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A Latent Class Model to discover Household Food Waste Patterns in Lisbon City in Support of Food Security, Public Health and Environmental Protection

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ABSTRACT

In the middle of a great world financial crisis that also affects food security, it is important to characterize the habits of households concerning the buying and wasting food. With this study we intend (1) to uncover the patterns of Portuguese citizens concerning food waste by using a mixed research approach and (2) to identify demographic factors that can influence the production of food waste and that may support initiatives towards the education of society on food waste. We used a random sample of 542 Portuguese citizens to identify consumer profiles and 18 in-depth interviews for better understanding the uncovered profiles in a mixed method research approach. Through a two-latent class model two clusters of consumers were identified: cluster 1, the *Non food waste citizens* with 65% of respondents, mainly 24 years or more, female and married or divorced and cluster 2, the *Food waste citizens* with 35% of respondents, mainly up to 23 years old, male and single. Our findings may impact in two distinct ways: they may be used to educate Portuguese citizens concerning the issue of food waste and they may be useful in contributing to a less polluted world.

Keywords: Household Food Waste; Citizen Behaviour; Recycling Waste, Mixed Method Research

1 Introduction

Food consumption is one of the most polluting everyday activities when impacts during product life cycles are considered, and greenhouse gas emissions from the food sector are substantial and need to be lowered to stabilise climate change (Carlsson-Kanyama, Ekstrom, and Shanahan, 2003). Planners have been heavily involved in efforts to improve the quality of air and water through air and water pollution control programs, but one of the major sources of pollution, food, has been virtually ignored (Pothukuchi and Kaufman, 1998).

However, as society requires greater care in developing waste disposal facilities and as communities increasingly reject proposed landfills, even for their own waste, the market price of waste disposal increases rapidly. One response is to examine ways of reducing the amount of waste generated by modern living (Epp and Mauger, 1989) or of reducing waste through recycling. According to Griffin, Sobal, and Lyson (2009), people have grown concerned about the impact of their dietary lifestyles on other individuals and also on the environment. Thus, a greater understanding of the lifestyle of citizens that produce food waste is needed, in order to allow better decisions by planners and decision-makers.

''Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.'' This widely accepted definition (FAO, 1996; Carletto, Zezza, and Banerjee, 2013) points to the four key dimensions of food security: food availability, food access, food utilization, and food stability. Should food

waste be the fifth dimension? In the middle of a world financial crisis with concerns about food security, it would be important to characterize the habits of households concerning the buying and wasting of food. Griffin, Sobal, and Lyson (2009) stressed that one quarter of our global supply of plant-based foods, in terms of calories, get wasted along the food supply chain, thus reducing food waste is one important way to ensure people have enough food. We intend to quantify waste and identify factors that influence waste production which could support solutions towards a reduction of waste, improvements in food security, and in turn the protection of the environment. Knowledge about demographic factors that influence waste production may support in educating people and raising awareness to this end.

Consumer choice, preferences, and attitudes concerning the purchase of food imply attitudes to food and nutrition, food waste, environmental protection, and food security.

With this study, we intend to uncover the pattern of Portuguese citizens concerning food waste issues, purchase habits, and lifestyles. We use a mixed method research approach in which we collect data through a questionnaire based survey complemented by in-depth interviews with 18 citizens that allow to better understand the profiles of citizens uncovered from the survey and the demographic factors responsible for food waste.

The complete framework of the study is presented in figure 1.

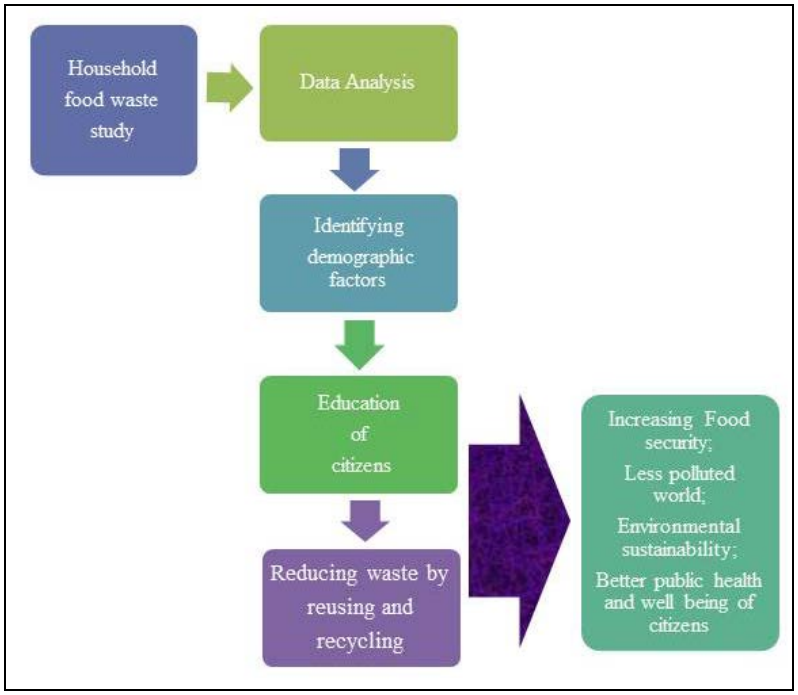

Figure 1. Framework of the study

The paper is organized as follows. In section 2 we review previous work on household food waste, in section 3 we discuss the methodology, in section 4 we report on data analysis and results, and finally in section 5 we present some concluding remarks and an outlook on future research needs.

2 Literature review

Municipal solid wastes are assumed to be comprised of organic (household food waste, mixed paper, yard wastes) and inorganic materials (plastics/refractory organics, glass, tin cans/aluminium, and other inorganic material) (Al-Maliky and Elkhayat, 2012).

As the abatement of pollution from large industrial sources seems to be within reach, environmental policy in Europe and elsewhere focuses increasingly on reducing the impact of “non-point” sources of pollution (Miljøstyrelsen, 1996), in particular on the pollution (and resource use) associated with private consumption (Geyer-Allély and Eppel, 1997; Norwegian Ministry of Environment, 1994b; OECD, 1997; Sitarz, 1994). Nowadays, pollution and the consumption of scarce resources are associated with all phases of the consumption cycle (Pieters, 1991), the acquisition of consumer goods and services, their use in the production of utilities in (or outside) the household, and the disposal of possible leftover products.

In the course of a few years the question of the adverse environmental impact of private consumption in the industrialized countries has shifted from being something of interest to a select group of experts and committed individuals only, to a position at the centre of public and political attention (Thogerson, 1993).

Solid waste compositions have been found to be relatively stable (Bai and Sutanto, 2002) and food waste always comprises the highest portion followed by paper, wood and plastics. As an example, food waste accounted for about 39 percent of the total solid waste in Singapore but only 2.3 percent of it was recycled in 1999. Following the authors, non-toxic contaminated food waste should therefore be separated for biological treatment, thus reducing the energy consumption and costs needed for the incineration of food waste.

In recent decades, food waste has become recognized as a significant social, nutritional, and environmental problem (Sobal and Nelson, 2003). It has been defined as all food produced or purchased that is discarded by humans (Gallo, 1980) and has serious consequences for the environment and community health (Blair and Sobal, 2006).

Household food waste is a significant contributor to the food waste stream, and much of the food waste at the consumer level is preventable, but many consumers would rather throw leftover items away than have to consume them again, store them for a future meal, or compost them (Griffin, Sobal, and Lyson, 2009).

The food system has a great bearing on the quality of urban life, and we believe that its significance needs to be understood more fully for its impact on the city's economy, public health, environment, land use, and other community systems (Pothukuchi and Kaufman, 1998).

With food waste a significant portion of the waste stream in industrialized countries, it contributes to ecological damages and nutritional losses (Griffin, Sobal and Lyson, 2009). It has serious consequences for the environment and community health (Blair and Sobal, 2006) through the destruction of the biophysical environment, air pollution from decaying food, water pollution from runoff or leaching, and rapidly growing landfills. In many countries the increasing amounts of household solid waste collected by the public services (or littered around public places) are now perceived by politicians and consumers alike as a problem in urgent need of solution (Thogerson, 1993).

From an ecological standpoint, minimizing food waste promotes environmental sustainability by conserving energy resources, reducing environmental costs of burning fossil fuels, protecting microhabitats, and preserving water and air quality (Griffin, Sobal, and Lyson, 2009).

From a nutritional standpoint, reducing food waste increases the availability of nutrients to individuals, improving community health (American Dietetic Association, 2001) and community food security (Hamm and Bellows, 2003).

Industrially developed countries produce large quantities of waste (Sujauddin, Huda, and Hoque, 2008), while developing countries generate less solid waste per capita because of their lower purchasing power and consequently lesser consumption (Cairncross and Feachem, 1993). In seven of the OECD countries (Switzerland, Denmark, Finland, Ireland, Portugal, Spain, and Greece) household waste grew even faster than incomes in the periods covered by the data (Thogerson, 1993)

Food waste impacts public health (it rots, smell, and attracts rodents) and costs (it drives collection frequency) (Diggelman and Ham, 2003), and decision makers need sound analysis of economic and environmental impacts of options for managing household food waste.

3 Data collection and methodology for data analysis

Data collection

The mixed-method study consisted of a literature review, the organization of focus groups, a consumer survey based on questionnaires (n=542) dealing with consumers' attitudes towards food waste, and semi-structured in-depth interviews with eighteen consumers. The conceptual framework is displayed in Figure 2.

The survey involved 542 citizens that were randomly selected and aimed at uncovering consumer profiles concerning the issue of food waste. In a sequential mixed research approach survey results provided the basis for 18 in-depth interviews trying to deeply understand the behaviour of Portuguese citizens.

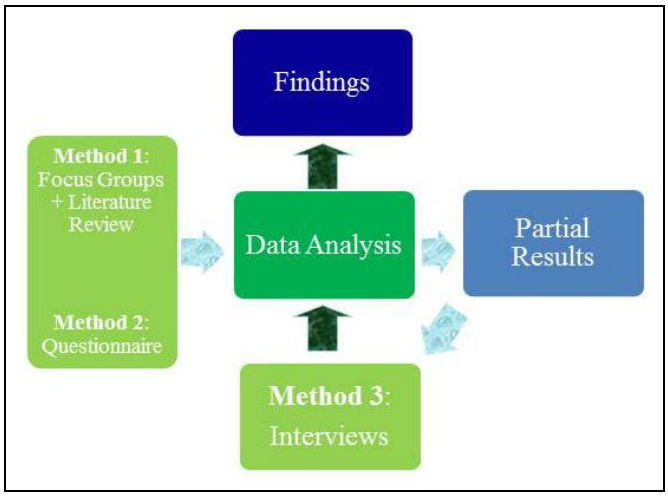

Figure 2. Mixed method conceptual framework

Methodology for data analysis

For displaying an overall multidimensional picture of data that includes all variables addressed in the study and allows to profiling different consumer classes, we employ Latent Class Models. These statistical models allow us to test if a group of unobserved classes (latent) conveniently justifies the association among the observed variables. In this context, a specific solution constituted by a group of latent classes is reasonable when it minimizes the association among observed variables, inside each class. This minimization corresponds with the basic assumption of independence or conditional independence.

Thus, postulating a heterogeneous population, constituted by S groups or homogeneous sub populations (latent classes), the latent class model is defined by the variable Y with S latent types of individuals, described through the observed variables, $X_1, X_2,..., X_p$, with $I_1,...,I_p$ categories, respectively. Let $\lambda_{i1i2...iP}$ be the probability for a certain individual belonging to the categories ($i_1, i_2,..., i_P$), relatively to the conjoint variable ($X_1, X_2,..., X_p$), with $i_1 = 1,...,I_1,..., I_P$. In these conditions, supposing the existence of a latent variable Y, with S types of individuals, explaining the relationships among the observed variables, the probability $\lambda i_1 i_2 ... i_P$ can be defined by the model

$$\lambda_{i_1 i_2 \ldots i_P} = \sum_{s=1}^{S} \lambda_Y(s)\, \lambda_{X_1|Y=s}(i_1)\, \lambda_{X_2|Y=s}(i_2) \cdots \lambda_{X_P|Y=s}(i_P)\,,$$

where

- $\lambda_Y(s)$ represents the probabilities of Y = s, probabilities that an individual belongs to the latent class s (s = 1...,S), that is, the probabilities of the latent classes, also designated by relative sizes or mixture proportions, which estimate the likelihood that individuals belong to each one of the classes.
- $\lambda_{X_p|Y=s}(i_p)$, p = 1,...,P, represents the conditional probability that the variable Xp is in the category *i*p, knowing that the latent variable Y is on level s.

In estimating latent class models, the estimates of the probabilities of the latent classes or relative sizes and certain individual's conditional probabilities are of fundamental importance in their structure, to take values in certain categories of the observed variables, given that it is a member of a class of the latent variable.

The proportions of the latent classes describe the distribution of probabilities of the latent classes or typologies; they become useful in the description of the typologies prevalent inside the population and in the comparison of the typologies prevalent among sub populations.

For a more complete description about the estimation of the latent class models, see McLachlan and Peel (2000), Fonseca and Cardoso (2007), Fonseca (2010) and Fonseca (2011). Concerning methodologies for the selection of the appropriate latent class model, we propose the use of the Akaike information criterion AIC_3 according to Fonseca (2010).

While it is important to know the demographic characteristics of the different groups, those

characteristics cannot be used to predict environmental concerns (Minton and Rose, 1997). Marketing researchers have found that attempts to identify or predict environmentally friendly behaviour or behavioural intentions from demographic variables were not consistent (Anderson and Cunningham, 1972; Kinnear, Taylor, and Ahmed, 1974; Balderjahn, 1988; Schwepker and Cornwell, 1991; Picket, Kangun, and Grove, 1993, Fonseca, 2011). However, they are important in order to gain a better understanding of the profile.

4 Data Analysis and Discussion of Results

Citizens' pattern

Firstly we intend to answer the first research question: Which is the uncovered citizens' pattern, concerning the clustering base variables? In order to do this, we estimate the baseline 1-latent class model or homogeneity model assuming that all the citizens are homogeneous, and then we estimate models from two-latent class model to four-latent class model. In the models' estimation process, we only use clustering base variables (see Table A1, appendix), not demographic variables (see Table A2, appendix), which were used in order to get a better understanding of members of each class.

By using the information criteria AIC_3 and because of the nature of the clustering base variables (mixed, all categories but *age*), we selected a two-latent class model as the most parsimonious model which fit well the data; the parameters' estimates are displayed in Table A1, in accordance with the clustering base variables.

All parameters' estimates in this table are probabilities. Values inside represent conditional probabilities of individuals answering an item category given that s(he) was allocated to cluster 1 or cluster 2. For instance, 0.47 (47%) and 0.57 (57%) represent the probability of responding *No* to question *Are you the principal buyer of food products*? given that s(he) belongs to cluster 1 and cluster 2, respectively; as 0,57 is higher than 0,47, *No* is a characteristic of class 2, *Food waste citizens* (see Table 1).

Based on these parameters' estimates, we can profile individuals, thus uncovering the individuals' pattern concerning the clustering base variables used and gaining more knowledge about individuals feelings concerning the issue we aim to highlight. So, based on these conditional probabilities, we display in Table 1 the individuals' profiles based on clustering base variables.

From this profile, we can see that *Non food waste citizens* (65 percent) are the first food buyers, they go frequently to shop, by walking or by using bus; they go shopping with a shopping list, they separate residuals, they do not like product promotions and read product labels; they never shop at the local market, rarely eat meat, they have no habit of tinkering/palpate vegetables and fruits, they are aware that the amount of food waste can contribute to greenhouse gas emissions; they never trash leftovers of meals but utilize them for a new menu, and they rarely buy fresh foods (vegetables, fruit, fish, etc.) pre-packaged.

As for *Food waste citizens* (35 percent), they go quite rarely to shop, use a car, go shopping without a shopping list as they are of the opinion that such a list is not necessary; they do not separate residuals, they like product promotions and they make frequently impulse purchases; they like shopping at the local market, frequently eat meat, they have the habit of tinkering/palpate vegetables and fruits and they have no opinion concerning the contribution of food waste to greenhouse gas emissions; they trash leftovers of meals, give to those in need and to their animals, and they usually buy fresh foods (vegetables, fruit, fish, etc.) pre-packaged.

Table 1.
Profile of citizens

Relative size	*Non food waste citizens* (65%)	*Food waste citizens* (35%)
Are you the principal buyer of food products?	Yes	No
How often do you go shopping?	Twice a week; at least once per day	Monthly; Every two weeks; Once a week
Which means of transport you use when you go shopping?	Walking; Bus; other	By car
Usually make a shopping list before going to the supermarket?	Yes, and I use	No, but I needed; Never, because I do not think necessary; Yes, but I end up not using
In the kitchen do you have containers for waste separation?	Yes, Another	No
Usually practice the method of composting in your home?	Not because I do not have physical conditions	Yes; No, by choice; This method unknown
Its habit of food promotions like "Take 2 and pay 1" or "buy one, get one free"?	No	Yes
Makes impulse purchases?	Never, Rarely	Sometimes; Almost always; Always
When you go shopping reads the label on the packaging?	Yes	No
Makes shopping at the local market?	Never	Sometimes; Frequently
How often do you eat meat?	Never use flesh; once a month; 1-2 times a week, 3-4 times per	Five to seven times a week; Daily; Two to three times a day
In the use of your refrigerator, agrees and implements the standards recommended by the manufacturer?	I do not agree, then do not practice, I have no opinion	Yes, but not practical; Yes, totally practical
When buying vegetables or fruits, has a habit of tinkering, palpate to confirm your condition and maturity?	Never, Rarely	Sometimes; Almost always; Always
Are you aware that the amount of food waste can contribute to greenhouse gas emissions?	Yes	No opinion
Coffee grounds	Yes	No
Bark and fruit pits	Yes	No
Horticultural	Yes	No
Spoiled food	No	Yes
Bread	No	Yes
Another waste	No	Yes
What usually does with leftovers of meals?	Freeze to another menu; Eat another meal heated; Never lie in trash; I make a new menu	I lay in the trash; Give to those in need; I give my animals
Usually buy fresh foods (vegetables, fruit, fish, etc.) pre-packaged?	Never; Rarely	Sometimes; Almost always; Always

From Table 2 with citizens' profiles according to covariates or demographic variables, we can see that Non food waste citizens are mainly female, 24 years old or more, married or divorced, mostly unemployed or retired, with highest levels of education, MSc or PhD, and living in households with up to 2 persons. As far as Food waste citizens is concerned, they are mainly male, up to 23 years old, single and students, with lower levels of education and living in household with between 3 and 5 members.

Table 2.
Profile according covariates

Relative size	*Non food waste citizens* (65%)	*Food waste citizens* (35%)
Covariates		
Age	24 years or more	Up to 23 years
Gender	female	Male
Marital state	Married; Divorced; another	Single
District	Aveiro, Beja, Faro, Guarda, Leiria, Lisboa, Setúbal, Viana do Castelo	Braga, Bragança, Castelo Branco, Coimbra, Évora; Portalegre, Porto, Santarém, Vila Real, Viseu; RA Açores, RA Madeira
NUTS_II	Algarve, Lisboa	Norte, Alentejo, Centro, Açores, Madeira
Employment	Unemployed; Domestic; Reformed; works another account; own works, The military service	student;
Education	MSc / PhD	1st cycle, 3rd cycle; Secondary; Graduate / Bach;
Residence	Floor / Apartment; Another	Villa / House
Number of people home	Less than or equal to 2, 6	Between 3 and 5 to 7

Based on the citizens' profile, interviews were conducted to better understand citizens' behaviour.

Table A3 in the appendix displays a few excerpts of interviews. From the interviews we can see that four households (interviews 1, 4, 8 and 15) do not separate garbage while households 6, 7 and 13 *try* to separate food waste, roughly corresponding to the *Food waste citizens* (35%) segment. Moreover, considering *eating habits*, *the use of shopping list and the reading of labels on packaging*, *factors that lead to the decision to purchase food,* and the *definition of food waste and the use of leftovers from meals* we are more able to understand the citizens into each one of the two segments. Thus, better than validate the quantitative results, qualitative findings put us in a good position to better understand citizens' profile.

Interviewees' findings roughly show that citizens from segment 1, those who are not food waste citizens, generally make a shopping list, have healthy eating habits, and have the habit to read the label on the packaging.

5 Conclusion

We used Latent Class models to discover citizens' profiles from an extended consumer survey. Follow-up in-depth interviews provided an understanding of citizens' behaviour concerning food waste.

It was concluded that the majority of consumers (65 percent of respondents) can be characterized as *Non food waste citizens*, who have in the kitchen containers for waste separation, who do not practice composting in their home because they do not have the physical conditions to do so, who have no habits of food promotions and rarely make impulse purchases; who rarely buy fresh foods (vegetables, fruit, fish, etc.) pre-packaged and who have the habit of recycling leftovers of meals in another menu. Moreover, they are the oldest of citizens, female, married or divorced, unemployed or retired, with highest education and living in households with few members.

About 35 percent of respondents can be characterized as *Food waste citizens*, who do not have containers for waste separation in the kitchen, who practice composting in their home, who have habits of food promotions and impulse purchases; who frequently buy fresh foods (vegetables, fruit, fish, etc.) pre-packaged and who have the habit of trashing leftovers of meals or giving it to those in need or to their animals. They are the youngest, male, single and students, living out of Algarve or Lisboa, with lowest education and living in households with between three and five members.

The findings may have an impact in three distinct ways: (1) firstly, we can identify (table 2) the main factors that contribute to food waste: age, gender, marital state, employment and education seem to be the most relevant factors; (2) secondly, the factors may be used to educate citizens concerning the issue of food waste: make a shopping list, have healthy eating habits, and make it a habit to read the label on the packaging; (3) thirdly, it may be useful for decision-makers in support of initiatives contributing to increasing food security, a less polluted environment, environmental sustainability, better public health, and in turn to the wellbeing of citizens.

However, further researches are needed regarding the contribution of demographic factors to food waste and the stability of the clusters of consumers that have been identified.

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Appendix

Table A1.
Parameter estimates of a two-latent class model (percent)

Cluster Size	Cluster1 (65%)	Cluster2 (35%)
Indicators		
Are you the principal buyer of food products?		
No	47	**57**
Yes	**53**	43
How often do you go shopping?		
Monthly	3	**4**
Every two weeks	10	**11**
Once a week	27	**32**
Twice a week	**48**	44
At least once a day	**12**	9
Which means of transport you use when you go shopping?		
Walking	**18**	9
Bus	**1**	1
Car	79	**89**
Other	**2**	1
Usually make a shopping list before going to the supermarket?		
No, but I needed	15	**21**
Never, because I do not think necessary	4	**7**
Yes, and I use	**76**	65
Yes, but I end up not using	5	**7**
In the kitchen do you have containers for waste separation?		
No	27	**41**
Yes	**72**	58
Other	**1**	1
Usually practice the method of composting in your home?		
Yes	14	**17**
Not by choice	12	**22**
This method unknown	16	**21**
Not because I do not have physical conditions	**58**	40
Its habit of food promotions like "Take 2 and pay 1" or "buy one, get one free"?		
No	**33**	29
Yes	67	**71**
Makes impulse purchases?		
Never	**9**	8
Rarely	**54**	51
Sometimes	36	**38**
Almost always	1	**2**
Always	0	**1**
When you go shopping reads the label on the packaging?		
No	17	**18**
Yes	**83**	82
Makes shopping at the local market?		
Never	**36**	30
Sometimes	47	**50**
Frequently	17	**20**
How often do you eat meat?		
Never meat consumption	**2**	2
Once a month	**2**	1
Once or twice a week	**27**	23
Three to four times a week	**35**	31
Five to seven times a week	19	**24**
Daily	15	**18**
Two to three times a day	0	**1**

Table A1.
Parameter estimates of a two-latent class model (cont.)

Cluster Size	Cluster1 (65%)	Cluster2 (35%)
In the use of your refrigerator, agrees and implements the standards recommended by the manufacturer?		
I do not agree, then do not practice	**1**	0
I have no opinion	**32**	25
Yes, but not practical	9	**15**
Yes, totally practical	58	**60**
When buying vegetables or fruits, has a habit of tinkering, palpate to confirm your condition and maturity?		
Never	**3**	2
Rarely	**18**	17
Sometimes	24	**25**
Almost always	28	**29**
Always	27	**27**
Are you aware that amount of food waste can contribute to greenhouse gas emission?		
Yes	**92**	91
No opinion	8	**9**
Coffee grounds		
No	84	**86**
Yes	**16**	14
Bark and fruit pits		
No	21	**25**
Yes	**79**	75
Horticultural		
No	37	**45**
Yes	**63**	55
Spoiled food		
No	**85**	73
Yes	15	**27**
Bread		
No	**93**	87
Yes	7	**13**
Another waste		
No	**97**	96
Yes	3	**4**
What usually does with leftovers of meals?		
Freeze to another menu	**4**	0
I lay in the trash	0	**46**
Give to those in need	0	**4**
I give my animals	0	**49**
I make a new menu	**39**	1
Never lie in trash	**1**	0
Eat another meal heated	**56**	0
Usually buy fresh foods (vegetables, fruit, fish, etc.) pre-packaged?		
Never	**6**	4
Rarely	**45**	40
Sometimes	38	**42**
Almost always	7	**9**
Always	3	**5**

Table A2.
Parameter estimates of a two-latent class model (covariates)

Cluster Size	Cluster1 (65%)	Cluster2 (35%)
Covariates		
Age		
To 23 years	19	**65**
24 or more years	**81**	35
Gender		
Male	21	**28**
Female	**79**	72
Marital state		
Singles	34	**41**
Married	**58**	54
Divorced	**7**	5
Other	**1**	0
District		
Aveiro	**3**	2
Beja	**2**	1
Braga	4	**9**
Braganca	2	**5**
Castelo Branco	1	**3**
Coimbra	2	**5**
Evora	1	**2**
Faro	**4**	2
Guarda	**2**	1
Leiria	**5**	3
Lisboa	**37**	18
Portalegre	0	**1**
Porto	15	**21**
Santarém	4	**6**
Setúbal	**12**	8
Viana do Castelo	**1**	0
Vila Real	0	**3**
Viseu	2	**3**
R.A.Acores	2	**5**
R.A. Madeira	1	**2**
NUTS II		
Norte	22	**37**
Alenteio	3	**5**
Algarve	**5**	2
Centro	14	**17**
Lisboa	**54**	32
Acores	2	**5**
Madeira	0	**2**
Employment		
Unemployed	**5**	4
Domestic	**1**	0
Student	12	**19**
Reformed	**2**	1
Worker account someone else	**68**	66
Worker self	**11**	10
The military service	**1**	0
Education		
1º cycle	0	**1**
3º cycle	1	**2**
Secundary	23	**24**
Graduate/ bachelor	45	**48**
Master/PhD	**31**	25
Residence		
Floor / Apartment	**70**	48
Villa / House	29	**52**
Other	**1**	0
Number of people home		
0	**4**	2
1	**10**	7
2	**25**	17
3	30	**34**
4	25	**29**
5	5	**10**
6	**1**	0
7	0	**1**

Table A3.
Some excerpts from 18 interviews

	Eating habits	List of shopping and reading labels on packaging	Factors that lead to the decision to purchase food	Separation of food waste	Definition of food waste and use leftovers from meals and suggestions
Interview 1	... I slip regularly ...	Never do list ... just some things I look labels	Do not buy what I want or think more healthy ... I cannot match prices ...	I have no recycling, no separation of garbage ...	Waste food is to buy more than we can consume ... Rarely throw food away, but sometimes things spoil yourself ...
Interview 2	I balanced meals ...	I do not usually do shopping list ... One of the rules to take into account will be careful with dates whatever article	Products that do not jeopardize the health ... prices, though, also keep in mind the quality of products ...	We performed the separation of food waste ...	Food waste, are the remains or waste food ... Whenever there leftovers are not wasted, keep up for the next meal ...
Interview 3	I have healthy eating habits ...	When purchases that include other products such as cleaning hygiene, for cooking and others, I list everything I read ...	He liked to buy organic products are more expensive but ...	In my home I recycle ...	In my house there was always plenty but never spoiled food because I always thought that was hungry ... Remains of a meal to get the other and never lies outside food ...
Interview 4	I do not consider to have adequate food ...	Always make a list ... I read the labels of the pack	Most important in the choice of products is the price and quality of products ...	I do not practice the separation of food waste ...	The food waste is related to lack of civic education to those who practice it ... Now I've learned to better regulate the amount I need. Never leave anything on the plate ...
Interview 5	Four meals a day ... In general, I avoid sweets, despite having a high body mass index	I do whenever purchases are made in the context of hypermarket	Quality and price ...	Mostly ...	Waste food make me confused and I'm very careful at that level ... There are people who enjoy leftovers for a sign of poverty ... It is the mindset of the consumer society ...
Interview 6	I do my best but I have some health problems ...	I make a shopping list ... I consider important to read the labels	You must look for quality, for the freshness of the vegetables and fruits ...	Food residues are generally not mixed ...	Speaking of food waste we refer to foods that are not used at home or given to anyone who needs them ... Generally not waste a lot of food; lay to waste, sometimes some leftovers ...
Interview 7	I believe that I have adequate food ...	My wife usually makes a list. I do not make the list ... We care always read the label on the packaging	Having in mind ... quality indices and economic indicators also ...	At home we try to make the separation of food waste ...	Wasted food means throwing away food ...
Interview 8	My diet is appropriate because it is diverse ...	I make a shopping list ... Normally I read the labels to avoid products with additives	Chosen ... depending on my diet ...	Not practice separation of food waste, or other ...	Waste food is related to the development of unnecessary amounts of food ... I make food to be ready when I have time to confectioner and that happens after lunch / dine out and spoils. This is related to a time management does not always correspond to that planned and then the food spoils.
Interview 9	Food habits quite balanced ...	Just do the shopping list of the month ... I never read the labels because I know that if read not buy anything	What matters is the quality and price ...	Practical separation of waste ...	Food waste has many faces, since people do not eat what's on the plate and throw out good food, even food supermarkets lie spent a day off because of the time and put bleach on top for the poor do not eat ...
Interview 10	Consider to have adequate food ...	I make a list because I have a ceiling ... No, do not bother to read the labels	The relationship between price and quality ...	Do the sorting of waste for many years ...	It's what makes spoil / degrade the refrigerator without spending ... I usually eat everything and rarely lay out food ...

Table A3.
Some excerpts from 18 interviews (continued)

Interview 11	I have suggestions from nutritionists ...	I have no shopping list ... I always read package labels and confirm dates.	What is ... more urgent ...	We usually do ... the separation of waste ...	I think it's a general awareness ... What waste duns can be availed by those who are most needy ...
Interview 12	I try to have adequate food, but I cannot always ...	I always list to go shopping ... I always remember to read the labels on packaging	More important ... is the quality of the products, but the price factor also weighs, of course ...	Practice waste separation ...	Sometimes people do not know how to enjoy food left over meals, making biscuits, pies and other foods ... Unfortunately this is also my case ...
Interview 13	Right now I can say I have adequate food ...	I usually always make the lists ... I always read the label because I'm always afraid to buy things out of time	The most important thing in life is health ... If necessary, ask for a medical guidance ...	Do not separate the organic waste for lack of domestic ...	Waste food is when foods are still able to be used and thrown away ... I use always the next day and so on ...
Interview 14	I consider my proper nutrition to lifestyle that I practice and I consider myself healthy ...	Rarely do shopping list ... Labels, just read the news of	The freshness, confidence and the origin of the brand ...	At home we are careful to separate their garbage ...	Food waste is any residue which has not been consumed ... food waste is minimal ...
Interview 15	A varied diet ... I should do more exercise ...	Not always do shopping list ... We do not have much in the habit of reading the labels on packaging	The quality / price ratio ...	I do not make any separation of food waste ...	Wasted food is food wastage and expiry dates of products ... Leftover meals go to waste ...
Interview 16	I consider my eating habits and appropriate to my lifestyle and my health ...	I list sometimes is rare ... but I do not have the habit of reading the label	The packaging, the brand and the look ...	At home makes daily separation of all waste ...	The food waste is to throw away any food that is or was in a position to be taken ... will have to be overcome with greater rationing and management of food purchased
Interview 17	Consider to have adequate food and balanced ...	Usually I make a visit to the pantry and check the products missing ... When choosing always take into account the validity	The reliability of the brand and price comparison between two similar brands ...	The family continues to this action by thinking that once there is a more direct use of recyclables ...	Waste food is any amount of food that is not consumed ... Small individual portions that were not consumed at the end of the meal ...
Interview 18	I do not consider my habits healthy ...	I list at home products that begin to fail ... I'll take that list with me ... I always try to read the labels on packaging	Quality ... (freshness and smell) and price ...	I separate food waste from other waste ...	To me it means the food scraps that go to waste; rarely throw debris out except those who are in the dish or some food that kept more than 2/3 days in the fridge ...