In-Home Food Waste Analysis in the Case of Tirana City, Albania-A Descriptive Approach

Author's Details:
[1]Myslym Osmani- [2]Arben Kambo-[3]Adelida Osmani-Ergen
[1][2][3]Agricultural University of Tirana, ALBANIA

Abstract
The goal of this research is identifying major drivers or factors that influence food waste by final consumers in the urban area of Albania. In this study data for 335 randomly selected households in Tirana city are collected by face-to-face interview. A descriptive research method, such as means, groupings, and statistical graphs, is used. To characterize the amount of waste, as waste variables are used the value and mass of food thrown. In addition, the frequency of throwing food (how many times per week households throw away food) has also been used as a proxy variable for food waste. Household income, size of family, concern about food waste, buying more than needed, cooking more than needed, frequency of eating outside home, education, type of house and living location inside the city, seem to be the most important factors that determine the amount of food wasted in the urban area of Albania.
Keywords: amount of waste, descriptive statistics, food waste, value of waste, waste factor

INTRODUCTION

Food Loss and Waste refer to the decrease in mass (quantitative) or nutritional value (qualitative) of food (edible parts) throughout the supply chain that was intended for human consumption. Food that was originally meant for human consumption but which gets out the human food chain is considered as food loss or waste, even if it is then directed to a nonfood use (feed, bio-energy). Food Loss refers to food that during its process in the food supply chain gets spilled, spoilt or otherwise lost, or incurs a reduction of quality and value before it reaches its final product stage. Food loss typically takes place at production, postharvest, processing and distribution stages in the food supply chain. Food Waste refers to food that completes the food supply chain up to a final product, of good quality and fit for consumption, but still doesn't get consumed because it is wasted, whether or not after it is left to spoil. Food waste typically (but not exclusively) takes place at retail and consumption stages in the food supply chain (FAO, 2011)

Food losses and waste seem to be one of the most actually challenging and most debated ever worldwide. And it is thoroughly justified. Although statistics coming from different sources seem not to converge, the truth is that between 1/3 and 1/2 of the world food produced globally is not consumed (FAO, 2011). This translates into 1.3 billion tons food being lost or wasted. Food loss and waste happen all along food supply chain and in both high- and low-income countries with important differences according to regions and products. In specifically developed countries in America or Europe countries, figures are even higher.

Developed countries are more responsible for food waste, and they contribute the most of food waste. If we take into account the food supply chain, in the developed countries, more food waste occurs in the consumption phase, whereas in the developing countries occurs on the farm, during storing, processing and transportations because of poor infrastructure and technologies, (FAO, 2011).

In EU also food waste is huge. In terms of phases of food supply chain, estimates of food waste (in a million tons) in EU-28 in 2012 are primary production 9.1 Processing 16.9, wholesale and retail 4.6, food service 10.5, households 46.5, total food waste 87, (Stenmarck et al., 2016). In percentage terms, this means that roughly 53% of waste occurs in the home and the rest of the pre-consumption phases. As for the type of food, is lost or wasted 30% of produced cereals, 20% of dairy products, 45% of fresh fruit and vegetables, 35% of fish and seafood 20% of meat, 20% of roots and tubers. Per capita waste by consumers is between 95-115 kg a year in Europe and North America, while consumers in sub-Saharan Africa, south and south-eastern Asia, each throw away only 6-11 kg a year. If just one-fourth of the food currently lost or wasted globally could be saved, it would be enough to feed 870 million hungry people in the world (FAO, 2017).

Food waste is becoming more and more an issue of growing interest; because of increasing world's population and because it has significant social, economic and environmental costs, and because food wastage means misuse of huge production resources such as of land, chemicals, and energy. In a study of

FAO points out that 40% of world's land, 70% of its freshwater, and 30% of its energy is dedicated to the production of food, (FAO, 2011).

Less waste and more food security have important effects, such as decreased pressure on natural resources, higher economic efficiency. Expertise, knowledge, and information also can help to reduce waste and losses. On the other hand, loss and waste mean food insecurity. A different organization with global reaches, such as UN, FAO, EU have addressed this issue as very critical and needing immediate actions and initiatives at both global and national levels.

As far as Albania is concerned, its GDP per capita is 3457 EUR (Bank of Albania, 2015). In Albania as well, food loss and waste are becoming more and more a serious problem. There are some but only rough estimations for in-home consumption in an urban area, but only for capital city Tirana only, there are. Based on these data, amount of yearly wastes is as much as 57 kg or 232 EUR per family. And 22.4% of food purchased is thrown, (Kambo et al., 2017a). Though these figures are still distant from the EU estimates, they are too much for a poor country.

RESEARCH PROBLEM, AIM, AND HYPOTHESES

Research carried out thus far has in Albania has identified a number of factors of food waste in urban Albania. Based on the value of food thrown in one week as a waste variable, it resulted that household income and size, living location or zone inside the city, number of employed per family and interest about food waste are some food waste factors. But this factorial ensemble is quite incomplete. Thus, despite the research already carried out the knowledge acquired about factors, forces or drivers of food waste in the consumption phase in the context of urban Albania remains still limited. Existing knowledge could be improved in a number of ways. First, other factors of food waste may exist, but they are not yet identified by the previous investigation. And findings on food waste factors might be not consistent enough, so there is also a need to improve the consistency of already gained knowledge by use of alternative metrics for variables measuring food waste. Thus, there is a need for further and a more in-depth and a wider perspective of food waste investigation.

This study aim is to improve the existing body of knowledge about food waste factors in urban Albania and its level of consistency. This has to be done by empirically investigating about other factors or forces that influence consumer behavior in relation to food, of urban consumers in Albania, and by matching results against various of alternatives of food waste variables.

The research hypotheses are:

The education level of the household head, buying and cooking behavior variables, such as "buying food more than needed" and "cooking food more than needed" is but some other food waste factors also in the context of Albania, though it is relatively poor as compared to other countries.

The frequency of eating outside home and person who is dealing with food cooking at home, whether parents or not parents and frequency of keeping food in the refrigerator might also be factors of food waste.

The frequency of throwing food during the week might also be a factor of food waste, in the sense that who throws food more frequently, wastes also more in terms of value or mass. This variable could also serve as a proxy variable that indirectly measures the amount of food waste.

Findings of previous research on food waste factors seem to be consistent against other measures of food waste, such as the value of food thrown in one day, and quantity of food thrown in one week.

Between various measures of food waste, there should be a correlation, which contributes to the consistency of previous and also present research findings.

REVIEW OF LITERATURE

Research in relation to food and loss wastes internationally is quite extensive; in Albania, it is quite non-existent if not void. Almost all research carried out focus on at least one of the following constructs: i-identifying factors, drivers and or barriers to food waste and losses. ii-describing state of the art in relation to food waste and losses in the world but also in different countries or groups of countries; iii-formulation of recommendations on how to reduce the amount of food waste and losses. Being so large, we cannot but just "lip" a little bit the relevant research.

Lipinski et al., (2013) provide a very good and comprehensive framework for understanding the situation and key concepts and ideas about food waste and losses. Food losses and waste occur in both high- and low-income countries, although following different patterns. In the medium- and high-income countries, food is largely wasted at the consumption stage. In low-income countries, it is lost mostly during the early

and middle stages of the food supply chain; much less is wasted at the consumer level. The causes of food losses and waste in low-income countries are mainly connected to financial, managerial and technical limitations in harvesting techniques, storage and cooling facilities in difficult climatic conditions, infrastructure, packaging, and marketing systems. Given that many smallholder farmers in developing countries live on the margins of food insecurity, a reduction in food losses could have an immediate and significant impact on their livelihoods. Most losses are avoidable to some degree, and some types of waste could be almost entirely eliminated. In developing countries, investments and other measures to improve the processing, storage and transport infrastructure should address much of the problem of waste from post-harvest losses. In developed countries, possible avenues for policy action could include engaging with the private sector to increase awareness.

Many authors have been dealing with the issue of which are major types of drivers or factors influencing food loss and waste. According to Segre and other authors (Segrè et al., 2014), there are three types of conditions, or drivers for the food losses and waste: microeconomic (at farm and consumer level), macroeconomic, and non-economic conditions. Among them, they point out imperfect information, missing markets, uncertainty, and income. Among macro conditions, they highlight employment structure, unemployment, inflation, infrastructure, and globalization; among non-economic conditions, they tell policy and legal framework, culture, social aspects, and climate. In order to better understand how and where food wastage occurs, they divide the food supply chain into five stages: i-agricultural production, ii-harvest, post-harvest, store; iii-processing; iv-distribution; v-in-home consumption. We can state seven stages of consumer food management process: planning stage, provisioning, storing, preparing, consuming, ordering/serving and disposal (what to do with leftovers) stages.

In a literature review using group discussions Canali et al., (2017) emphasize that some of the more important drivers for waste are inherent characteristics of food; social and economic factors, individual non-readily changeable behaviors, priorities targeted by private and public stakeholders, diverse factors such as mismanagement and inefficient legislation, lack of awareness or information; and sub-optimal use of available technologies. Other authors discuss typical reasons for food waste in developing countries, (Bond et al., 2013).They are: i-pre-harvest losses: extreme weather, pests, disease & weeds, less resilient crop varieties, poor soil quality and water shortages; ii-agricultural production: poor agricultural practices, technological limitations, often from manual farming with traditional implements, labor limitations, poor animal welfare standards and high occurrence of diseases, early harvesting forced by weather conditions, alleviating hunger and financial constraints; iii-poor post-harvest handling and store: lack of physical infrastructure, poor storage and distribution facilities, processing facilities, market networks, transport infrastructure, power supply, poor information exchange, lack of grading of produce sent to market, lack of price differentiation of quality, markets not functioning well for small holders, because of too many middlemen, low private sector investment

Packaging is considered to be of special importance to food waste and loss, (Manalili et al., 2013). Appropriate packaging for different phases of the food chain is very important to reduce food losses and waste. to avoid too much food preparation, they suggest ready-to-eat entrée and portion control packs. To avoid spoilage, they suggest re-sealable packaging and vacuum or modified atmosphere packaging; for food not consumed prior to expiration date they suggest shelf-life extension and freshness preservation packaging.

The relationship between income and food waste has been largely debated and discussed by economists. The conclusion is that income influences amount of waste, but different group income consumers may behave differently for different food categories. (Setti et al., 2016). They found a significant relationship between personal income and food waste, in particular, mid-to-low income consumers purchase higher amounts of lower quality products and waste more food.

In a study carried out in the UK, with 15 households, to identify motivations and barriers to food waste, authors (Graham-Rowe et al., 2014) arrived at the conclusion that there are two groups of motivations: waste concerns, and doing the right. Also improving management skills and empowering people to reduce waste resulted importantly. The authors also identify four group of barriers to waste reduction: good provider identity, minimizing inconveniences, lack of priorities, and exemption from responsibility.

Some studies point out the role of social media in reducing waste. In one study made in the UK, (Young et al, 2016) it was found the large retailers can influence buying behavior through social media; they made a kind of experiment by interviewing consumers of a big retailer one month before intervention, two weeks after and five months after the intervention and found significant effect of social media and newsletters on food waste reduction. Another author views the food waste problem from the retailers' potential perspective a for the greater role (Wyman, 2014). He points out that reasons for food waste include among others overstocking, not consuming in first-in first-out order, improper storage, misinterpretation of best-before dates, elevated quality, misjudged preparation volumes, preparation mistakes; and sees in all these a crucial roles of the retailer themselves.

Other authors as well emphasize the role of research along the supply chain; they also suggest in order wastage interventions to be effective, must be part of a broader holistic approach rather than individual activities. For example, the value chain approach could help improve the situation by inducing actions along with all part of the chain, not only consumers (Tielens et al., 2014).

In the context of product group, foodstuffs most wasted are vegetables, home-cooked food, and milk products (Silvennoinen et al., 2014). The main reasons for disposing of foodstuffs are spoilage: e.g., mold, the expiry of best before or use by date, plate leftovers, and preparing more food than needed; examining waste per person resulted that singles generally produce more waste (Silvennoinen et al., 2014). Other researchers study the food waste problem from the territorial and urban-rural perspective, (Secondi et al., 2015). Through analysis at the territorial level they identify countries with similar behavior, and through individual-based analysis, they found that people in large cities produce more waste. But these authors also found that sorting practices, education level and concern against food waste are important factors of food waste.

Perceived behavioral control and routines related to shopping and reuse of leftovers are the main drivers of food waste while planning routines contribute indirectly. In turn, the routines are related to consumers' perceived capabilities to deal with household related activities. In relation to intentional processes, injunctive norms and attitudes towards food waste have an impact while moral norms and perceived behavioral control make no significant contribution, (Stancu et al., 2015).

Some authors, (Herath et al., 2016), have pointed out that the purchasing decision is crucial in relation to food waste and they try to identify relationships between extrinsic or intrinsic attributes of food and the purchasing decision. For this they take into account 12 food attributes, seven extrinsic food attributes (price, organic certification, fair trade label, free-range label, eco-friendly label, heart and stroke foundation endorsement, healthy brand label) and five intrinsic food attributes (nutritional value, safety, quality, impact on environment, locally produced). Consumers may be of two types or profiles: homo morals, and homo economic profiles. The first type appreciates more ethical and moral aspects of food waste, whereas the second type appreciates more the so-called value-seeking drivers of food during purchase,

Literature has identified five main reasons why consumers waste food: "buying more than your household can eat or store"; "due to package sizes that are too large"; "due to food that is not eaten by the best before date"; "due to preparing too much at mealtimes" and "due to someone in the household not liking the taste", (Herath et al, 2016).

Some authors highlight findings of other researchers that point out that the consumer waste process is also influenced by some crucial trade-offs and goal conflicts, (Aschemann et al., 2015). Some of these are health/safety versus sustainability, food safety versus environmental concern, food waste versus packaging waste, convenience or being a good food provider for the family versus avoiding food waste, etc.

Role of packaging in the home seems to be important (Plumb et al., 2013) because related research has shown that consumers don't recognize the role of packaging in the home, so information on labels and how it is used could be more effective. But since packaging may cause environmental problems, the ability to recycle the packaging is also important.

Experience and research shows that food waste is positively influenced by family size, too big package, education level, age, shopping in supermarkets and hypermarkets, and consumption style; negatively related to the level of awareness for the waste as an important issue, (Marangon et al., 2015)
More consumer willing to separate waste can have a negative effect on waste reduction (Afroz et al., 2011).

The issue of how much food loss and waste is avoidable has been the focus of research as well. Beretta and other authors have quantified losses and waste of food for 22 food categories in Switzerland

using data from 41 companies within the food chain. The result is that 48% of food calories are lost during the food chain phases. They estimated that half of the loss and waste could be avoided, mainly in production, processing and consumption phases; households alone are responsible for half of the avoidable food wastage (Beretta et al., 2013).

Buying behavior model is composed of three constructs: motivation (awareness, attitude, social norms), ability (skills and knowledge) and opportunity (time and schedule, infrastructure, technology). All these influence food waste and losses

Research is focusing heavily on the role of knowledge on food loss and waste, but emphasize that solutions to the problem are also very important. The issue is complex and involves socio-cultural and material factors (Hebrok et al., 2013) and coming to solutions is not so easy.

It has been a question of debate whether poor countries have the potential to waste and loss food. But, because of poor infrastructure and dysfunction of the marketing network, even poor countries produce a huge amount of losses and waste (Smith, 2015). This is true not only for losses occurring during pre-consumption phases but also for wastes occurring in consumption phase.

In the context, Albania the empirical research concerning food waste is almost missing. By referring to two studies carried out on this topic, it results that a number of employees, size of household, immigration and not residence also has effects on the value of food thrown (Kambo et al., 2017a). Checking stocks, household income, the feeling or not of being guilty about food waste and level of interest about the importance of the food waste, affect the value of food thrown (Kambo et al., 2017b).

METHOD AND DATA

Descriptive statistics, more specifically means, groupings and statistical graphs are used as a method to evaluate, present and compare measures of food waste according to assumed drivers or factors of in-home food waste. We don't apply rigorous statistical procedures (inference) because our aim only to assess factors and their effects on waste and not to statistically test significance of effects. This could help to formulate good hypotheses for assessing major food waste drivers and their effect in the urban area of Albania, specifically in its capital Tirana city.

A three-dimensions dependent variable approach is used to look for more consistent and reliable results, by asking information in different metrics for the dependent variable. Note that previous research for the food waste in Albania used a single-variable dependent approach.

Face-to-face interviews with consumers in Tirana city are used to collect needed data for 335 people living in various zones of Tirana, to obtain a sample as much as a possible representative for the entire population of the city. Data are obtained for 17 independent (X) variables and some alternatives of the dependent variables (amount of food thrown), to ensure higher quality or reliability of information about food waste supplied. Independent variables are assumed to be factors of the value or mass of the food waste in the home, as suggested by relevant literature and empirical evidence in different countries and areas of the world as described in the section of the literature review. All variables included in the study areas indicated in Table 1 (Appendix).

ANALYSIS AND RESULTS

As indicated in Table 2 (Appendix) it could be identified that for three alternative variables of food wasted in the home (Y_1, Y_2, Y_3), amount of waste is increasing with increasing level of education. This means that people with more formal education waste more compared to less educated. And that level of education might well be a factor with a positive effect on the waste amount.

In relation with the living zone, we see that families living in the ex-block area (where used to live ex-communist leaders, now a very populated and expensive area) waste distinctively much more than people living in other areas. Based on the variable value of food thrown (Y_1), we calculated that wastes are times higher than those of New Tirana area. Thus, living area seems to be a source of food waste variation as per living area.

As indicated by Graph 1 (Appendix) one could easily understand that families which own a private house or apartment waste more, based on each of the three waste variables, with not so much difference between private flat and private house, which can be tested with statistical procedures, but statistical inference is not objective of this research.

Taking into consideration the size of the family, as indicated by Table 2 and Graph 2 (Appendix), in terms of number of members living in one family, we can understand that with increasing number of

members, value of food thrown in one week and value of food thrown in one day, (as obtained by distinct questions in the interview and not by mere calculations), the total value of food waste decreases. The average per member food waste thus is decreasing even more as the number of members increases.

Thus, small families might deserve a special analysis and focus on the reasons of why so much waste and policies to waste reduction. We also can identify easily that the contrary happens with the second variable that of the mass of waste per week, which decreases with increasing size of households. We can assume that small families throw less in term of mass but more in terms of value, meaning that smaller families might waste more high-value food compared to larger households which might throw more less value food.

As indicated by Graph 3 (Appendix), families who have one or more members in immigration, tend to waste less in both terms of value and mass of food. Assuming that income is a factor that correlates positively, in Albania as well, with the amount of waste, as empirical evidence worldwide affirms, the expectation is that families with immigrants would waste more because it is supposed that they are supported with money from abroad.

As indicated by Table 2 and Graph 4 (Appendix), with increasing number of employed per family, food waste keeps increasing to a certain number of the variable (more or less three, as seen in Table 7 and quite clear in Graph 4). Then it decreases. Afterwards, it drastically increases reaching a maximum at the size of employed 6, this based on each of three waste variables. We assume that other variables of unknown effect, or variables of negative effect specifically for these two classes of households, might cause this situation.

With increasing income, as indicated by Table 2 and Graph 5 (Appendix), it could be seen a sustained increase of food waste, based on any of three food waste variables. But one could see clearly enough that the correlation between food waste and income is not a linear or proportional relationship. Thus, if we compare the first group with the last one, though income is increased by almost 20 times, food waste increases only 1.6 times as based on the value of waste per week variable, and roughly 2 times as much based on the variable mass of food lost per week. So, only significant and sharp increases in money income could bring about significant (though, not as much) food waste.

As indicated by Graph 6 (Appendix), concern about food waste seems to be a strong factor for waste reduction. In general, we can say that if people are more aware of consequences of food waste if they are aware that food waste means lost energy and production resources, and if they are aware that more waste means less food for the poor and people with limited access to food, then waste will be less.

Buying more than needed seems to be a strong driver of food waste at the consumer level. Based on the three variables, it exists quite a regular and rigid increase of the amount and value of food thrown as the amount bought is more and more than needed. This calls for a detailed analysis of pre-shopping buying habits, or other factors such as packaging size, promotional sales, etc., but right now we only can assume an effect of these factors. If this comes true, then this group of variables would be a key area for intervention, as they could help to reduce the amount of food wasted significantly.

As indicated by Table 2 and Graph 7 (Appendix), the effect of the variable "Coking more than needed" is similar to the story told by Graph 2. If we look carefully and compare both graphs, for each of three waste variables there seems to be a strong correlation between Maybe cooking more than needed is a direct result of buying more than needed, but also factors could have an influence.

In relation to who is doing the cooking, as indicated by Graph 8 (Appendix)clearly when parents deal with cooking wastes are less, because presumably parents are more careful while cooking, and they try to save more than outsiders during food preparation.

As indicated by Graph 9 (Appendix), the factor "buying more than needed" can tell too much. Clearly, consumers who agree that amount of waste is related to buying more than needed seem to waste more than others.

Food leftover disposing habits may have a significant impact on the amount of food waste. Our data show that households that do have and make efficient use of the refrigerator waste less. It is maybe an issue of culture and education and tradition to make good use of the refrigerator.

Other factors also could be identified in more detailed and more targeted research than ours. As indicated by Graph 10 (Appendix), people who go out for their meals more frequently waste clearly more compared to those who go out less or don't go out at all. This could be an indirect result of higher income,

because people who eat outside house more frequently are supposed to have higher money income, or maybe because they are less careful, less educated and may have fewer skills and inappropriate habits in food preparation and disposal of leftovers.

A very interesting factor affecting food waste seems to be the frequency of throwing food. As indicated by Graph 11 (Appendix), there seems to be a strong positive correlation between frequency of throwing and amount of food thrown. The frequency of throwing could well be the result of a group of factors, starting with income, shopping and cooking habits, education and type of job, use of refrigerator, etc.

From the study, fruits and vegetables result in the most wasted food categories. Apple and mandarin seem to be the most wasted and least thrown are strawberry and exotic fruits. Among vegetables, tomato and cabbage are the most wasted types of vegetables, whereas least thrown are mushroom and potato. Most thrown is tomatoes and cabbage, least thrown is mushroom and potatoes.

DISCUSSION AND CONCLUSIONS

Findings of our study confirm that urban Albanian consumers are guided by similar basic motivations and behavior as wasting food is concerned, as consumers anywhere in the world. There seem to be similar drivers behind their decision to throw away food. Income earned by family is confirmed to be a strong driver taking to high wastes of food, though Albania is a poor country. Though Albanians consumers, in general, spend most of their income for nutrition, because of low income in absolute terms, for higher income consumers their food basket seems to be less expensive in relative terms, allowing so higher food consumption and also food waste. Thus, even for Albania, it exists a clear trend of wasting more and more as family income gets increased. And for sure it will be a tough challenge to make high-income consumers waste less.

Level of formal education seems to be positively correlated with the value or mass of food thrown, though this correlation is clearly not strong; the expectation is that more educated people have much more care, resulting in less food waste. This may imply that formal or at school education is not enough to prevent waste and other types of education (family education) may prevail in some instances. On the other side, behind formal school stands the higher income factor, which may prevail and take to higher waste.

Size of family results a strong factor to waste. As family size increases, the total value of waste decreases whereas the total mass of waste increases; for both variables, waste per person decreases with increasing family size. There is a negative correlation between value and mass of waste, meaning that larger families waste more in mass terms but less in value terms. One hypothetical factor behind that result might be that larger families consume more in mass but cheaper in value (low price) food.

People living in certain areas of Tirana, like the ex-block, tend to waste more. This happens not because of any intrinsic feature of this area, but because this is a business and entertainment area, with plenty of discos, nightclubs and bars and people living there may have higher money income. So higher income and the specific pattern and style of living in this might be the differentiating factors bringing about also more food waste.

A number of employed seems to have a positive effect on waste but not so clearly and to some extent. The positive effect we link with higher income and consumption for households with more employed. But it may also be because of variation in the style of living and cooking and eating habits and culture. However, it is of more interest than average waste per number of employed gets lower and lower as a number of employed increases. It might seem paradoxical, but because of this fact the main focus of interest in terms of reducing waste would be families with fewer employees, say one or two employees.

It is found that families with one or more immigrants working somewhere abroad waste less as compared to families with no immigrants at all. We can formulate at least two suppositions in this case: i-families with emigrants are smaller in size, so the spend and waste less; ii-money inflow to inland households from abroad is already limited, not providing a significant extra source of money to be spent in the home.

It is quite compatible with the logic and experiences and findings from literature the result we had for the impact of the variable concern about food waste. People who already have a clear moral stand towards wasting, tend to waste less, so *homo moral* principles are affecting to some extent food waste also in Albania. People may also behave also like *homo economicus*, by taking into account economic factors

taking to wasting less, but this seems to us less realistic. We suppose that in the binomial *homo morals* vs. *homo economics* the second prevails at large, at least in Albania and at least for the lower to the middle-income span of household's income.

Research has shown enough evidence in support of the hypothesis that "buying more food" and "cooking more food than needed" are important factors as being strongly correlated with value and mass of food waste. There also results in a strong correlation between buying more and coking more variables. This seems to result in more waste produced. Of course, there are a number of factors behind buying more, and our purpose in this study is not to identify them. As a new hypothesis, behind buying more could be income, size of packaging, distance to shopping centers, time, type of job, retailers' practices and policies, etc. But buying and cooking more should be for sure areas of major interest if Albania should reduce the amount of food wasted.

Another interest of ours was the result of effects of eating outside. People eating outside more frequently tend to waste more, this result being in support of the other of our hypothesis. The expectation was to waste less because of less consumption in the home. This result is maybe related to poor buying and cooking, but also disposal habits of leftovers.

It also counts who is making cooking, parents or paid cookers. Clearly when parents are involved in cooking wastes are less, maybe because parents tend to be more conscious and tend to save more of their own money.

The study also highlights the critical role of the refrigerator, not per sè, but only when properly used. Use of refrigerator is also an issue of good education, good habits, and family tradition. A household which uses it always produce as much as half of the food waste as compared to those who don't use it not at all. As for example, the refrigerator can save food by reducing the frequency of cooking, keeping leftovers for later reuse, preserve food when bought in large portions or package is removed, etc. Education about good food management in the home, refrigerator use include, could be a route towards less waste in the future.

In the study, it is also investigated the role of frequency in throwing food. Information for some specific food categories is collected and summarized into one aggregate variable of the frequency of food throwing. A clear correlation seems to exist between food waste and frequency of food throwing, meaning that who does throw more frequently also produces more waste. We have enough ground to accept our hypothesis about the relationship between these two variables. But the investigation of reasons of why people tend to throw more frequently might be crucial in reducing waste. Buying and cooking more, as well inappropriate habits and mismanagement of food residues, might be some but not only for these reasons.

It is of crucial importance also to investigate about reasons why households buy more than needed or cook more than needed, or what affects high frequency if throwing food, or how to improve food management skills in the home, or what is the role of knowledge or skills, together with related factors, in cooking food. And which are the factors, outside the consumer reach, influencing the consumers' buying behavior, if we must reduce food waste. This needs complex research, and then effective food-reduction seeking strategies and policies. Policies and other measures should take place as earlier as possible and in particular, to restrict the existing trend of wasting more with increasing income; we are supporters of the idea that it is easier and less costly to educate people to form good behaviors/habits and attitudes to waste before reaching high levels of waste, rather than educate them to change their already formed bad behaviors/habits or attitudes toward waste.

Analysis has also shown that food waste drivers result in almost the same if other measures other than the value of food thrown per week is used. So, add to this variable, we used the value of food thrown per day and amount of waste (mass waste) to assess how much consistent are our findings. The results show that our findings are consistent.

And last, since this our research is descriptive, further and inferential research is needed to more rigorously and statistically test significance of our findings.

REFERENCES

i.   *Afroz, R., Hanaki, K., Tudin, R. (2011). Factors affecting waste generation: a study in a waste management program in Dhaka City, Bangladesh, Environ Monit Assess 179:509–519 DOI 10.1007/s10661-010-1753-4*

ii.   *Aschemann, J., Witzel, I. de H., Amani, P., Bech-Larsen, T., Oostindjer, M. (2015). Consumer-Related Food Waste: Causes and Potential for Action, Sustainability, 7, 6457-6477; doi:10.3390/su7066457*

iii. *Beretta, C., Stoessel, F. ,Baier, U., Hellwe, S. (2013). Quantifying food losses and the potential for reduction in Switzerland, Waste Management 33 (2013) 764–773*

iv.   *Bond, M.; Meacham, T.; Bhunnoo, R.; Benton, T.G. (2013).Food Waste Within Global Food Systems; Global Food Security Programme: Swindon, UK*

v.   *Canali, M., Amani, P., Aramyan, L., Gheoldus, M., Moates, G., Östergren, K., Silvennoinen, K., Waldron, K., Vittuari, M. (2017). Food Waste Drivers in Europe, from Identification to Possible Interventions, Sustainability 2017, 9, 37; doi:10.3390/su9010037*

vi.   *FAO (2011). Global food losses and food waste – extent, causes and prevention, by J. Gustavsson, C. Cederberg, U. Sonesson, R. van Otterdijk& A. Meybeck. Rome (http://www.fao.org/docrep/014/mb060e/mb060e00.pdf).*

vii. *FAO (2017). Save Food: Global Initiative on Food Loss and Waste Reduction: Key facts on food loss and waste, http://www.fao.org/save-food/resources/keyfindings/en/*

viii. *Graham-Rowe, E., Jessop, D.C., Sparks, P. (2014). Identifying Motivations and Barriers to Minimising Household Food Waste. Resour. Conserv. Recycl. 2014, 84, 15–23*

ix.   *Hebrok, M.,Boks, C.(2013). Household food waste: Drivers and potential intervention points for design – An extensive review, https://doi.org/10.1016/j.jclepro.2017.03.069*

x.   *Herath, D., Felfel, A. (2016). Determinants of consumer food waste behavior: Homo Economicus vs. Homo Moralis, Selected Paper prepared for presentation at the 2016 Agriculture and Applied Economics Association Annual Meetings, Boston, Massachusetts, July 31-August 2*

xi.   *Kambo, A., Keco, R., Tomorri, I. (2017a). An empirical Investigation of the Determinants of Food Waste Generation in urban Area at Household Level in Albania, IJECM Vol. V, Issue 5, May 2017 ISSN 2348 0386*

xii. *Kambo, A., Keco, R., Tomorri, I. (2017b). Pre-shopping activities and their influence on amount of food waste generated at household level in urban area of Albania: an econometric approach, IJECM, Vol. V, Issue 6, June 2017, ISSN 2348 0386*

xiii. *Lipinski, B.,Hanson, C., Lomax, J., Kitinoja, L., Waite, R., Searchinger, T. (2013). "Reducing Food Loss and Waste." Working Paper, Installment 2 of Creating a Sustainable Food Future. Washington, DC: World Resources Institute. Available online at http://www.worldresourcesreport.org.*

xiv. *Manalili, N.M., Dorado, M.A., Van Otterdijk, R. (2011). Appropriate food packaging solutions for developing countries, Study conducted for the International Congress SAVE FOOD! at Interpack 2011 Düsseldorf, Germany (FAO, Rome)*

xv.   *Marangon, F., Tempesta,T.,Troiano, S. Vecchiato, D. (2015). Food waste, consumer attitudes and behavior. A study in the North-Eastern part of Italy, Rivista di EconomiaAgraria, Anno LXIX, n. 2-3, 2014: 201-209March 25 to 27, 2015 Naples, Italy*

xvi. *Plumb, A., Downing, Ph. (2013). Consumer Attitudes to Food Waste and Food Packaging, Research carried out by Icaro Consulting, WRAP Final Report, ISBN: 978-1-84405-465-7*

xvii. *Secondi̦ L., Principato, L., Laureti, T. (2015). Household food waste behavior in EU-27 countries: A multilevel analysis, Elsevier, Food Policy, Vol.56 October 2015, p 25-40, https://doi.org/10.1016/j.foodpol.2015.07.007*

xviii. *Segrè A., Falasconi L., Politano A., Vittuari, M. (2014).Background paper on the economics of food loss and waste, FAO Working Paper 2014*

xix. *Setti, M. Falasconi, L., Segrè, A., Cusano, A., Vittuari, M. (2016). Italian consumers' income and food waste behavior, British Food Journal, Vol. 118 Issue: 7, (2016), pp.1731-1746, https://doi.org/10.1108/BFJ-11-2015-0427*

xx.   *Silvennoinen, K. Juha-Matti, K., Hanna, H., Lotta, H., Reinikainen, A., (2014)."Food waste volume and composition in Finnish households", British Food Journal, Vol. 116 Iss 6 pp. 1058 - 1068 Permanent link to this document: http://dx.doi.org/10.1108/BFJ-12-2012-0311*

xxi. *Smith, R. (2015). Even Poor Countries End Up Wasting Tons of Food, 2015, www.wnyc.org/.../even-poor-countries-end-up-wasting-tons-of-food...*

xxii.   *Stancu, V., Haugaard, P., Lähteenmäki, L. (2015). Determinants of consumer food waste behavior: Two routes to food waste, https://doi.org/10.1016/j.appet.2015.08.025*

xxiii.   *Stenmarck, A.; Jensen, C.; Quested, T., Moates, G.(2016). Estimates of European food waste levels-Reducing food waste through innovation, FUSIONS, 2016, ISBN 978-91-88319-01-2, Available   online: https://www.eu-fusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf*

xxiv.   *Wyman, O. (2014). Reducing Food Waste, how can retailers help? www.oliverwyman.com*

xxv.   *Young, W., Russell, S.V., Robinson, C.A., Barkemeyer, R. (2016). Can Social Media Be a Tool for Reducing Consumers' Food Waste? A Behavior Change Experiment by a UK Retailer. Resour. Conserv. Recycl. 2016, 117, 9.*

Appendix

Table 1: Variables their measurement scale and/or metrics

X_1=Age, years X_2=Education: Low=1, Middle=2, High=3, Post-university=4 X_3=Type of house 2=Private house, 1=Private apartment, 0=Other X_4=Living zone 2=Block area, 1=New Tirana area, 0=Other X_5=Size of family 1,2,3,4 above 4 (6) X_6=Emigration No, Yes X_7=Buy more than needed 0=Don't agree, 1=Somewhat agree, 2=Agree, 3=Totally agree	X_8=Frequency of eating outside house: 0=None, 1=once a week, 2=Twice a week, 3=3-4 times a week, 4=5-7 times a week X_9=Frequency of throwing Average, of specific food category frequency of throw, X_{10}=Number of employed Number X_{11}=Income, (000) ALL (Albanian Currency Lek) X_{12}=Interest 0= None, 1=Little 2=Too much X_{13}= Frequency of keeping in the refrigerator, 0=No, 1=Rarely, 2=Frequently, 3=More than frequently, 4=Always X_{14}=Cook more than needed, 0=Don't agree, 1=Somewhat agree, 2=Agree, 3=Totally agree	X_{15}= Concern about food waste: 0=No, 1=Quite No, 2=Little, 3=Enough, 4=Too much D_1=Emigration 1=If yeas, 0=if no D_2=Who does cooking 1=Parents, 0=Other Y_1=Value thrown in one week, ALL (Albanian Currency, Lek) Y_2= Quantity thrown per week, g Y_3=Value of food thrown in one day, ALL

Table 2: Food waste according to potential factors

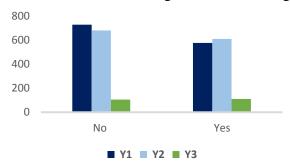| Waste factors	Food waste variables		
	Y_1	Y_2	Y_3
1-Education			
Low	517.9	408.6	75.9
Middle	610.8	629.1	99.1
University	703.9	709.4	107.6
Post-university	846.5	719.6	131.9
2-Living zone			
New Tirana	602.9	494.0	94.3
Ex-Block	985.3	960.0	156.9
Other	640.7	642.0	98.5
3-Family members			
1	888.9	406.7	136.1
2	772.2	506.2	108.9
3	691.2	599.2	111.5
4	637.6	654.3	106.8
>4	672.2	847.0	96.6
4-Number of employed			
1	653.5	569.1	92.3
2	645.0	636.2	101.5
3	864.8	793.1	134.4
4	638.9	793.9	108.3
5	607.1	664.3	100.0
6	1250.0	750.0	200.0
5-Income			
15000	557.7	586.7	82.7
40000	571.9	550.1	94.5
60000	574.5	502.0	90.6
84000	743.1	636.5	108.5
125000	916.7	978.4	142.4
200000	1032.6	1120.4	150.0
300000	916.7	1178.3	166.7
6-Cook more than needed			
Don't agree	535.7	460.7	91.4
Somewhat agree	680.9	530.7	88.9
Agree	681.6	714.6	116.4
Totally agree	720.6	792.1	117.9
7-Frequency of keeping in the refrigerator			
No keeping at all	931.8	797.3	122.7
Rarely keeping	881.9	870.2	132.6
Frequently keeping	723.4	732.6	118.4
More than frequently	522.7	448.6	90.9
Always	503.5	451.3	70.8
Average	685.6	661.1	106.5

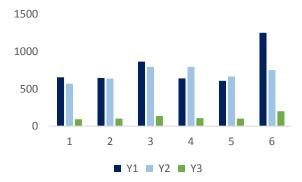Graph 1: Food waste according to variable "Type of house"
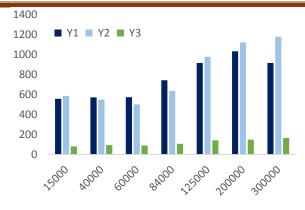
Graph 2: Food waste by size of family

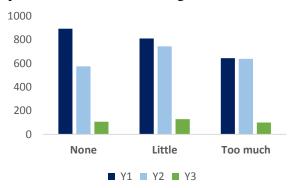Graph 3: Food waste according to variable Immigration
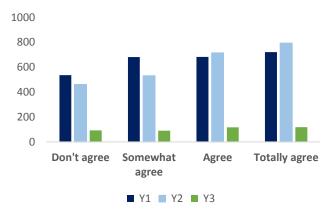

Graph 4: Food waste number of employed

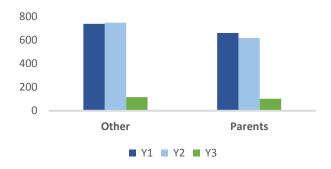Graph 5: Food waste according to income

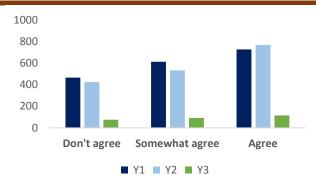Graph 6: Food waste according to variable Concern

Graph 7: Food waste variable "Cook more than needed"
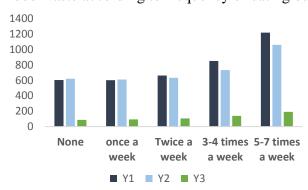

Graph 8: Food waste according to person who makes cooking

Graph 9: Food waste according to variable Buying more than needed

Graph 10: Food waste according to frequency of eating outside house

Graph 11: Food waste according to average frequency of throwing food