<td>Apple (raw)</td>
<td>4.6%</td>
</tr>
<tr>
<td>3</td>
<td>Feta cheese</td>
<td>7.0%</td>
</tr>
<tr>
<td>4</td>
<td>Tangerine (raw)</td>
<td>4.6%</td>
</tr>
<tr>
<td>5</td>
<td>Milk (cow)</td>
<td>5.6%</td>
</tr>
<tr>
<td>6</td>
<td>Banana (raw)</td>
<td>2.9%</td>
</tr>
<tr>
<td>7</td>
<td>Persimmons</td>
<td>5.7%</td>
</tr>
<tr>
<td>8</td>
<td>Tomato and cucumber salad</td>
<td>3.5%</td>
</tr>
<tr>
<td>9</td>
<td>Brown bread</td>
<td>9.1%</td>
</tr>
<tr>
<td>10</td>
<td>Milk (cow)</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

Table 5.2.5. At-home and out-of-home prepared foods by average energy contribution

<table>
<thead>
<tr>
<th>No.</th>
<th>Food item</th>
<th>AH Mean*</th>
<th>AH SD</th>
<th>Food item</th>
<th>AH Mean</th>
<th>AH SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Trachanas pie</td>
<td>941.1</td>
<td>-</td>
<td>Veal casserole</td>
<td>1109.2</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Leek pie</td>
<td>591.6</td>
<td>-</td>
<td>Jam tart</td>
<td>949.7</td>
<td>311.7</td>
</tr>
<tr>
<td>3</td>
<td>Onion &amp; Tomatoes Pie</td>
<td>553.1</td>
<td>112.6</td>
<td>Souvlaki</td>
<td>648.2</td>
<td>149.0</td>
</tr>
<tr>
<td>4</td>
<td>Potato salad</td>
<td>526.4</td>
<td>594.0</td>
<td>Pizza (all pizzas)</td>
<td>761.7</td>
<td>559.1</td>
</tr>
<tr>
<td>5</td>
<td>Crepe pastry</td>
<td>524.5</td>
<td>247.3</td>
<td>Chicken salad</td>
<td>689.5</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Lamb meat (meat braised)</td>
<td>514.6</td>
<td>493.7</td>
<td>Peinirli (bacon and cheese)</td>
<td>631.9</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Minced meat and rice balls</td>
<td>514.5</td>
<td>276.2</td>
<td>Pie (with curd)</td>
<td>584.3</td>
<td>415.3</td>
</tr>
<tr>
<td>8</td>
<td>Sandwich</td>
<td>510.0</td>
<td>0.0</td>
<td>Sandwich</td>
<td>540.6</td>
<td>168.6</td>
</tr>
<tr>
<td>9</td>
<td>Pork in tomato sauce</td>
<td>506.4</td>
<td>287.6</td>
<td>Onion &amp; Tomatoes Pie</td>
<td>521.7</td>
<td>328.9</td>
</tr>
<tr>
<td>10</td>
<td>Russian salad</td>
<td>505.3</td>
<td>297.6</td>
<td>Crepe pastry</td>
<td>466.2</td>
<td>180.6</td>
</tr>
</tbody>
</table>

*SWEETS AND DRINKS | MEAT AND BY-PRODUCTS | FRUITS & VEGETABLES | GRAINS AND CEREALS

*AVERAGE CONTRIBUTION OF ENERGY FROM FOOD ITEM
When sorted by nutrient density, some nutrients are present in higher densities in foods out of home, like SAFA’s and proteins. This gives a general idea on the composition of the diet at home an OH, which in general seems to have some minor differences, but not major ones. These representation gives also an idea of the food origin of nutrients, like pizza in the case of foods consumed OH.

**Figure 5.2.1. Food items and their nutrient composition consumed**

This is a *fisheye view* generated by open source software LineUp® by Caleydo®, and here we notice that the general diversity in diet is higher at home, than compared to out of home. This can be inferred if we compare the total different food items consumed OH vs. AH. There were 125 different food items consumed at home and 88 food items consumed out of home. This provides an indication of the fact that food variety is higher at home and food choices are more limited out of home, especially considering the limited fast food niches. Food consumed at home are generally rich in fats, saturated fats, proteins and carbohydrates, while foods OH have also high densities of macronutrients and fast-food dominated the top of the list. Foods consumed OH seem to be less diverse with options like pizza, sweets, casseroles and other high energy dense foods.
5.3. Assessment of OH and AH contribution

Now if we ignore the difference in intensity of eating OH and focus only on the average percentage of students eating OH we can explore differences based on university and sex (Figure 5.3.1).

**Figure 5.3.1. Comparison of average percentage* of eating OH by sex and university**

Males seem to eat more OH compared to female students in all three universities visited. In Table 5.3.1 below, these comparisons are summarized and a paired t-test is performed to check for statistical significance of the differences between males and females within each university.

Statistical differences were found for the University of Medicine Tirana (P<0.001) and Polytechnic University of Tirana (P=0.03), but for University of Tirana (P=0.18) the difference is not of statistical importance.

When we observe the differences between males and females on an overall comparison, males seem to have a higher percentage of eating OH compared to females (59.7% vs 43.7%, P<0.001).

Moreover, males eat more OH compared to females, almost 16% more on average.
Table 5.3.1. Sex differences of eating OH percentage by university

<table>
<thead>
<tr>
<th>University (Females - Males)</th>
<th>Mean Difference</th>
<th>Std. error of difference</th>
<th>95% CI of the Difference</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Tirana</td>
<td>-11.3</td>
<td>7.8</td>
<td>-28.8 - 6.3</td>
<td>0.18</td>
</tr>
<tr>
<td>University of Medicine Tirana</td>
<td>-32.0</td>
<td>6.4</td>
<td>-44.7 - 19.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Polytechnic University of Tirana</td>
<td>-12.8</td>
<td>5.7</td>
<td>-24.3 - 1.3</td>
<td>0.03</td>
</tr>
</tbody>
</table>

The average percentage of eating OH is very similar and relatively homogenous across all three universities (P=0.492).
Further, BMI has commonly been linked to higher OH consumption. Based on the data collected, the correlation between BMI and energy intake from OH is noted, but the coefficient of correlation seems to be relatively moderate to weak. The results on this relationship are not conclusive, even though we see BMI is positively associated with energy intake OH.

**Figure 5.3.4. Correlation between BMI and Energy from OH sources**

Within a university, the patterns of higher contributions in sugars, fibers, proteins and iron from AH foods persist (Table 5.3.2). It seems that the greater statistically significant contribution among nutrients from AH foods seems to be consistent for University of Tirana and University of Medicine Tirana and almost for every nutrient (except saturated fats) for Polytechnic University of Tirana. This has been noted during the data analysis as a clear pattern, which is a result of the high density of AH foods and the consumption of certain foods rich in sugars, fibers and proteins. These differences are also reflected in the table below (Table 5.3.2). Another notable aspect is the lack of statistically significant difference between energy, fats and salt consumed AH vs. OH within the universities settings.
<table>
<thead>
<tr>
<th>University</th>
<th>Comparison</th>
<th>Δ Mean</th>
<th>SD</th>
<th>SE</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
<th>(P^*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Tirana</td>
<td>Energy OH - Energy AH (kcal)</td>
<td>-250.4</td>
<td>1192.2</td>
<td>103.8</td>
<td>-455.7</td>
<td>-45.1</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>Energy OH - Energy AH (%)</td>
<td>-129</td>
<td>46.2</td>
<td>4.0</td>
<td>-208.4</td>
<td>-4.9</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>Fats OH - Fats AH (g)</td>
<td>-5.0</td>
<td>53.9</td>
<td>4.7</td>
<td>-14.3</td>
<td>4.2</td>
<td>0.284</td>
</tr>
<tr>
<td></td>
<td>Fats OH - Fats AH (%)</td>
<td>-8.7</td>
<td>52.0</td>
<td>4.5</td>
<td>-17.6</td>
<td>0.3</td>
<td>0.057</td>
</tr>
<tr>
<td></td>
<td>Carbs OH - Carbs AH (g)</td>
<td>-46.1</td>
<td>162.2</td>
<td>14.1</td>
<td>-74.0</td>
<td>-18.1</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Carbs OH - Carbs AH (%)</td>
<td>-15.7</td>
<td>49.1</td>
<td>4.3</td>
<td>-24.2</td>
<td>-7.2</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Salt OH - Salt AH (mg)</td>
<td>-127.9</td>
<td>1613.0</td>
<td>140.4</td>
<td>-405.6</td>
<td>149.9</td>
<td>0.364</td>
</tr>
<tr>
<td></td>
<td>Salt OH - Salt AH (%)</td>
<td>-7.6</td>
<td>59.1</td>
<td>5.1</td>
<td>-17.7</td>
<td>2.6</td>
<td>0.143</td>
</tr>
<tr>
<td></td>
<td>Sugars OH - Sugars AH (g)</td>
<td>-83.2</td>
<td>73.9</td>
<td>6.4</td>
<td>-209.5</td>
<td>-35.4</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Sugars OH - Sugars AH (%)</td>
<td>-28.1</td>
<td>56.2</td>
<td>4.9</td>
<td>-37.7</td>
<td>-18.4</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Fibers OH - Fibers AH (g)</td>
<td>-21.1</td>
<td>19.3</td>
<td>1.7</td>
<td>-24.5</td>
<td>-17.8</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Fibers OH - Fibers AH (%)</td>
<td>-55.1</td>
<td>47.3</td>
<td>4.1</td>
<td>-63.3</td>
<td>-47.0</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Proteins OH - Proteins AH (g)</td>
<td>-15.8</td>
<td>49.9</td>
<td>4.3</td>
<td>-24.4</td>
<td>-7.2</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Proteins OH - Proteins AH (%)</td>
<td>-19.8</td>
<td>54.0</td>
<td>4.7</td>
<td>-29.1</td>
<td>-10.5</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Iron OH - Iron AH (mg)</td>
<td>-8.6</td>
<td>10.7</td>
<td>0.9</td>
<td>-10.5</td>
<td>-6.8</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Iron OH - Iron AH (%)</td>
<td>-39.6</td>
<td>50.8</td>
<td>4.4</td>
<td>-48.4</td>
<td>-30.9</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>University of Medicine, Tirana</td>
<td>Energy OH - Energy AH (kcal)</td>
<td>-75.9</td>
<td>1306.8</td>
<td>168.7</td>
<td>-413.5</td>
<td>261.7</td>
<td>0.654</td>
</tr>
<tr>
<td></td>
<td>Energy OH - Energy AH (%)</td>
<td>-4.9</td>
<td>46.2</td>
<td>6.0</td>
<td>-16.9</td>
<td>7.0</td>
<td>0.412</td>
</tr>
<tr>
<td></td>
<td>Fats OH - Fats AH (g)</td>
<td>-0.1</td>
<td>48.1</td>
<td>6.2</td>
<td>-12.5</td>
<td>12.3</td>
<td>0.988</td>
</tr>
<tr>
<td></td>
<td>Fats OH - Fats AH (%)</td>
<td>-8.7</td>
<td>52.0</td>
<td>4.5</td>
<td>-17.6</td>
<td>0.3</td>
<td>0.057</td>
</tr>
<tr>
<td></td>
<td>Carbs OH - Carbs AH (g)</td>
<td>-28.9</td>
<td>180.9</td>
<td>23.3</td>
<td>-75.7</td>
<td>17.8</td>
<td>0.220</td>
</tr>
<tr>
<td></td>
<td>Carbs OH - Carbs AH (%)</td>
<td>-9.3</td>
<td>47.8</td>
<td>6.2</td>
<td>-21.7</td>
<td>3.1</td>
<td>0.138</td>
</tr>
<tr>
<td></td>
<td>Salt OH - Salt AH (mg)</td>
<td>-20.9</td>
<td>1736.8</td>
<td>224.2</td>
<td>-469.6</td>
<td>427.7</td>
<td>0.926</td>
</tr>
<tr>
<td></td>
<td>Salt OH - Salt AH (%)</td>
<td>-7.6</td>
<td>591</td>
<td>5.1</td>
<td>-17.7</td>
<td>2.6</td>
<td>0.143</td>
</tr>
<tr>
<td></td>
<td>Sugars OH - Sugars AH (g)</td>
<td>-48.8</td>
<td>85.5</td>
<td>10.8</td>
<td>-70.4</td>
<td>-27.2</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Sugars OH - Sugars AH (%)</td>
<td>-33.6</td>
<td>57.2</td>
<td>7.4</td>
<td>-48.4</td>
<td>-18.8</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Fibers OH - Fibers AH (g)</td>
<td>-17.6</td>
<td>23.9</td>
<td>3.1</td>
<td>-23.8</td>
<td>-11.4</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Fibers OH - Fibers AH (%)</td>
<td>-45.1</td>
<td>50.3</td>
<td>6.5</td>
<td>-58.1</td>
<td>-32.1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Proteins OH - Proteins AH (g)</td>
<td>-8.5</td>
<td>53.3</td>
<td>6.9</td>
<td>-22.3</td>
<td>5.3</td>
<td>0.222</td>
</tr>
<tr>
<td></td>
<td>Proteins OH - Proteins AH (%)</td>
<td>-8.9</td>
<td>51.8</td>
<td>6.7</td>
<td>-22.3</td>
<td>4.5</td>
<td>0.188</td>
</tr>
<tr>
<td></td>
<td>Iron OH - Iron AH (mg)</td>
<td>-7.3</td>
<td>12.9</td>
<td>1.7</td>
<td>-10.6</td>
<td>-4.0</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Iron OH - Iron AH (%)</td>
<td>-28.7</td>
<td>54.3</td>
<td>7.0</td>
<td>-42.7</td>
<td>-14.6</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

*Paired t-test – significant differences in bold,
*Based on total contribution

29
Figure 5.3.5. Comparison of OH intensity (as % from OH food on the total daily intake) and nutrient contents in diets

<table>
<thead>
<tr>
<th></th>
<th>Sugars (g) [± 2SD]</th>
<th>Saturated fats (g) [± 2SD]</th>
<th>Carbohydrates (g) [± 2SD]</th>
<th>Fats (g) [± 2SD]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low OH</td>
<td>125.1</td>
<td>25.0</td>
<td>285.0</td>
<td>81.7</td>
</tr>
<tr>
<td>Moderate OH</td>
<td>105.6</td>
<td>32.0</td>
<td>304.7</td>
<td>92.8</td>
</tr>
<tr>
<td>High OH</td>
<td>104.8</td>
<td>41.8</td>
<td>366.9</td>
<td>112.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Sodium (mg) [± 2SD]</th>
<th>Dietary fibers (g) [± 2SD]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low OH</td>
<td>1872.6</td>
<td>36.5</td>
</tr>
<tr>
<td>Moderate OH</td>
<td>2401.6</td>
<td>30.0</td>
</tr>
<tr>
<td>High OH</td>
<td>2829.8</td>
<td>29.0</td>
</tr>
</tbody>
</table>

*P values for mean differences (One Way ANOVA) after adjusting with residual method

[For the post hoc test see Annex and for definition of OH intensity see Subjects and Methods, section Data Analysis]
According to Figure 5.3.5 there is a statistically significant difference of nutrient contribution among different intensities of eating OH. These differences are all in the same direction. For fats, saturated fats, carbohydrates and salt, the nutrient contribution seems to increase with increasing eating OH, but in the case of sugars and dietary fibers we notice an inverse trend, students with a lower intensity of eating OH have a greater contribution of nutrients than higher intensity of eating OH. Specific nutrients such as sugars and dietary fibers are consumed more at home mainly because of higher fruit and vegetable products AH.

Table 5.3.3 compares the energy intake from OH and AH by meal. Meals taken OH are on average higher in energy density compared to meals consumed AH.

<table>
<thead>
<tr>
<th></th>
<th>Out-of-Home</th>
<th>At-Home</th>
<th>P*</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% TE</td>
<td>Mean</td>
<td>SD</td>
<td>%TE</td>
</tr>
<tr>
<td>Breakfast</td>
<td>10.2%</td>
<td>287.2</td>
<td>259.8</td>
<td>5.8%</td>
</tr>
<tr>
<td>Brunch</td>
<td>9.9%</td>
<td>278.9</td>
<td>236.3</td>
<td>4.5%</td>
</tr>
<tr>
<td>Lunch</td>
<td>12.1%</td>
<td>339.6</td>
<td>252.4</td>
<td>8.4%</td>
</tr>
<tr>
<td>Snack</td>
<td>9.4%</td>
<td>265.0</td>
<td>239.0</td>
<td>5.6%</td>
</tr>
<tr>
<td>Dinner</td>
<td>11.3%</td>
<td>316.8</td>
<td>235.2</td>
<td>8.3%</td>
</tr>
<tr>
<td>Late night meal</td>
<td>10.4%</td>
<td>292.2</td>
<td>291.1</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

*Paired t-test
†Food consumed OH or AH
¥Percentage of total average energy

What is important to be noticed in this table is the very high energy contribution of snack, dinner and late night meals consumed OH. As for the contribution of sugars and fats during meals dinner and late night meal seems to be higher than some other meals. In Table 5.3.4 shows that sugar and fat content of late night meals for eating OH is considerably high, compared to the rest of OH meals and also compared to late night meals consumed at home, but it is significant only for fats. This shows also the significantly higher contributions of fats and sugars for dinner meals.

Table 5.3.4. Comparison of total per day fats and sugars intake by meal and typology (AH vs. OH)

<table>
<thead>
<tr>
<th></th>
<th>Fats (g)</th>
<th>Sugars (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AH</td>
<td>OH</td>
</tr>
<tr>
<td></td>
<td>x̄</td>
<td>SD</td>
</tr>
<tr>
<td>Breakfast</td>
<td>5.5</td>
<td>6.7</td>
</tr>
<tr>
<td>Brunch</td>
<td>2.2</td>
<td>4.3</td>
</tr>
<tr>
<td>Lunch</td>
<td>10.1</td>
<td>10.8</td>
</tr>
<tr>
<td>Snack</td>
<td>3.1</td>
<td>6.3</td>
</tr>
<tr>
<td>Dinner</td>
<td>8.8</td>
<td>10.3</td>
</tr>
<tr>
<td>Late night meal</td>
<td>2.4</td>
<td>4.9</td>
</tr>
</tbody>
</table>

In the case of dinner even though there is a relative difference observed which is statistically significant, energy contribution is high both OH and AH. What is to be noticed is the high variance of late night meals for OH foods. These differences are plotted in Figure 5.3.6.
Figure 5.3.6. Comparison of mean energy contribution by meal

- Breakfast
  - At-home food: 213.4 kcal
  - Out-of-home food: 237.4 kcal
  - Significance: $P < 0.001$

- Brunch
  - At-home food: 177.05 kcal
  - Out-of-home food: 279.2 kcal
  - Significance: $P < 0.001$

- Lunch
  - At-home food: 234.1 kcal
  - Out-of-home food: 209.5 kcal
  - Significance: $P < 0.001$

- Snack
  - At-home food: 16.8 kcal
  - Out-of-home food: 485.1 kcal
  - Significance: $P < 0.001$

- Dinner
  - At-home food: 239.97 kcal
  - Out-of-home food: 216 kcal
  - Significance: $P < 0.001$

- Late night meal
  - At-home food: 113.5 kcal
  - Out-of-home food: 352.2 kcal
  - Significance: $P < 0.001$
The differences are obvious between meals and variability of energy contribution is greater in the case of meals eaten out of home compared to meals consumed at home. A noticeable variability can also be seen clearly in the case of snacks and lunch, compared to the mean energy consumed AH which for these meals is narrower. The whiskers show this variability as function of standard deviation.

In this graph (Figure 5.3.7) we observe food groups stratified by percentage of meals consumed at home and out of home on a typical day basis. What is to be noticed is that sweets and drinks meals are mainly originated from OH sources and grains seem to have similar contribution from OH and AH sources.

![Figure 5.3.7. Food groups and percentage of meals eaten OH and AH on a typical day basis, by sex](image)

Some more meals of meats and by products are consumed more OH by males. All other food groups are consumed more AH, especially in the case of fruits and vegetable products.
Figure 5.3.8. Comparison of energy contribution per meal/per day, portion size/per meal and energy per gram of food consumed for foods AH vs. OH

There is clearly a difference in the portion size between OH and AH meals, with AH being significantly larger, but in terms of energy density and calories OH foods have 2.7 kcal/g compared with 1.7 kcal/g of AH foods. Also average energy density per meal is higher among OH meals (296.8 kcal) compared to AH meals (207.5 kcal).
6. Discussion

In this study, we sought to improve our understanding of the quickly evolving eating out of home patterns in Albania. Our results suggest that students developed certain eating patterns, because of the unavailability of student restaurants and the access to only vendors offering sugary drinks and almost no food. Therefore, students are left to eat out whatever is available to them in the fast-foods in their reach. Studies in other school settings (Hill et al., 2015; Vepsäläinen et al., 2015; Penney et al., 2015) show that healthy food options availability influence nutrition quality and nutrition status.

Our results show that there are no major observable differences between foods consumed AH and foods consumed OH, even though carbohydrate, sugar and protein contribution seems higher from AH foods and saturated fats and energy density contribution is higher OH.

Literature generally has shown that eating OH is usually associated with greater energy contribution (Seguin et al., 2016; An, 2016; Fernandes et al., 2015; Nguyen et al., 2014; Powell et al., 2013; Lachat et al., 2012), and in the context of our study there were interesting differences observed in energy densities, and in terms of nutrients. We also observe is that fruits and vegetables are significantly consumed more AH.

This is consistent with studies conducted that explore OH eating and fruit and vegetable consumption (Seguin et al., 2016; Lachat et al., 2012). We found that overall the portion sizes are greater for meals and foods consumed AH compared to foods consumed OH, but energy contribution per gram is significantly higher in foods consumed OH and at the same time average energy from food items is significantly greater in foods consumed OH. We see that AH foods have a higher energy contribution, but this is highly variable as shown by the standard deviation indicated.

Regarding the distribution by energy, macro- and micronutrients a greater contribution of energy per gram is seen in OH foods, as shown in results. Surprisingly, carbohydrates, sugar, fibers, proteins and iron contribution seem to be of a statistically significantly larger again from AH foods. This is believed to be due to limited food options even at home and the foods that are consumed AH are foods prepared in larger portions and students in general have little options because the sources of foods and the food choices themselves are relatively limited.

This is evident in Figure 2.4.2, where all possible sources of food are mapped. Options to buy healthy food are limited and there is a relatively large density of unhealthy food options in the vicinity of the university.

Literature acknowledges that the food options availability in fast-foods, restaurants and other types of food vendors is an important factor that influences food choices (Ledoux et al., 2015; Larson et al., 2011; Mehta et al., 2008; Boutelle et al., 2007). In a recent study in Mexico (Barrera et al., 2016), for a similar setting that this study, suggest that the food environment is a substantial driver of nutritional status.
Furthermore, OH foods have a high content in saturated fats. AH foods have on average the most important contribution of fats but this difference was not statistically confirmed. Sodium contribution was high from OH foods, but also that relationship was not statistically confirmed. *(Table 5.2.1).*

Salt seems to be consumed in relatively high amounts both at home and OH. This pattern, for also other nutrients, is believed to result from the type of AH foods and the consumption of certain foods rich in sugars, fibers and proteins at home by the student community.

These differences are also shown in *Table 5.3.2* and confirmed across the different universities. The weak or even absent statistically significant differences between energy, fats and salt consumed AH vs. OH within each university would suggest that foods consumed AH are not substantially healthier or with lower energy densities, compared to foods consumed OH in our sample.

This calls for attention for nutrition guidance and reflects the lack of nutritional attentiveness among the student population for a better nutrition at least at home. Attention to nutrition is at its early stages in Albania and a great confusion exists among the population about the science of nutrition itself. This also clear form the lack of nutrition infrastructure and profession. In addition, nutrition policies in Albania have not yet grasped their true potential and understanding among professionals.

Something else to consider for the results of this study and the approach towards classifying OH foods is that foods OH in our survey were defined in order to include almost all meals that are not prepared at home and that are bought near fast-foods, restaurants, street food vendors and other out of home sources of food.

According to our approach of defining OH foods, the decision of whether the food was an at-home or an out-of-home food, was carefully determined on a case-by-case method. The way we defined OH foods, includes also all food and food products that were purchased ready-to-eat from food stores, such as supermarkets, convenience stores, and some special food stores.

Instead, these types of foods are treated as OH foods consumed at home although they are not prepared at home. Several additional efforts were also made to improve data quality. First, top students of Master of Public Health at the Faculty of Public Health, University of Medicine Tirana were selected and extensively trained for 24-hour multiple pass method. This procedure was able to generate more reliable data and possible biases related to data collection were reduced to minimum. Each member of the team was monitored in real time by the coordinator and detailed information on the food consumed was scrutinized live, to avoid potential missing consumption due to unawareness or unasked question.
Figure 6.1 shows the different food groups consumed AH and OH and that strategies for better eating OH might provide important insights to develop a healthy and sustainable nutrition among the student community in Tirana.

**Figure 6.1 Dietary pattern in terms of food groups among AH and OH foods**

With regards to the study approach, foods OH in our survey were defined such as to include almost all meals that are not prepared at home and that are bought near fast-food vendors. According to our approach of defining OH foods, the decision of whether the food was AH or OH, was carefully determined on a case by case method. The way we defined OH foods includes also all foods and food products that were purchased ready-to-eat from food stores such as supermarkets, convenience stores and some special food stores. These types of foods are treated as OH foods even if consumed at home, although they are not prepared at home. Several additional efforts were made to improve data quality. First, top students of Mast of Public Health, at the Faculty of Public Health, University of Medicine Tirana, were selected and extensively trained for a 24 H multiple pass method. This procedure and other mentioned in methodology, enabled us to generate more reliable data and possible biases related to data collection were reduced to a minimum. Each member of the team was monitored I real time by the coordinator and detailed information on the food consumed was scrutinized. At the moment of collection, in order to avoid potential missing consumption due to unawareness and unasked questions

One particular element of this study, was how to deal with the consumption of yoghurt and its relation to tradition and culture. Specifically, interest was focused on the consumption of traditional yoghurt, which has been use by Albanian households for decades, versus commercialized yoghurt. Although it is widespread traditional food and the population in
Tirana, is very familiar with it seems that the new generation has no preference for the traditional yoghurt.

Recognizing transition of traditions can sometimes be supported by observing dietary changes in food preparation domestically, and even this study can be considered as evidence of a switch from traditionally prepared foods at home to more out of home foods. Many traditional foods that were assumed to be important at the start of the study, like fli-ja\(^8\), but were not seen to be consumed at all. Convenience and cooking techniques, globalization has influenced the way Albanians prepare their food.

Traditional food preparation and food choices that existed before must be seen, carefully in their historical context, and the phenomenon of eating less or none of these foods outlines major structural changes.

Usually traditional foods were prepared by women in the household and this can be seen, even though not the only factor, as a change of gender roles in Albanian society. We see that the most consumed type of yoghurt is home-made yoghurt (Table 5.2.3 in Results). This underlines the connection with tradition and maybe the preference for some traditional food still.

**Limitations and novelty**

In terms of limitations, I believe that the survey for this study could have included two parts, instead of one. For future studies the first part should collect detailed information on demographics and socioeconomics of the individuals and the second part can record food consumption information based on 24-hour recall.

The first part was not performed in this study as it was not possible within the timeframe and context to extract all the information from the subjects.

The length of the questionnaire was a central issue since during the trials and trainings, it was clear that subjects reached saturation and got tired easily as they were asked for about 30 minutes to one hour, on their food consumption.

Coordinators would check and re-check the interviewers. Future research can focus on multiple days and should collect detailed information on socio-economics and demographics. The single day 24 H recall is not a significant limitation, but it is something to consider with regards to the reliability of the findings. The study could also be expanded in multiple settings and cities.

\(^8\) Fli-ja is a specialty from the traditional Albanian cuisine, that is mostly prepared in the north of the country. It is most certainly one of the typical Albanian dishes that everyone local will recommend.
This study even has a relevant and scientific methodology, but it is constrained by some limitations due to the context and the late introduction of nutrition research methods in Albania.

The context of this study is limiting for two main reasons:

(1) There are no national food composition tables in Albania and there is very little research done in this area. For this reason, the Greek food composition tables were used because of the similarities in dieting, as part of the Mediterranean diet.

(2) Another hindering factor is the total absence of weights and measurement charts for foods and food containers. To overcome this constrain weights and measurement charts had to be produced by the research team in Albania specifically for this study. It should however be more standardized for future studies.

Findings of this thesis, also justify the need to monitor the nutritional quality of OH foods and its implication for students’ community health.

Future research should look at the differences in nutrient contents between AH and OH foods in general and between types of OH foods in order to explain changes in consumers’ nutritional status. A standardization of the definition of OH eating is needed to make the interpretation and comparison of results from future research easier. Classifying foods according to their place of preparation seems more appropriate compared with using the place of consumption, since the place of preparation is where the nutritional quality of foods could be controlled for.

This study makes a unique and original contribution towards better understanding of particular nutritional aspects and considerations of eating out of home in Albania.

The results of this study reveal a food environment that influences healthy food choices and restricts food alternatives. Strategies for better nutrition need to target students whose lifestyle is constrained by the abundance of high energy density foods and lack of student university restaurants. The results of this study also suggest that the difference in nutritional value of foods consumed at home and out of home are not that different, and it is a modifiable aspect that can have big nutrition implications for university students.
7. Conclusions and recommendations

Food intake and eating OH among the university students of Tirana, Albania, is a complex dietary practice, which is driven by several environmental, nutritional, psycho-social, political and economic factors. Eating OH among students is something common and this research confirms that eating OH has gained a significant role in the daily diet of students included in this study and in Albania in general. AH foods contain high amount of sugar and carbohydrates which is mainly attributed to the traditional and high consumption of bread, particularly white bread spread with (lots of) jam. Albanians are generally bread eaters and it is of no surprise that their staple food is based on wheat (FAO, 2015).

Most OH eating occurs at fast-food vendors found around universities. Although many studies show that eating OH is commonly associated with unfavorable dietary intake, our data indicate that this is not necessarily the case for Albanian students in Tirana, and influencing factors or potentials of OH eating in different domains are not yet investigated or reported. As we see that eating OH among the subjects in our study is relatively high, I believe that policy interventions are needed to improve the quality of foods consumed OH. Sugar is a particular problem both for AH and OH foods, but overall, our findings show that even though no major differences were found in the composition of foods prepared at home are of better nutritional quality.

OH foods should be more diverse and lowered in sugar and fat contents. This research also concludes that eating OH, in a broad sense is positively associated with the risk of consuming less fruits and vegetable products. Eating OH is not necessarily an attitude to be seen as unhealthy, but rather something that should be identified, acknowledged and mitigated against. At home foods seem to have better composition and OH foods had generally poorer nutrient intake associated with consuming of fast-foods. This suggests that nutrition policies in Albania should consider to open university student restaurants, in order to initially decrease the relative costs of food related purchases by students and by making available and accessible healthy food options.

At the same time, regulatory and voluntary policies are needed to set standards for the nutritional content of meals offered at student restaurants. It is however, important to assess eating OH comprehensively. This study also calls for further research on the consumption of OH foods and long term potential effects on the nutritional status of students. More detailed evidence on the association of OH eating and anthropometric changes is needed to clearly see the interactions of OH eating and health. The variability in anthropometric measures in this research was too small to find significant correlations. To summarize our empirical results, we find that students increase their caloric consumption from food when they choose to eat OH. Future research should focus on including more days of 24 H recall and other variables like income, price of foods, residence (urban-rural), etc. in order to establish a clearer framework for the drivers of eating OH among students in Albania. Future research may also consider widening the inclusion of other segments of population (not only students) to have a broader understanding of the phenomenon of eating OH.
8. References


the Health-Disparate Dan River Region of Virginia and North Carolina, 2013. *Preventing chronic disease, 12*.


