

**FUNDAÇÃO GETÚLIO VARGAS
ESCOLA DE ADMINISTRAÇÃO DE EMPRESAS DE SÃO PAULO**

GUSTAVO PORPINO DE ARAÚJO

**Food waste in lower-middle income households:
a qualitative analysis of antecedents and a typology of food wasters**

São Paulo
2015

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Campo de conhecimento: Marketing

Orientador: Prof. Dr. Juracy Parente

São Paulo
2015

Porpino, Gustavo.

Food waste in lower-middle income households: a qualitative analysis of antecedents and a typology of food wasters – Gustavo Porpino – 2015.
195 f.

Orientador: Juracy Gomes Parente

Tese (doutorado) - Escola de Administração de Empresas de São Paulo.

1. Alimentos - Consumo. 2. Alimentos - Aspectos sociais. 3. Desperdício (Economia). 4. Consumidores de baixa renda. 5. Afeto (Psicologia). I. Parente, Juracy Gomes. II. Tese (doutorado) - Escola de Administração de Empresas de São Paulo. III. Título.

CDU 612.392

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Campo de conhecimento: Marketing

Data de aprovação: 15/12/2015

Banca examinadora:

Prof. Dr. Juracy Parente (Orientador)
FGV-EAESP

Profa. Dra. Eliane Zamith Brito
FGV-EAESP

Prof. Dr. Felipe Zambaldi
FGV-EAESP

Profa. Dra. Leticia Casotti
UFRJ-COPPEAD

Profa. Dra. Vivian Strehlau
ESPM

To those who strive to feed well their families in
this paradoxical world of abundance and scarcity.

ACKNOWLEDGMENTS

Finishing a PhD program resembles climbing a mountain. Along the way, we stumble, experience fatigue, anxiety and even think about quitting, but also on the route we are treated to discoveries, as well as the support and encouragement of those more accustomed to the struggles of reaching the summit. Getting to the top is more than a feeling of accomplishment. When I look back, I see how important it was the experience of Professor Juracy Parente, my adviser, an experience guide in the task of pointing out ways that might not be the easiest, but are the most enriching. Additionally, the journey would not have been so rich, without the time spent at Cornell University, where I had the pleasure of working together with Professor Brian Wansink and the Food and Brand Lab team. To professors Juracy and Brian, my sincere thanks.

My thanks to all of my colleagues from the Cornell Food and Brand Lab for the encouragement, and exchange of ideas. There were many who helped me in many ways.

To Embrapa, for the financial support, and to all colleagues who believed in me, especially Allan Kardec and Marcos Bischoff for their support. I am very proud to be part of a research company that considers investments in knowledge a differentiator.

To Professor Harry De Gorter, from Cornell, and his wife Erika Kliauga, my gratitude for their support, even before my arrival in Ithaca and for their trust. To all of my colleagues at Cornell, in particular, researcher Patrícia Pinheiro and family, for the tips and encouragement.

I thank all the FGV professors with whom I had the opportunity to interact with, especially the ones from the marketing department – Professor Delane Botelho, Prof. Eliane Brito, Prof. Felipe Zambaldi and Prof. Tania Veludo; as well as to Professor Rodrigo Bandeira de Mello, and to Diogenes Bido, from Mackenzie, for the support and the exchange of ideas.

I'm grateful also to my classmates (Andre, Caê, Carla, Carol, Joselia, Lilian, Mateus, Ricardo and Viviane) for the exchange of experiences, and for taking part in this trek.

To my friends Paulo and Alan, for their support upon my arrival in São Paulo and their encouragement. Alan, by a coincidence of life, was also present in the New Yorker phase of my Doctorate.

I thank my family who helped and encouraged me to move forward. To my parents, Geraldo and Selma, my sister Karla and her family, and uncles for their support and love! To Simone, for the understanding, companionship, unconditional support and encouragement at all times!

Last, but not least, to all families who have opened the doors of their homes so I could collect data. I went from Itaquá to Ithaca, and along the way I learned how big a mother's heart is everywhere!

AGRADECIMENTOS

Concluir o Doutorado é como escalar uma montanha. Pelo caminho, podemos tropeçar, sentir cansaço, ânsia e até mesmo pensar em desistir, mas é também no percurso que somos brindados com descobertas, assim como com o apoio e o incentivo daqueles mais acostumados com os percalços até chegar ao cume. Chegar ao topo representa mais do que a sensação de dever cumprido. Quando olho para trás, vejo como foi importante a experiência do professor Juracy Parente, meu orientador, um guia calejado na tarefa de apontar caminhos, que podem até não ser os mais fáceis, mas são os mais enriquecedores. E a experiência não teria sido tão rica, não fosse minha passagem por Cornell, onde tive o prazer de trabalhar em conjunto com o professor Brian Wansink e equipe. Aos professores Juracy e Brian, meus sinceros agradecimentos.

Meu agradecimento à todos que fazem o Cornell Food and Brand Lab pelo incentivo, trocas de ideias e apoio financeiro para coleta de dados. Foram muitos que me ajudaram de diversas formas.

À Embrapa, pelo suporte financeiro, e a todos os colegas que acreditaram em mim, especialmente a Allan Kardec e Marcos Bischoff pelo apoio. Muito me orgulha fazer parte de uma empresa de pesquisa que acredita no diferencial de investir em conhecimento.

Ao professor Harry De Gorter, de Cornell, e sua esposa Erika Kliauga, meu agradecimento pelo apoio antes mesmo da minha chegada à Ithaca e pela confiança. A todos os colegas de Cornell, em especial, à pesquisadora Patrícia Pinheiro e família, pelas dicas e incentivo.

Agradeço a todos os professores da FGV com quem tive oportunidade de interagir, em especial aos professores da linha de marketing – prof. Delane Botelho, profa. Eliane Brito, prof. Felipe Zambaldi e profa. Tania Veludo, assim como aos professores Rodrigo Bandeira de Mello, também da FGV, e Diogenes Bido, da Mackenzie, pelo ensinamento, pelo apoio e pelas trocas de ideias.

Agradeço aos colegas de Doutorado (em especial a Andre, Caê, Carla, Carol, Joselia, Lilian, Mateus, Ricardo e Viviane) pelas trocas de experiências e por participarem todos, de alguma forma, dessa caminhada.

Aos amigos Paulinho e Alan, pelo apoio na minha chegada à São Paulo e incentivo. Alan, por uma coincidência da vida, também se fez presente na fase nova-iorquina do Doutorado.

Agradeço aos familiares que contribuíram e me incentivaram a seguir em frente. Aos meus pais, Geraldo e Selma, minha irmã Karla e família, e tios, pelo apoio e carinho! A Simone, pela compreensão, companhia, apoio irrestrito e incentivo em todos os momentos!

Por fim, e não menos importante, a todas as famílias que abriram as portas de suas casas para que eu pudesse coletar dados. Fui de Itaquá a Ithaca, e pelo caminho aprendi como o coração de mãe é grande em todo lugar!

“Next to breathing, eating is perhaps the most essential of all human activities, and one with which much of social life is entwined” (Mintz & Du Bois, 2002, p.102).

ABSTRACT

This dissertation, based on empirical data collected with 50 nutritional gatekeepers distributed in Brazil (n=30) and the US (n=20), aims to provide an improved understanding of household food waste in the lower-middle income context. The thesis is comprised in three essays, which combined, fulfill the objectives of identifying the core antecedents of food waste and delineating a typology of food wasters. Additionally, it presents a contextualization of food waste worldwide and a concluding chapter proposes an agenda for future research studies on consumer food waste. Food waste, as a research theme, provides the opportunity for scholarly work in marketing to meet the criteria of managerial, public policy, and societal relevance. In the first article, I describe the drivers of the so-called “food waste paradox”, the identification and analysis of food waste in families with income constraints while presenting the food consumption itinerary and the core antecedents of wasted food. This first essay, based on data collected in Brazilian families, illustrates also how cultural norms, such as over-preparing food to show hospitality or as a form not to be perceived as poor, can generate more food waste. In the second essay, a grounded theory oriented research highlights the role of affection and abundance on consumer food waste. This second study presents a framework with six dimensions of food waste - 1. Affection; 2. Abundance; 3. Multiplicity of choices; 4. Convenience; 5. Procrastination; 6. Unplanned routine - to enrich the theoretical contributions. Based on empirical data collected in American families, it provides novel explanations, such as on how stockpiling comfort foods in abundance – a form of both boosting positive self-emotions and showing affection for kids – can promote more food waste. In sum, the second essay identifies a negative outcome of affection and food abundance in the family context, while providing a theoretically relevant general framework for the food waste phenomenon. Finally, the third essay, drawing from the entire dataset and a new data gathering from ten families, proposes a behavioral typology of household food waste, an original contribution to consumer behavior studies. The identification of five distinct food wasters’ types - (1) Caring mothers; (2) Heavy cooks; (3) Leftovers killers; (4) Procrastinators; (5) Resourceful mothers - contributes to theory, whilst a number of potential implications for nutritional educators and government officials are explored in light of the findings. A comparison of the Brazilian and American samples explains the characteristics of each type identified, showing many similarities in their respective food waste behaviors. Waste levels perceived per country are also compared. Overall, findings from the three studies, such as the itinerary presented and the identification of the major drivers of household food waste, can contribute to maximizing the results of campaigns aimed at mitigating food waste, and they provide insights for retailers interested in sustainability initiatives. Broadly-based, results presented can also be applied to improve hunger relief programs and nutritional education projects undertaken by the public sector or NGOs.

Key words: household food waste; food consumption itinerary; consumer typology; affection; abundance; low-income; sustainability

RESUMO

Esta dissertação doutoral, com base em dados empíricos coletados com 50 mães distribuídas no Brasil (n = 30) e nos EUA (n = 20), tem como objetivo fornecer uma melhor compreensão do desperdício de alimento no contexto da baixa renda. A tese é composta por três artigos, que combinados, cumprem os objetivos de identificar os antecedentes do desperdício de alimento e delinear uma tipologia dos desperdiçadores de alimento. Adicionalmente, contextualiza o desperdício global e um capítulo propõe uma agenda futura para estudos sobre desperdício de alimento no âmbito do consumidor. O desperdício de alimento nas famílias, enquanto tema de pesquisa, oferece a oportunidade para o trabalho acadêmico em marketing cumprir os critérios de relevância social, gerencial e para políticas públicas. No primeiro estudo, descrevem-se os fatores do chamado "paradoxo do desperdício de alimento", a identificação e análise do desperdício de alimento em famílias com restrições orçamentárias, enquanto apresentam-se o itinerário do consumo de alimentos e os antecedentes do desperdício. Este primeiro artigo, elaborado com dados coletados em famílias brasileiras, ilustra também o papel das normas culturais, tais como o preparo abundante de alimento para mostrar hospitalidade ou como forma de não ser percebido como pobre, no aumento do desperdício. No segundo artigo, uma *grounded-theory* (teoria fundamentada nos dados) destaca o papel do afeto e da abundância no desperdício de alimento familiar. Para enriquecer as contribuições teóricas, este segundo estudo apresenta um *framework* com seis dimensões do desperdício de alimento (1. Afeto; 2. Abundância; 3. Multiplicidade de escolhas; 4. Conveniência; 5. Procrastinação; 6. Rotina sem planejamento). Baseado em dados empíricos coletados em famílias americanas, este estudo proporciona novas explicações, a exemplo de como o estoque abundante de *comfort foods* - uma forma de impulsionar tanto emoções positivas para si quanto mostrar afeto para crianças - pode gerar mais desperdício de alimentos. Em síntese, o segundo artigo identifica uma consequência negativa do afeto e da abundância de alimentos no contexto familiar, e apresenta um *framework* teoricamente relevante. Finalmente, o terceiro artigo, a partir do conjunto de dados dos estudos anteriores e de nova coleta com dez famílias, propõe uma tipologia comportamental do desperdício de alimento, uma contribuição original aos estudos de comportamento do consumidor. A identificação de cinco tipos de desperdiçadores de alimentos - (1) Mães carinhosas; (2) Cozinheiras abundantes; (3) Desperdiçadoras de sobras; (4) Procrastinadoras; (5) Mães versáteis - contribui para a teoria, enquanto implicações potenciais para educadores nutricionais e agentes públicos são exploradas a partir dos resultados. Como uma forma de explicar as características de cada um dos cinco tipos identificados, compara-se aspectos das amostras brasileira e norte-americana, que apresentam similaridades no comportamento de desperdício de alimento. Os níveis de desperdício percebidos por país também são comparados. Em suma, os achados dos três artigos podem contribuir para maximizar os resultados de campanhas de conscientização voltadas à mitigação do desperdício de alimento, e apresentam ideias para varejistas interessados em iniciativas de sustentabilidade. Mais abrangentemente, os resultados apresentados também podem ser aplicados para incrementar programas de combate à fome e projetos de educação nutricional realizados pelo setor público ou ONGs.

Palavras-chave: desperdício de alimento familiar; itinerário do consumo de alimento; baixa renda; tipologia do desperdício de alimento; afeto; abundância; sustentabilidade

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CHAPTER 1

GENERAL INTRODUCTION

Sustainable food production and consumption are not merely a fad, but two core areas that demand the application of scientific knowledge. Given that food is a basic necessity in sustaining every form of life, it is no exaggeration to state that food waste studies should be a research priority in countries such as Brazil and the US, global players in the food sector. Food waste, as a research theme, provides the opportunity for scholarly work in marketing to meet the criteria of managerial, public policy, and societal relevance. In a world facing climate change and scarcity of natural resources (e.g. water shortage in California and São Paulo), consumer studies can contribute to identifying ways for behavioral changes to benefit society at large.

Besides the pertinence of the theme, the relevance of amplifying the knowledge about the antecedents of waste needs to be emphasized, considering that about one-third of the food produced in the world, the equivalent of 1.3 billion tons, is discarded without being consumed (Gustavsson et al., 2011). This data is likely to be an underestimation due to difficulties in measuring waste at the end of the chain.

Considering our current pattern of food waste, it is estimated that the world needs to increase food production by 60% by 2050 to meet the rising demand resulting from population growth in emerging countries, mainly in Africa and South Asia, increasing consumption in developing countries, and changes in patterns of consumption (FAO, 2009; Alexandratos & Bruinsma, 2012). In such a global scenario, addressing consumer behavior at the end of the chain in order to reduce wastage is as important as creating and disseminating technologies for food production (FAO, 2013). What role might marketing science play in such a demanding context? It faces the challenge of unifying rigor, relevancy and precision (Kumar, 2015) while responding to the imperative environmental pressures (Kotler, 2011; Barthel & Baeyens, 2014).

Drawing from Bazerman (2001), I assume that the problem of waste creates the opportunity for scientific research to contribute to the welfare and to be more beneficial to consumers. The need for marketing to align itself more to sustainability is also defended by Kotler (2011), and for Sheth, Gardner and Garrett (1988) the discipline

must generate responses to the call for social respect for the environment and the consumers themselves.

As Staelin (2005) observes, research should generate insights for real world phenomena and it should seek social relevance. The development of theories and methodological advancements are a means to that end of generating knowledge with applicability to real problems (Staelin, 2005). Based on insights derived from empirical data, and drawing on consumer behavior theoretical fragments, the three essays of this thesis regarding household food waste carry implications for retailers and government agencies interested in taking action to mitigate food waste, as will be further detailed. Each essay carries theoretical contributions and also implications for managerial (e.g. opportunities for supermarkets) and public policy actions (e.g. campaigns and nutritional education initiatives) aimed at reducing household food waste.

Apart from contributing to addressing the research gap in relation to consumer food waste in a low-income context; there is evidence that increases the importance of studying this research topic: the rising price of food after the 2008 financial crisis, the growing social activism related to waste and the prospect of climate change impacts on agricultural production (Evans, Campbell, & Murcott, 2013). As the major food producers in the world, the US and Brazil can enhance the sustainability of its food systems by reducing food waste.

Furthermore, Brazil, ranked as the second largest exporter of agro-food products in the world behind the United States (rising from fourth place in 2000), is expected to increase its contribution to the global food supply in order to meet the more diversified diet adopted by an increasingly wealthy population, especially in developing Asian countries (OECD-FAO, 2015). Therefore, mitigation of food losses and waste can be a sustainable alternative to the expansion of croplands in order to increase food supply with less compromise of natural resources.

Food waste studies have gained vigor in the last two years, partly due to an understanding that waste at the end of the food chain (consumer food waste) is the most relevant factor in terms of decreasing the negative impacts of food disposal. Another factor likely to contribute to more academic interest in this area was the Food and Agriculture Organization of the United Nations' (FAO) call for greater awareness

of this global problem. Since the FAO released the reports “Global food losses and food waste” in 2011 and “Food wastage footprint” in 2013, consumer behavior studies are being published with a focus on food waste.

In fact, until 2014 food waste was considered “a hugely under-researched area of interest for social scientists” (Evans, Campbell & Murcott, 2013, p. 5). More recently, when I was already analyzing data collected for this research, the topic started to bloom in Europe. Seminars and conferences are devoting attention to the issue, such as the “International Conference Envisioning a Future without Food Waste”, organized by the University of the Basque Country (Spain) in November 2015, and the “Fight Food Waste, Feed the Planet”, research seminar by the European Commission in October 2015 held at the Expo Milan.

Initially, the literature tended to view consumer food waste as an issue of more affluent families. This myopic view might be understood due to the absence of studies targeted to understand the low-income segment, a gap filled in this study. Another common bias was to blame consumers for wasting food without taking into account a broader contextualization. Evans (2011) cited that blaming consumers was a drawback in fighting food waste, and called for a conceptualization of food waste that would take into account the social and material contexts of food consumption.

Furthermore, as noted by Southerton and Yates (2015, p. 137), “food waste can only be fully grasped when located within the wider set of socio-cultural processes that affect contemporary eating”. Thus, in this study, I avoid evaluating food waste behavior as an independent action detached from the social and cultural contexts in which it is produced, as suggested by Southerton and Yates (2015). To avoid this bias, the first article, based on empirical data derived from the Brazilian context, emphasizes the importance of culture for an improved understanding of food waste.

Interestingly, most studies on household food waste published until 2014 were from Northern Europe countries and the Netherlands, such as Evans (2011, 2012, 2012b, 2014), Stefan et al. (2013), and Koivupuro et al. (2012). Evans’ work is oriented by social practices theories, such as Warde (2005), while Stefan et al. (2013) is a quantitative study inspired by the theory of planned behavior (Ajzen, 1991) and Koivupuro et al. (2012) is also a survey aimed to identify factors that influence the

amount of wasted food. These surveys lack an investigation of the cultural dimension of food waste.

More recently, while providing the first attempt to evaluate how American consumers' awareness, attitudes and behaviors relate to food waste, Neff, Spiker and Truant (2015) found that Americans perceive themselves as wasting little, with nearly three-quarters reporting that they discard less food than the average actually wasted. This tendency of self-reporting low amounts of wasted food in surveys augments the necessity to investigate household food waste with ethnographic-oriented methods, as this study did. However, even more important, is to explore the "whys" underlying household food waste.

Therefore, by applying distinct qualitative methods (in-depth interviews combined with in situ observations, analysis of photos and field notes, and a focus group), this study uncovers antecedents of food waste that otherwise wouldn't be identified if based mainly on self-reports, as some fieldwork insights indicate. For instance, I noted that most informants minimize their food waste behavior in the beginning of the interviews, but as the conversation progresses, they start to reveal some habits related to food waste, such as the preference for freshly prepared rice instead of consuming leftovers. In other cases, the observations conducted allowed for questioning, for example, the reasons behind abundant stockpiling, which end up elucidating some factors, such as having plenty of comfort foods on hand as a form to decrease anxiety for the self or to show affection to children.

When consumers self-report their behavior, for instance, it is unlikely that the core reasons for wasting food will emerge. In this recent survey by Neff, Spiker & Truant (2015), concern about foodborne-illness was the most common reason given for discarding food. As to be discussed in this thesis, however, consumers might waste food even knowing that it still edible. The role of affection and abundance, explored in the second paper, shed light on the phenomenon of over-preparing and over-serving – and therefore increasing the likelihood of wasting – as symbols of affection to family members. Neff, Spiker and Truant (2015, p. 12) end up stating that "to improve our ability to intervene and target appropriate interventions, there is a need for research drilling deeper into every one of these reasons for waste".

In addressing the need to find a solution to food waste, Gustavsson et al. (2011, p. 15) state that there are many data gaps about waste and loss of food in the world, and that research with this focus is urgent, “especially considering that food security is a major concern in large parts of the developing world”. For these authors, solutions applied at the farm and distribution stages to mitigate food loss in industrialized countries can be marginal if households continue to waste at current levels. To conclude, it is mentioned that households need to be better informed to change their behavior (Gustavsson et al., 2011), which leads to the necessity of further investigation of consumer food waste drivers.

Hence, this study attempts to provide an improved understanding of household food waste, a barely researched phenomenon within the area of consumer behavior. Overall, as to be detailed hereafter, the seven chapters from this thesis (Introduction; contextualization; three essays; future research agenda; and general conclusion) answer several research questions, such as the need to identify and explain drivers of food waste in lower-middle income families in the developing world context, and among the low-income in the developed world.

Furthermore, the elaboration of an itinerary of household food waste, inspired by the method proposed by Desjeux (2006), and the classification of families by waste types are theoretical contributions capable of positively impacting initiatives for waste mitigation. Additionally, the identification of theoretical dimensions in a framework helps to explain the role of affection and abundance on household food waste, a theoretically relevant finding.

Given that data collected for these three essays came from Brazil and the US, two culturally distinct countries, findings can contribute to empirical generalizations. Although the analyses of food wasters’ types point to certain differences among the two countries, as to be discussed, similarities regarding the major drivers of household food waste (e.g. the role of abundance) were also found. This may contribute to managerial initiatives and public policies within the global scope.

The first and second essay are aimed at filling a theoretical gap since previous studies did not include immersions in low-income families via observations and in-home interviews to identify drivers of wasted food. In the first article of this thesis, in order to observe whether in the Brazilian context food waste is an issue that deserves attention

among the low income segment, fieldwork involved twenty caregivers. Apparently, no previously peer-reviewed paper has focused on consumer food waste within the Brazilian context.

Surprisingly, high levels of food waste were found in these families, which denies the commonsensical view of food waste as a problem related mainly to upper-middle class households. The initial paper enabled not only an improved comprehension of the peculiarities of food waste in the low income context, but delineates an itinerary of food waste in households, describing each step in the consumer behavior process; from planning the purchasing trip, to the food consumption and disposal at home. Additionally, a framework with the core antecedents of food waste is developed. These findings are presented in the first paper.

The initial discoveries had encouraged further the investigation into the subject. It was during the first phase of interviews and observations that the need for deeper exploration of some antecedents of food waste, such as the good provider identity and the preference for abundance, was identified. While the first paper aimed at understanding household practices relating to the purchase, storage, preparation and disposal of food in the Brazilian lower-middle income context, the second study advances the theoretical contributions via grounded theory (GT) oriented research with quasi-ethnographic methods.

The second study, conducted in the United States, presents antecedents of food waste grouped in six dimensions, following the assumptions of GT coding (Corbin & Strauss, 2015). It illustrates how even positive intentions might lead families to waste food. Furthermore, by investigating the low-income context in a different country, it was possible to better identify similarities and differences among the two groups, isolating the economic impact. This comparative approach was useful in delineating the third essay.

Apart from the valuable contributions presented in the first and second essays as described, it appears that an effort to classify different types of household food waste is a novel contribution. The typology is derived from considering the different ways (stages and antecedents) that food waste takes place within households. Typologies are important contributions, which shouldn't be seeing as merely descriptive as cited by Fischer and Otnes (2006).

As such, in the third article, drawing from the empirical data of the two studies and additional data gathered from 10 families, a behavioral typology based on distinct household food waste patterns is presented. For each of the five types presented - (1) Caring mothers; (2) Heavy cooks; (3) Leftovers killers; (4) Procrastinators; (5) Resourceful mothers – a network of factors leading to food waste is elaborated based on data analyzed utilizing Atlas.ti software. Quotations extracted from the interviews conducted are also separated by each type to illustrate how they differ. Finally, this third essay also compares waste levels per country and typologies identified per country.

Additionally, to complement the study, several opportunities for future research are presented in the sixth chapter. This complementary analysis of previous studies comes after the three essays due to the prevalence of recently published papers. Most peer-reviewed studies were published when data for this thesis had already been collected and analyzed.

Collectively, these three essays and additional chapters elucidate why household food waste can be an issue even in the low-income context, and present useful insights for the mitigation of the problem. Overall, findings from this study show that food waste reduction initiatives demand an understanding of cultural norms in order to change behavior.

In terms of research methods, efforts were made to increase inference quality in these three essays. Drawing from Tashakkori and Teddlie (1998) and Guba and Lincoln (1982), it is assumed that the trustworthiness of results in qualitative research, can be maximized with some criteria found in this research, such as (1) an adequate amount of time in the field in three geographically distinct regions (Eastern region of São Paulo; Itapoã-DF; and Ithaca-Tompkins County), which relates to prolonged engagement; (2) observation and analysis of the social scene, following the recommended persistent observation; (3) multiple sources for data gathering (triangulation technique); (4) preliminary results presented in conferences and research seminars both in Brazil and the US as a form of peer debriefing; (5) raw qualitative data stored and organized appropriately in Atlas.ti (referential adequacy); and (6) studies included a research diary with field notes, following the recommendation to keep a reflexive journal.

In regard to prolonged engagement, fieldwork in the US took three and a half months, and in Brazil the two phase of data gathering required another three and a half months. The main steps of the research process are presented in Appendix A. Ethical principles guided the entire research process. As such, informed consent was provided by every informant, no family members appeared on the photos taken at households, confidentiality was assured, and following a suggestion by Cornell Institutional Research Board (IRB), informants were not asked about their income.

Additionally, attention was given to avoid possible biases in the research process. The researcher visited community centers before starting to visit the families to collect data, community leaders were identified and introduced the families to the researcher, and during the fieldwork the researcher dressed clothes appropriated to the setting (e.g. jeans and unbranded t-shirt during Summer) to prevent drawing undue attention. Public transport was the preferred method of transportation to get in and out the communities visited, and attention was also given to language usage during interviews.

Apart from conceptual contributions, this study carries important implications for government officials, nutritional educators and retailers. In terms of public policies, drawing from the consumption itinerary presented in the first essay, it is possible to identify in which phases food waste occurs and the major drivers of the problem. The framework presented can serve as a guideline to delineate more precise interventions.

Additionally, the importance of the alignment between hunger relief programs and nutritional education initiatives is highlighted. Nutritional educators can also find opportunities to take action by exploring some of the findings presented, such as the prejudice against leftovers.

Finally, both the food industry and retailers are likely to gain insights from the findings. It is clear, for example, that supermarkets are the preferred source for low-income families to purchase food and win-win strategies can be developed to benefit both retailers and consumers. For instance, by communicating what can be done to decrease household food waste, it is assumed that retailers can develop stronger ties with consumers. Wasted food not only has economic and environmental costs, but also negatively impacts retail brand image (Ellis, Lee, Reeder, & Yip, 2013). As such, brands interested in managing their businesses in a more sustainable manner and then marketing their accomplishments in sustainability will need to tackle consumer waste.

In the next chapter, I explore the broader context of food consumption and waste, as well as the consequences of food waste. The contextualization presented elucidates how consumer food waste relates to the broader area of food security and nutrition, and it demonstrates the impact of food disposal. The three essays (chapters 3 to 5) follow this contextualization. In conclusion, a future research agenda (chapter 6) is proposed and a general conclusion (chapter 7) outlines the main contributions of this study. As a final note, the reason for an analysis of previous studies to be inserted at the end is due to the recent boom in food waste studies. Several studies were published in 2015, when data for this dissertation had already been collected and analyzed.

CHAPTER 2

A BROADER CONTEXT OF FOOD CONSUMPTION AND WASTE

This contextualization, based on the analysis of secondary data, aims to provide the basis for understanding how consumer behavior affects the food system and to illustrate the relevance of this study, considering the current levels of food losses and waste presented. Furthermore, I introduce some important concepts, such as the food system itself and food security. Food waste interplays with several concepts as to be illustrated, and the necessity to prevent it is being reinforced by diverse initiatives exemplified in Table 1.

Food production, processing, packaging, distribution, retailing and consumption are all activities inherent to the food system (Ericksen & Ingram, 2005; Ericksen 2008), a concept that subsumes the term food chain (Garnett, 2013). As a system, it includes the governance and economics of food production, its sustainability at every stage, and the degree to which food is lost and wasted, as well as how food production and consumption affects the natural environment (Future of Food, 2015).

The food system is complex and permeated by production, consumption and socio-economic challenges. As illustrated by Garnett (2013), there is both a need to balance the trade-off between food production and biodiversity conservation, and a consumption challenge, characterized by unsustainable dietary drivers impacting food production. Furthermore, in socio-economic terms, changes in how the food system is governed are required to augment, for instance, fair trade and improve distribution.

Food waste reduction is a condition to achieve a sustainable food system, defined by Evans and Welch (2015, p. 3) as the “task of producing sufficient safe and healthy food to meet the demands of feeding the world’s growing population, in a manner that respects environmental limits”. Commenting on the results of the Foresight Project on the future of food and farming (Foresight, 2011), Godfray (2010) states that one of the major threats to the food system is the current level of waste.

The desired sustainable scenario demands dealing with challenges at every stage of the food chain, such as the necessity to preserve as much biodiversity as possible while increasing crop yields, but given the focus of this study on consumer behavior, the later stage of the chain is primarily discussed. Later in the food supply chain, sustainability involves the commitment of retailers to fair trade, prioritizing locally grown food, and consumption habits marked by the awareness of the value of food, which means a mentality of utilizing what was bought as much as possible, rather than a pattern of wasting.

Concomitantly, “globally changing and unsustainable dietary patterns” (Fava & Godefroy, 2015) are a matter of consumer behavior with negative impact on food waste. In the developing world, for instance, rising income diversifies diets, increases the demand for meats and dairy products (FAO, 2013), and it is likely to worsen food waste. Furthermore, efforts to tackle food insecurity are undercut by rising populations concentrated in regions that lack technological resources to increase food production.

Therefore, the food system involves challenges that often interplay, such as the pursuit for food security, food safety and the mitigation of food waste. As advised by Fava and Godefroy (2015), this complexity demands, research initiatives targeted both toward increasing production and resource efficiency, as well as toward enhanced sustainability.

This chapter is organized in the following six parts. It starts with an explanation about food insecurity, an important concept that is related to food waste as to be explained. In the second part, the role of consumer awareness is introduced. Subsequently, data on food waste is presented to illustrate how severe is this phenomenon worldwide. The fourth section describes global initiatives aimed to reduce food waste. The consequences of food waste are also presented in the fifth section. Finally, the chapter ends with concise concluding remarks.

Understanding food insecurity

In this dissertation, I consider food insecurity as an antecedent of hunger and undernourishment (Kendall, Olson & Frongillo, 1996). This conceptualization goes along with FAO (2015), which defines food insecurity as a situation that exists when

people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development, and an active and healthy life. The existence of both food waste and food insecurity in countries such as Brazil is seen as a paradox, and food waste reduction is an alternative to improve food security.

In the US, for instance, public policies aimed at diverting food waste from landfills, such as the initiative “Feed families, not landfills” from the Environmental Protection Agency (EPA), are based on the understanding that decreasing food waste augments food security (Tagtow, 2015; EPA, 2015). In September 2015, when the EPA and the United States Department of Agriculture (USDA) announced the US goal of reducing food waste by 50 percent by 2030, the need to improve food security and preserve natural resources was highlighted (Tagtow, 2015).

Furthermore, in the US context, the Supplemental Nutrition Assistance Program (SNAP), which served 46,6 million people in fiscal year 2014, and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), which benefited 8,2 million individuals in 2014, are hunger-relief efforts that jointly demand an annual investment of US\$76 billion (FNS, 2015). As such, it is reasonable to assume that if more food is redirected to food banks and food pantries, it is likely that these programs would amplify their scope.

In such a scenario of combating food insecurity, food waste equals a lost opportunity to feed the hungry. Although this study focuses on household food waste, it seems important to present the paradoxes existing in the food system, which also points to the necessity of mitigating waste.

In the Brazilian context, food waste and food insecurity coexist concomitantly even considering that hunger in Brazil is no longer considered an endemic problem (FAO, 2015). As for the average calorie intake, Brazil more greatly resembles high-income nations than sub-Saharan Africa and Southeast Asia. On the other hand, 52 million Brazilians, which means about $\frac{1}{4}$ of the population, are still food insecure considering the three levels of food insecurity: low, moderate and severe (IBGE, 2014).

In fact, food insecurity is still a threat even in the US, where 15.3 million children live in households classified as food insecure (Coleman-Jensen et al., 2015). Besides the paradox of malnutrition, the current model of food consumption contributes to obesity

and the occurrence of diseases related to inappropriate eating, such as diabetes (Buchner et al., 2012). Food waste interplays with over-consumption. As to be discussed in the studies, abundance is a driver of waste and consumers might face the dilemma between over-eating or wasting food.

As we can see, the world, even while producing surplus food, is still living with malnutrition and obesity, which is now a more frequent problem among lower-middle income families in developed nations, and even in developing countries it emerges as a health issue. In Brazil, 51% of the population is overweight, according to the Ministry of Health (SAÚDE, 2013).

The global challenge, therefore, involves both reducing food waste and hunger as well as reversing the growth of obesity (FAO, 2013). Addressing these issues necessarily involves consumer behavior. Thus, if the awareness of the consumer in relation to food is increased, it might be the case that an effort to decrease waste might contribute to reflections regarding the entire food consumption process.

The role of awareness

Grizzetti et al. (2013) point to the need to reflect on the present system of production and consumption of food. On one hand, the increase in consumer awareness conveys social and environmental benefits, on the other, the logic of the market shows interest in maintaining the consumption growth. Reducing food waste involves both better management of the supply chain and a change in consumer behavior.

Consumer food waste is not a novel phenomenon. Food waste was a major concern of American society in the years of the Great Depression (Poppendieck, 1986 apud Blair and Sobal, 2006). More recently, however, the abundance and greater accessibility of food in the United States have led to a decreased awareness of waste as a social problem (Sobal and Nelson, 2003 apud Blair and Sobal, 2006).

The current generation has not faced the shortages by the two world wars and the recession of the 1930s, periods in which national campaigns to combat food waste were common (Stuart, 2009). As the baby-boomers have matured, the awareness of the value of food seems to have diminished.

Empirical evidence shows that European countries, which faced a lack in the availability of various foods in times of war, have replaced their mentality of resourcefulness with a pattern of waste (Bloom, 2010). In Germany, for instance, households are estimated to waste 47- 65% of the total wastage along the food chain (Leal Filho & Kovaleva, 2015), while the average for EU is 42% (Katsarova,2014).

Figure 1 - First World War poster for awareness raising on food waste



Source: Albert Mann Library archive / Cornell University

Interestingly, we are returning to the times in which saving food was a necessity, but for different reasons. While periods of war, saving food was promoted as a means to guarantee enough staple foods for the army, as illustrated in this poster by the US Food Administration (Figure 1), nowadays the societal call for sustainable practices demand waste reduction as a means to guarantee global food security with less compromise of natural resources.

Food waste data and patterns

Data on consumer food waste is often fragmented and disparities are perceived among various studies. While the European Commission (2010) estimated household food waste per capita in EU countries to be 76 kg/year, with Netherlands (113 kg), France and Sweden (100 kg) presenting wastage patterns above average; more recently Vanham et al. (2015) projected EU consumer food waste at 123 kg (cap/yr) and

Katsarova (2014) cited an increase in household food waste from 33 kg (cap/yr) in 2004 to 52 kg (cap/yr) in 2010.

It is also known that, in developed nations, such as the UK, most of the household food waste could have been avoided. It is estimated that a typical British family throws away six meals per week, amount equivalent to 270 kg per year (WRAP, 2014). The UK, however, is making progress on mitigating food waste with several awareness-raising campaigns and initiatives from both retailers and the public sector.

Among other European countries, even Switzerland, one of the three most respected countries in the world in terms of reputation (Reputation Institute, 2013), generates waste above what is considered acceptable. About a third of the food calories produced for human consumption in Switzerland are lost along the food supply chain (Beretta et al., 2013). Of the total waste in Switzerland, half occurs in the final stage of household consumption (Beretta et al., 2013).

Despite the uncertainty of the quantities wasted, it seems feasible to assert that raising the awareness of consumer food waste is needed to neutralize the expected increase in food waste at the end of the chain. The increasing food waste tendency verified in EU nations is also seen in other regions of the globe, especially among nations with an expanding middle-class, such as Brazil and China.

In the US, household food waste represents 21% of the available food supply, with the average American home throwing out \$371 of food each year (Buzby, Wells, & Hyman, 2014). Canadians waste \$27 billion of food annually, the equivalent of 40% of all food produced in the country (Parizeau, Massow, & Martin, 2015). Worldwide, "...the direct economic cost of food wastage of agricultural products (excluding fish and seafood), based on producer prices only, is about US\$ 750 billion, equivalent to the GDP of Switzerland" (FAO, 2013, p.7).

In emerging economies, such as China, high levels of consumer food waste are being identified, especially in metropolitan areas and in the restaurant sector. Cheng (2014) estimated that about 79.69 g is wasted per capita/meal away-from-home in the Beijing urban area, with diners in large restaurants wasting up to three times more than those in fast food diners. Rising purchasing power and urbanization are seen as factors that

promote food waste in China (Liu, 2014), and the role of serving-sizes in family restaurants is likely to contribute to more waste.

In Latin American countries (LAC), household food waste is an increasing threat. Recently, the FAO (2014) estimated that 28% of the food that reaches the end of the chain is wasted at the consumer level, a percentage equal to losses at the production stage in LAC. It is likely that country-level analysis would provide a clear picture about food waste in the region given the socioeconomic and cultural differences among LAC. This recent data from FAO vanishes the idea that consumer food waste is a major threat only in developed nations.

Furthermore, a panel of experts sponsored by the FAO in October 2014, in Santiago, Chile, came up with the conclusion that data on food losses and waste in Latin American countries is sparse and limited. The panel called for a standardized methodology for the measurement of food waste.

The Brazilian case seems to be distinct from other emerging nations, but measurements of food losses and waste are too scarce in Brazil to provide precise explanations. Although Brazil is said to concentrate most of the waste in the immediate post-harvest stage (Soares, 2009), it also has high wastage at the end of the chain as empirical evidence suggest. Therefore, in relation to food waste, Brazil has both the characteristics of lower income nations and of developed countries.

According to Gustavsson et al. (2011), the Brazilian households waste an average of 20% of the food amount purchased in a week. If considering the whole supply chain, the losses increase to around 35% of agricultural production (IPEA, 2009), although some studies have estimated even higher wastage rates when focusing on certain categories such as fruits and vegetables. This data from IPEA means that more than 1/3 of the food produced in Brazil is not consumed and this data is likely to be an underestimation, given the difficulties of measuring household food waste.

Losses of fruits such as bananas, in Brazil, reach 40% of the production for human consumption (Smith, 2009). Fehr and Romao (2001) show wastage of 16.6% of fruits and vegetables in a study conducted in households of one medium-sized city. Moreover, a survey from the Nutrition Department of the Centro Universitário do Rio Grande do Norte (UNI-RN) indicates that 25% of the food of Rio Grande do Norte's

households is wasted, a rejection that would feed about a half-million people, more than half the population of the state's capital, Natal (TN, 2013).

The scale of the food waste problem is impressive and it creates an unprecedented paradox in history. The amount of food wasted in industrialized countries is equivalent to the total agricultural production in sub-Saharan Africa (Gustavsson et al., 2011). As Chade (2009, p. 34) points out, between 2003 and 2007, "the world has experienced an almost unprecedented expansion of wealth, but hunger has increased at a time when food production has never been higher on the planet". In 2008, the biggest grain harvest in history was recorded, but the financial crisis has made investments in humanitarian aid migrate to banks (Chade, 2009).

Increases in the volume of grain on the world market, as highlighted by Carneiro (2005), are not necessarily translated in increased accessibility to food by the majority of the population. "The greatest oddity and the most shocking to anyone who has studied the history of food, certainly is the prevalence of hunger and malnutrition in the present day, where food production is the greatest of all time and the technical means of transporting and preserving food are the most efficient ever acquired" (Carneiro, 2005, p. 75).

Worldwide initiatives to mitigate food waste

As a response to this global threat, The United Nations Program for Environment (UNEP), the United Nations Food and Agriculture Organization (FAO) and Messe Dusseldorf presented in 2011, the Save Food initiative to encourage dialogue between industry, researchers, policy-makers, and civil society regarding food losses and waste. As part of this effort, the Think.Eat.Save campaign was launched to raise public awareness of the impact of food waste and aimed at promoting the responsible consumption of food.

Table 1 - Food waste prevention initiatives

Initiative	Sponsor	Region	Actions
Save Food	FAO, UNEP, Messe Dusseldorf	Worldwide	Think.Eat.Save campaign, annual meeting, studies
United Against Waste	Unilever	Worldwide	Campaign, best practices sharing, chef's tips
Global Food Banking Network	The Global FoodBanking Network	Worldwide (outside US)	Creating and enhancing food banks
Slow Food Youth Network	Slow Food NGO	Worldwide (40 countries)	Awareness raising events (e.g. DiscoSoup), biannual congress
Fusions	European Commission Framework	13 European countries	Food waste monitoring, awareness raising events, testing social innovation projects
European Week for Waste Reduction	French Environment and Energy Management Agency and partners	European Union	Identification of best practices, awareness-raising actions, EWWR Awards ceremony
Every Crumb Counts	Wageningen University, Save Food, WRAP, AIBI and partners	Europe	Joint food wastage declaration
Zero Waste Europe	Network of Zero Waste municipalities	Europe	Promotion of ZW strategies, annual ZW conferences
FeedBack	Global Feedback Ltd and partners	Europe, USA and Kenya	Feed the 5000 campaign, Food waste pledge commitment to the public, The pig idea (food waste to feed pigs)
Love Food Hate Waste	WRAP and partners	UK, Australia and New Zealand	Campaigns and APP
Stop Wasting Food	Stop Wasting Food NGO	Denmark	Awareness-raising events, introduction of doggy-bags in restaurants, food waste surveys
Culinary Misfits	Culinary Misfits NGO	Germany	Promotion of vegetables that do not fit beauty standards, recipes, events
Re-food	Re-food network and partners	Portugal	Preparation and distribution of meals with close to expire food products and exceeding foods
Kliekipedia		Netherlands	Awareness-raising information and events about leftovers use
Last Minute Market	University of Bologna and partners	Italy	Collects unsold edible foods from retail stores for distribution
Stop Food Waste	National Waste Prevention Programme (NWPP)	Ireland	Campaigns, events, nutritional education (e.g. The Stop Food Waste kitchen)
Släng Inte Maten (Don't Throw Food Away)	Konsumentforeningen Stockholm	Sweden	Awareness-raising campaigns and events, nutritional education initiatives
Food Waste Reduction Alliance	Grocery Manufacturers Association, Food Marketing Institute, and the NRA	USA	Measuring food waste, donation to charities, diverting unavoidable waste from landfills

Smarter Lunchrooms Program	USDA and Cornell University	USA	Equip school lunchrooms with evidence-based tools that improve child eating behaviors
Rolling Harvest Food Rescue	Rolling Harvest NGO and partners farms	USA	Collects unsold produce from local farms and markets, donation to charities
Food Recovery Network	FRN NGO	USA (36 states)	Recovers foods from universities cafeterias and donates meals
Feeding America	Feeding America Network	USA	Recovers foods from farmers, the food industry and retailers, donation to charities
Food Shift	Earth Island Institute	USA	Collects and redistributes excess foods, awareness-raising campaign and events
Imperfect Produce	Imperfect Produce company	USA (California)	Sells “ugly” produce from local farms
Food Cowboy	Food Cowboy company	USA	Mobile technology to route surplus foods from wholesalers and restaurants to food banks and soup kitchens
Satisfeito	Satisfeito NGO	Brazil and Mexico	Promotes Satisfeito version (portions 2/3 of the original size in restaurants)
OBA – Banco de Alimentos Mesa Brasil	OBA NGO Sesc	Brazil Brazil	Cookery lessons and workshops, Collects and redistributes food products Distribution of food products, nutritional education initiatives
Food Forward	Western Cape Government	South Africa	Food chain excursions or “experiential tours” across the Western Cape
Food Angel	Bo Charity Foundation	Hong Kong	Rescues edible surplus food from different sectors of the food industry, prepare meals and distributes
Robin Hood Army	Robin Hood NGO	India and Pakistan	Collects surplus foods from restaurants and redistributes
OzHarvest	OzHarvest NGO	Australia	Collects quality excess foods from commercial outlets and deliver it to charities

Source: information gathered by the author from reports, events attended and web search.

The FAO estimates that a 25% reduction in food loss and waste would be enough to feed 870 million people living in conditions of malnutrition (FAO, 2013b). In terms of potential savings, Parry, James and LeRoux (2015, p.10) estimate that a 20 – 50% reduction in global consumer food waste could save “between 55 and 140 million tonnes of food per year (US\$80 to 200 billion) based on 2011 waste levels, or 110 – 280 million tonnes of food (US\$120 – 300 billion) based on potential future levels of consumer food waste linked to the increase in the middle classes”.

To meet the challenge of saving food, waste reduction is a national priority in several European countries. In the UK, for instance, the Love Food Hate Waste campaign from the Waste & Resources Action Programme (Wrap) reached 10 major cities and it

intended to run a series of events, such as kitchen skills and cookery lessons, from 2014 to March 2016 (WRAP, 2015). This program has acquired good results - 1.1 million tons reduction in household food and drink waste between 2007 and 2012 – since the launching of the awareness-raising campaign (Wrap, 2014). Table 1, based on data gathered in several reports and events attended, lists 32 major initiatives around the world aimed at mitigating food waste.

As shown in Table 1, certain initiatives, such as the Food Waste Reduction Alliance from the US, contribute to divert food waste from landfills while supporting charities that run food pantries. In the American context, while food banks store and distribute food products to other organizations, food pantries are the ones who attend people in need on its premises by offering free of charge produce and food products.

Food pantries are widespread all over the United States. The metropolitan area of New York City, for instance, hosts about 1200 food pantries and nonprofit soups kitchens, which attend 1.3 million low-income New Yorkers (New York City Coalition Against Hunger - NYCCAH, 2014). These initiatives fight food insecurity and at the same time contribute to divert food products from waste.

Brazilian food banks are a relatively new initiative compared to the ones in the United States, where the first one was established in 1967 (Sullivan, 2005). According to the Brazilian Ministry of Social Development (MDS), which was contacted by telephone and e-mail for this study, 16 tons of food were distributed in 2014 via food banks to 770 charities and nonprofit organizations.

These initiatives listed on Table 1 are useful for benchmarking. In the general conclusion chapter, drawing from the analysis of secondary data and empirical evidences from the studies, suggested actions to mitigate food waste are presented to industry, retail, consumers, NGOs, and government. By providing these insights, the intent is to contribute to changes in consumer behavior that result in gains for society as a whole.

Interestingly, by questioning how scientific marketing research can contribute to social welfare, Bazerman (2001) argues that consumer research produces more value to society when it encourages consumers to purchase products that will enhance their own wellbeing. Although the consumer is the subject of constant study, the purpose of

research rarely contributes to consumer education (Bazerman, 2001). Thus, although science has not a prescriptive nature, studies of buying behavior, which include descriptions and contribute to prescriptions, are initiatives that could be encouraged.

Furthermore, the environmental agenda is another dimension likely to have impact on marketing practices and theory. Marketing needs to reinvent itself in the face of social pressures for production processes with lower environmental impact (Kotler, 2011). Thus, while delineating a better understanding of food waste, identifying factors that contribute to consumers valuing greater sustainability is an important topic of research.

Similarly, for the agricultural sector it is no longer enough to focus on increasing productivity, but to seek optimization through a much more complex scenario of production, rural development, environment and social justice, in which the consequences of food consumption are taken into account (Pretty et al., 2010). With current practices wasting up to 50% of food produced, we must act to promote sustainable ways to reduce waste from farm-to-supermarket, and by the consumer (Aggidis et al., 2013).

Consequences of food waste

Food production is an activity intense in utilization of several resources, such as water, energy, fertilizers, and labor. As an illustration, agriculture demands 70% of the water use at a global level (OECD, 2014) and it might occupy land that was previously rich in biodiversity. Astonishingly, 28% of the farmlands are producing food that will be wasted (FAO, 2013).

The burden of consumer food waste, in particular, is that it carries the highest negative impact on the food system, given that when the loss occurs at the end of the chain, all resources needed for production, transportation, commercialization and preparation of food are also discarded (Baldwin, 2015). Therefore, the food system has to be analyzed entirely to understand that the wastage at the household level jeopardizes efforts to mitigate losses earlier in the chain.

In terms of its impacts, food waste has moral, environmental and economic dimensions (FAO, 2013; Tucker & Farrelly, 2015). The complexity of food waste, and the interplay of its dimensions, can be illustrated if we analyze the growing demand for beef in

developing countries and waste in the developed context. The wastage of beef causes greater allocation of grains to serve as animal feed instead of increasing the supply for human consumption, a problem with ethical implications; and it increases the occupation of land, an environmental concern. For instance, to produce meat and milk wasted at the end of the chain in the United States and Great Britain, 8.3 million hectares of land are required (Williams et al. 2012).

Firstly, from a moral perspective, it seems ethically unacceptable to waste food while 795 million people are undernourished globally (FAO, 2015), with high rates of undernourishment persisting in middle Africa (41.3%), eastern Africa (31.5%), Sub-Saharan Africa (23.2%), the Caribbean (19.8%) and Southern Asia (15.7%). Food waste also impacts food security of the poor and the economic development of low income countries (Griffin et al., 2009; Gustavsson et al., 2011).

For instance, when edible food is discarded, the opportunity to be channeled to provide additional food security for the hungry is missed. In order to mitigate this loss of opportunity, several countries have approved Good Samaritan Acts, which protect from liability the retailer or NGO donating foods and grocery products. In the US context, The Federal Bill Emerson Good Samaritan Food Donation Act was signed in 1996 to encourage donations of foods to non-profit organizations for distribution for individuals (Cornell LII, 2015).

The second dimension relates to the environmental impact. The environmental damage from waste worsens according to the stage at which it occurs in the supply chain (FAO, 2013). Therefore, wasteful consumption, for example, has a higher negative impact than waste occurring earlier in the chain (e.g. production or distribution). Moreover, the waste in middle- and high-income nations has a greater negative impact than that of low income ones, given that it is concentrated in the last step of the chain. Additionally, the food thrown away in rich countries sometimes had to travel around the world to reach the residence of the consumer (Aggidis et al., 2013).

Given that food is biodegradable, consumers tend to underestimate the environmental effects of waste (Heist, 2012), and do not perceive that food waste contributes to biodiversity losses, if considered that the increase in crop productivity achieved in the past century, known as the Green Revolution, came at the cost of high use of natural resources (Fava and Godefroy, 2015). Therefore, food waste aggravates the

environmental impact of agricultural production by utilizing land, water and nutrients in vain.

For instance, the advance of the agricultural frontier, which ends up clearing areas of native vegetation for livestock and/or agriculture, is also partly explained by the disposal of food. In a hypothetical scenario of less wastage, there would be less pressure on arable land (Stuart, 2009) and biodiversity would be less compromised (Grizetti et al., 2013).

To compound the problem, as emphasized by the FAO (2013), this conversion of land for food production often occurs in areas of native forest in the tropics. Studies show that approximately 55% of land used for agricultural expansion between 1980 and 2000 was previously occupied by native vegetation, and another 28 % was already disturbed forests (Gibbs et al., 2010).

As noted by Refsgaard and Magnussen (2009, p. 760), the “ever-increasing flow of household waste is a large environmental problem in many countries”. While analyzing the case of Norway, where the average amount of household waste (cap/yr) nearly tripled from 1992 to 2002 (120 kg to 354 kg cap/yr), these authors indicate that disposal methods such as incineration and landfills are environmentally questionable. The disposal of food in landfills contributes to an increase of methane and carbon dioxide (CO₂) emissions, greenhouses gases related to global warming (Gustavsson et al., 2011).

In the U.S., 25% of methane emissions are due to food being discarded (Gunders, 2012). In Australia, for example, food waste is the second leading factor with greater impact on emissions of methane (Edwards & Mercer, 2013). The FAO (2013) indicates that global food waste, compared to CO₂ emissions by nations, is the third largest emitter of CO₂ in the atmosphere, after the United States and China.

As explained by Cuéllar and Webber (2010), food is not just a form of energy, but also demands fossil energy for production, transportation and preparation. For these authors, not only agricultural productivity has grown considerably in the last 50 years, but also the consumption of fossil fuel-based inputs, such as nitrogen fertilizers.

In the economic dimension, the consequences of food waste are also severe and complex. In certain circumstances, it might be the case that it is cheaper to waste than

to save food, such as when a Brazilian *feirante* (street vendor) decides not to transport ripe fruits when the market is over. In a household, there are also transaction costs associated with the decision to save or to waste food. For instance, consumers might choose to stockpile in abundance due to difficulties of transportation (e.g. not owning a car) or due to weather issues (e.g. snowfall in the winter). Therefore, the perceived costs of going out to buy extra food might be higher than overstocking and wasting part of it.

However, if we consider the recent trend in rising food prices, household food waste negatively impacts the family budget, especially for the low-income segment. In this respect, food waste affects market behavior, and may lead to higher financial costs for the populations of low-income countries to access food, which negatively impacts food security. The increase in losses decreases market equilibrium and causes prices to increase (Vilela et al., 2003).

It should also be considered that the market as a whole is affected by variations in supply and demand. The financial crisis of 2008, for instance, illustrates how lower grain production in the United States may raise the price of some commodities and, consequently, affect access to food in Sub-Saharan Africa. As such, one can also deduce that wastage removes from the market food that could be available for purchase, and therefore would help to maintain stable prices (Stuart, 2009).

As the average income becomes higher in developing countries, the population consumes more meat and dairy products, causing a rapid growth in demand for agricultural commodities to feed livestock. The growth in demand over the past decades has been driven mainly by increased consumption in China and Brazil, and the future trend is likely to be also strongly influenced by income growth in India and sub-Saharan Africa, where per capita consumption of beef is still low (Beddington, 2010).

Following the same line, Alami et al. (2010, p. 137) point out that the rise of the BRICs notably “transformed the market for raw materials and food, which induces transformations of a new order for their production, consumption and in relation to the environment”. It is worth mentioning at this point that the current marketing concept (AMA, 2013) has already absorbed the necessity of organizational practices to be beneficial to society as a whole.

In summary, a hypothetical reduction of 25% of waste, as claimed by the FAO (2013b), brings only benefits to consumers. Reducing food waste saves land, water, energy and fertilizer (Aggidis et al., 2013), as well as labor (Estadão, 2013), and contributes to more available food on the market, which in turn is likely to keep prices at a level more accessible to low-income consumers who face food insecurity.

Concluding remarks

As presented in this chapter, consumer food waste can be seen as a topic inserted in the scope of food security efforts. Food security and nutrition (FSN) is an area of research of growing interest, and it carries the potential to improve public policies aimed at fighting poverty. Firstly, the significant extent of consumer food waste carries negative consequences for food security, nutrition, use of natural resources required for food production, and the environment. Additionally, this global problem presents opportunities for actions described, herein, while presenting the current initiatives worldwide.

The 32 initiatives aimed at reducing food waste listed show that increasing consumer awareness of the food system, which had been prevalent in times of war, has gained momentum again. On the other hand, to be more effective, these efforts need more scientific based data. More experimental research, for instance, is needed to guide behavioral change.

In terms of research opportunities, the analysis of consumer food waste data indicates that a standardized method for measuring food waste is lacking. For public policies, the understanding that consumer food waste can be an issue even in the lower-middle income context, particularly in countries such as Brazil, in which food production is abundant, can contribute to the alignment of programs aimed at amplifying food security and food waste reduction initiatives.

CHAPTER 3

Essay 1 - FOOD WASTE PARADOX: ANTECEDENTS OF FOOD DISPOSAL IN LOW-INCOME HOUSEHOLDS

Abstract

This paper aims to identify antecedents of food waste among lower-middle class families – a paradox, given the financial constraints this population faces. The importance of this research is evident in escalating environmental pressures for better use of our planet's scarce resources. Given that most of the world is low-income, any behavioral change in this population is likely to have a considerable impact. Empirical data were collected from 14 lower-middle income Brazilian households, based on observations, in-depth interviews and photographs, and a focus group (n=6). Five major categories of food waste antecedents were identified: (1) excessive purchasing, (2) over-preparation, (3) caring for a pet, (4) avoidance of leftovers, and (5) inappropriate food conservation. Several subcategories were also found, including impulse buying, lack of planning and preference for large packages. Surprisingly, findings show that strategies used to save money - such as buying groceries in bulk, monthly shopping trips, preference for supermarkets, and cooking from scratch – actually end up generating more food waste. This mitigates the savings made during the purchasing phase.

Keywords: household food waste; food consumption; low income; Brazilian market.

1. INTRODUCTION

In a world that faces both scarcity of natural resources and extreme poverty, why does household food waste seem to be so prevalent? While more than 2.2 billion people are either near or living in poverty (United Nations Development Programme - UNDP, 2014), approximately one third of the food produced worldwide is wasted (Gustavsson

et al., 2011). This waste equates to 250 km³ of water and 1.4 billion hectares of land use, adding 3.3 billion tons of greenhouse gases to the earth's atmosphere (The Food and Agriculture Organization of the United Nations - FAO, 2013).

The seventh largest economy in the world (World Bank, 2013) and a major food exporter, Brazil concentrates most of its losses in the immediate post-harvest stage (Soares, 2009), but it also has large amounts of waste at the end of the chain. In fact, Brazil is among the nations that waste more food at the consumer and retail level than is needed to feed those who still face hunger in the country (FAO, 2014), estimated to be 7.2 million (Brazilian Institute of Geography and Statistics - IBGE, 2014). Why is so much food wasted among the lower-middle class in Brazil?

Considering its yearly per capita income of US\$11,000 (World Bank, 2013), Brazil is considered a high-middle income country. Nevertheless, due to its high-income inequality, most Brazilian households are classified as low-income families, which make it a feasible representation of the world. This study proposes that even lower-middle class families may frequently waste food due to behavioral and cultural aspects, a topic scarcely researched in marketing literature.

According to FAO (2014), Latin American consumers waste on average 28% of their food, but consistent data is missing to provide a precise estimate focused on Brazil. Considering the whole supply chain, Brazil loses an estimated of 35% of its agricultural production (Carvalho, 2009).

Household food waste has been considered characteristic of high-income nations (Stuart, 2009; Gustavsson et al., 2011; Beretta, Stoessel, Baier, & Hellweg, 2013) and families with less purchasing power would be expected to be more careful about how they spend their money on food. Reports from the FAO (2013b, 2013c), the Institution of Mechanical Engineers (Aggidis et al., 2013), and the Barilla Center for Food and Nutrition (Buchner et al., 2012) also tend to relate affluence with food disposal. I assume that, in order to understand the paradox of food waste among low-income families, a broad analysis of other variables besides household income is mandatory.

The existing literature seems to lack a clear understanding of the antecedents of household food waste. There are few studies on the topic of waste and its association with consumer behavior (Stefan et al., 2013). Evans et al. (2013) claim that the

phenomenon remains neglected, and the research content and style have failed to present a broader view of the problem. Academic studies also lack a deeper understanding of how waste may be a consequence of the ways in which domestic food practices are socially organized (Evans, 2011).

Considering the lack of empirical studies aimed at identifying antecedents of waste at the family level, this paper purpose is to investigate the household food waste phenomenon and to identify antecedents of food waste in the final stage of the supply chain. Households serve as the unit of analysis. This study identifies behavioral and cultural factors which contribute to food waste among low-income consumers. In this essay, low income does not refer to families living below the poverty line, but rather the lower-middle class Brazilian families, which represent 1/3 of the country's population.

The following section presents literature pertinent to this study, with an emphasis on culture and waste in Brazil. I then discuss the research methodology. The subsequent section is devoted to the presentation and interpretation of the empirical data. I conclude by summarizing the paper's findings, and showing the implications for reducing household waste.

2. LITERATURE REVIEW

This literature review introduces the concepts of food waste and loss, and it analyses antecedents of food waste identified in previous studies.

2.1 FOOD WASTE AND LOSS

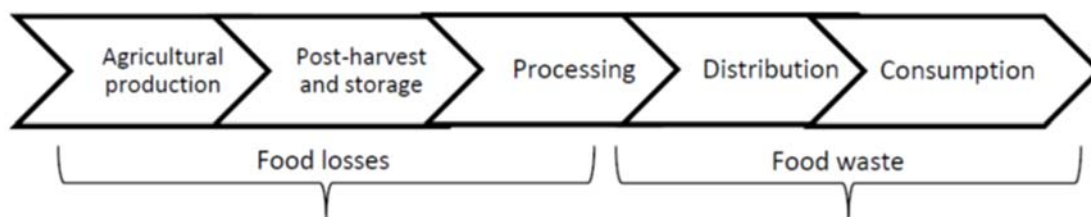
There is no universal definition for "food waste". While Gustavsson et al. (2011) define it as the non-use of food in the stages of distribution and consumption, Leal Filho and Kovaleva (2015) cite that it might arise at any point in the food supply chain as a result of inappropriate behavior of producers, retailers, or consumers, as well as lack of technological inputs.

Drawing from Gustavsson et al. (2011) and Ganglbauer, Fitzpatrick, and Comber (2013, p. 11), I define food waste as unintended losses of food produced for human consumption occurred in the distribution and consumption stages of the food supply

chain due to “multiple moments of consumption dispersed in space and time across other integrated practices such as shopping and cooking,” which are themselves embedded in contextual and cultural factors. Apart from being unintended, most food waste is avoidable. In the US, for instance, an estimated of 64% of household food waste is avoidable (O’Donnell, 2014).

As illustrated in Figure 2, I consider “food loss” as the waste in the earlier stages of the food supply chain. This term has also been used broadly to represent the amount of edible food, postharvest, that is available for human consumption but is not consumed for any reason (Buzby, 2014). In this sense, food waste is part of food loss.

Figure 2 - The food chain



Source: Elaborated by the author, based on Gustavsson et al. (2011) and Parfitt et al. (2010).

In high-income nations, the largest contribution to food waste comes from the consumer (Graham-Howe, Jessop, & Sparks, 2014). In low-income countries, however, losses early in the food chain are more common, due to low technological support in the management of crops, lack of structure for storing produce, and inadequate infrastructure for the distribution of crops (Aggidis et al., 2013). In the first stage, the losses stem also from improper harvest (Gustavsson et al., 2011), among other causes, such as pests, diseases and natural disasters.

In relation to the last stage, Stuart (2009) posits that in developed nations, consumers tend to waste food because they can afford to buy excess food, among other reasons. Gustavsson et al. (2011) assert that in low-income countries, consumption-stage waste is minimal due to the limited purchasing power and procurement of food in small, daily quantities. This claim, however, was not confirmed by the empirical investigation conducted in this study.

2.2 ANTECEDENTS OF HOUSEHOLD FOOD WASTE

While an estimated 46% of losses comes from the stages of processing, distribution, and consumption of the food supply chain (Pressinott, 2013), relatively little is known about the drivers of waste within households, especially in a developing world perspective. Most efforts to understand household food waste come from the UK. Among what it is known about food waste in families, Graham-Rowe, Jessop and Sparks (2014) identified four core barriers to minimizing it as: (1) a 'good' provider identity; (2) minimizing inconvenience; (3) lack of priority; and (4) exemption from responsibility.

Table 2 presents a list of studies that have identified antecedents of household food waste. Recent literature discusses the relationship between packaging and waste (Williams et al., 2012), the influence of labeling on waste (Milne, 2013), and the topic of domestic food practices (Evans, 2011). At the consumer level, planning, shopping and stockpiling routines are important predictors of waste (Stefan et al., 2013; Chandon & Wansink, 2002; Wansink & Deshpandé, 1994).

Also mentioned in studies are other behavioral characteristics related to consumption culture, such as over-preparation and excessive purchasing. One stream of research suggests as much as 11% of purchased food products are wasted before even being opened (Wansink, 2001). The most common reason for this is because people purchase them for special occasions that never happen or because they forget about them until they are too old to use (Wansink, Brasel, & Amjad, 2000).

When commenting on shopping as an integrated practice, Ganglbauer et al. (2013, p. 19) explain that some households go shopping in the context of other dispersed practices such as "caring for the family", "having a social life" and "living on a tight budget". The latter, for instance, leads consumers to choose larger packages perceived as less expensive. However, this also increases the likelihood that they would later throw away the unused excess.

Table 2 - Antecedents identified in the literature

Antecedent variable	Author	Antecedent categories based on itinerary phase (refer to Figure 3)
Socio-demographical factors (single household type, woman responsible for grocery shopping)	Koivupuro et al. (2012)	Planning and negotiating the purchase
No or incorrect purchase and meals planning	Schneider (2008), Parfitt et al. (2010), Evans (2011), Ganglbauer et al. (2013), Stefan et al. (2013)	
Children in the family	Terpstra et al. (2005)	
Poor home economics skills	Cox & Downing (2007)	
In-store behavior (impulse buying)	Parfitt et al. (2010)	Buying food
Excessive purchase	Harrison et al. (1975), Cox & Downing (2007), Koivupuro et al. (2012), Beretta et al. (2013), Ganglbauer et al. (2013), Graham-Howe (2013), Stefan et al. (2013)	
Retail offers and promotions	Cox & Downing (2007), Schneider (2008), Godfray et al. (2010)	
Buying food in large packages	Ganglbauer et al. (2013), Koivupuro et al. (2012), Williams et al. (2012)	
Lack of knowledge about food storage and handling	Parfitt et al. (2010), Terpstra et al. (2005), Koivupuro et al. (2012), Barilla (2012), Williams et al. (2012), Plumb & Downing (2013)	Stocking food at home
Stockpiling routines	Wansink & Deshpandé (1994)	
Long storage time (e.g. exceed expiration date or spoiled leftovers)	Kantor et al. (1997), Quedsted & Johnson (2009), Williams et al. (2012)	
Wrong interpretation of food label	Parfitt et al. (2010), Milne (2013)	
Food provisioning routine (domestic food practices)	Evans (2011), Stefan et al. (2013)	Preparing food
Over-preparation	Kantor et al. (1997), Chandon & Wansink (2002), Blair & Sobal (2006), Cox & Downing (2007), Quedsted & Johnson (2009), Evans (2012), Gustavsson et al. (2011), Koivupuro et al. (2012), Williams et al. (2012), Beretta et al. (2013), Graham-Howe (2013)	
Good mother identity	Stuart (2009), Graham-Howe, Jessop & Sparks (2014)	
Dietary transition (more diversified diet)	Parfitt et al. (2010)	
Low preference losses (e.g. bread crusts)	Beretta et al. (2013)	
Over-serving	Wansink & van Ittersum (2014), Wansink, van Ittersum, & Payne (2014)	Food consumption
High sensitivity to food hygiene	Cox & Downing (2007)	Storage of prepared food

Source: elaborated by the author. Third column links literature with itinerary elaborated from empirical data.

In addition to external antecedents of waste, household stockpiling can generate overuse and waste (Wansink & Deshpandé, 1994). Waste can also be increased by the over-preparation of these stockpiled foods (Chandon & Wansink, 2002), or by the over-serving that can occur because of large serving bowls or plates (Wansink & van Ittersum, 2014; Wansink, van Ittersum, & Payne, 2014).

There is a general belief that income is positively related to waste generation (Palatnik et al., 2014), but the literature seems to lack a clear understanding of the relationship between income and food waste. While Gustavsson et al. (2011) state that poverty and limited household income make it unacceptable to waste food and Stefan et al. (2013) found that higher household income leads to more waste, Cox and Dowling (2007) point that low-income families tend to waste more food.

In a study conducted by Quested and Johnson (2009) with self-reports (diary research) of 300 participants in the UK, differences in the amount of food waste between socio-economic classes were minimal. Williams et al. (2012) also found no correlation between household income and food waste in an exploratory study conducted with 61 Swedish households. Moreover, in a survey of 47 households in Gaborone (Botswana), Bolaane and Ali (2004) found that the rate of waste generation (measured as in weight units) was not directly related to household income.

The analysis of the literature presents other incongruence. For example, Evans (2011) mentions a relationship between having freezer and food waste, but Williams et al. (2012) found no evidences of such relation. The studies conducted by Evans, which observed the phenomenon with a sociological lens, and the quantitative ones from Stefan et al. (2013) and Koivupuro et al. (2012) are among the few peer-reviewed ones identified that had a broader focus on the antecedents of food waste.

2.2.1 Domestic practices and food waste

While analyzing “the movements and placing that work to configure food as waste”, Evans (2012, p. 1123) notes that societies developed various conduits to get rid of surplus things. In this view, something is wasted when its sources of residual value have been exhausted. In the case of food, Evans (2012) cites a process of ridding

surplus food, which means that consumers not simply get rid of food, but in fact the disposal is marked by an interim placing (e.g. at the back of the fridge).

Even considering that leftovers sitting in the fridge might be rediscovered and re-used in a meal, Evans (2012) mentions that it tends not to happen. Griffin et al. (2009, p.79) recognizes the existing habit of wasting food, as they state that “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”.

As stated by Evans (2012, p. 1123), “disposal of surplus food is enacted via a graduated process in which it first enters a gap where ambiguities and anxieties surrounding its residual value and onward trajectory are addressed”. Thus, on Evans’ study food waste is mainly related to preparing food in excess (overprovision) and families put in practice some procedures in order to enact the disposal of food in ways that will ameliorate their anxieties.

Evans (2012) and Ganglbauer et al. (2013) found that consumers that show concern about food waste, do not like to waste and some appear to feel guilty. As an example to illustrate how consumers find ways to deal with the feeling of depositing food on the bin, Evans (2012, p. 1132) mentions that freezers, Tupperware containers and aluminum foils “operate as coffins of decay that play an active part in carrying discarded food towards the waste stream”. Overall, the author postulates that it is crucial to recognize the social and material contexts of food practices in order to understand the food waste process.

When commenting on shopping as an integrated practice, Ganglbauer et al. (2013, p. 19) explain that some participants of their study in 14 households (11 in Austria and 3 in the UK) go shopping in the context of another dispersed practices such as “caring for the family”, “having a social life” and “living on a tight budget”. These three practices have relation to food waste.

The need to care about the family is linked to the good provider identity mentioned by Graham-Howe et al. (2014) as a barrier to minimize waste. Household food purchasers with such identity tend to over buy food items (Graham-Howe et al., 2014). Moreover, dealing with constricted financial resources leads consumers to choose larger

packages that were perceived as less expensive, but also increased the likelihood that they would later throw away the unused extra (Ganglbauer et al., 2013).

In reviewing the literature, the variables identified as antecedents of waste might be classified in five macro-themes: (1) socio-demographic; (2) retail and marketing stimuli; (3) Situational; (4) behavioral and/or cultural; and (5) food waste consciousness awareness. It might be the case that some variables mentioned could be positioned in more than one category, but I have organized them according to what I think is more related to the variable.

Hereafter, socio-demographic, retail stimuli and situational variables are discussed. Culture and waste demanded a larger section, given the perceived importance of cultural norms to the understanding of household food waste.

2.2.2 Socio-demographic variables

In relation to socio-demographic variables, the literature presents contradictory findings regarding food waste related to household types. While Koivupuro et al. (2012) found that single households tend to waste more, others state that residual waste from multi-family dwellings contains a significant higher percentage of avoidable food waste and overall food waste (Lebersorger & Schneider, 2011).

In a survey conducted in Finland, Koivupuro et al. (2012) identified also gender of the person responsible for grocery shopping as an antecedent of food waste. For these authors, the amount of avoidable food waste is considerably higher in households where a woman is responsible for grocery shopping in comparison to households where only a man or both spouses are responsible. Given the quantitative method applied, the reasons for such relationship were not established by Koivupuro et al. (2012) and they note that qualitative approaches are needed to better understand the phenomenon and to identify effective methods of preventing the waste.

Income is also a relevant variable in food waste studies. Although Stefan et al. (2013) indicate a positive relationship between income and food waste, and sector studies conducted by FAO emphasize a larger waste at the end of the chain in high-income countries, it seems reasonable to assume that, in the Brazilian context, this correlation

may not be found, given the cultural aspect in low-income, particularly in the countryside, to wish to show abundance on the table, a cultural facet emphasized since the works of historians like Câmara Cascudo (1968, 1968b) and Gilberto Freyre (1933/2002).

Moreover, given that surplus purchase might also be identified among Brazilian low-middle class consumers, it would be worthy investigating whether household income and food disposal are related. However, such objective would require comparisons between groups of distinct social classes, which is not within the scope of this study.

Additionally, although Gustavsson et al. (2011) say that consumers in developing countries generally buy smaller amounts of food products at the time, often just enough for meals on the day of purchase, the Brazilian context seems distinct as the habits of maintaining a fridge and pantry filled with food indicate. Given this incongruence, observations to be conducted will allow for a better understanding on to what extent low-middle class Brazilian families are stocking food at home.

It seems simplistic to explain consumer food waste according to the household income. In fact, the literature seems to lack a clear understanding of how income and food disposal are related. Gustavsson et al. (2011) state that poverty and limited household income make it unacceptable to waste food and Stefan et al. (2013) found that higher household income leads to more waste, but the coefficients of correlation ($r = .14$, $p = .026$) found in the study were relatively low and, thus, authors did not include income in the structural model elaborated.

Although most authors indicate a positive relation between income and food waste, there was also opposite propositions such as the statement that “high food wasters are more likely to be of lower social class” (Cox & Downing, 2007, p.8). Furthermore, in a study conducted by Quested and Johnson (2009) with self-reports (diary research) of 300 participants in the UK, differences in the amount of food waste between socio-economic classes were minimal. No correlation was found between household income and food waste also by Williams et al. (2012) in an exploratory study conducted with 61 Swedish households.

In a survey conducted by Bolaane and Ali (2004) among 47 households in Gaborone (Botswana) it was not found a direct relationship between waste and household

income. These authors state that the higher waste generation rate as measured by wet weight was identified for low-income households and it could be attributed to consumption of heavier wet food, while field observations indicated that the high-income households generated the more voluminous packaging waste. Bolaane and Ali (2004) emphasize, though, that this relationship needs further investigation.

2.2.3 Retail and marketing stimuli

Another dimension of the problem lies in the retail relationship with the consumer. Food pricing strategies, marketing communications and the eating environment bias food consumption (Chandon & Wansink, 2012). For instance, consumers are not always aware of some forms of marketing communications, such as the use of games on the internet for introducing food products. Additionally, lower income consumers are predominantly affected by temporary price promotions and quantity discounts (Chandon & Wansink, 2012).

Similarly to the analysis of food marketing in relation to obesity, it seems feasible to investigate if marketing practices might be relevant antecedents of food waste. In both cases, win-win solutions could be proposed, in which retailers would increase profits and consumers would benefit from a healthier diet or wasting less. The development of adver gaming (online games with advertising content) for healthy products, increasing the presence of healthy eating in the media, and the rebrand of healthy food were some win-win solutions suggested by Chandon and Wansink (2012).

Although several authors mention a linkage between retail marketing practices as contributors to waste (Cox & Downing, 2007; Schneider, 2008; Stuart, 2009; Edwards & Mercer, 2013), there is little empirical evidence to support the allegation that marketing practices are the major driver leading consumers to buy products they will never use, as stated by Wansink, Brasel and Amjad (2000). For these authors, most unused grocery products (63% of the sample studied) are specialized or nonversatile products and were bought for specific recipes that were not prepared, specific purposes or special occasions, which ended up not occurring.

On the other hand, Graham-Howe et al. (2014) identified promotions as a source of food waste, but it is not estimated how big the impact of it on the total wasted at households is. Instore marketing techniques create a dilemma for consumers (Graham-Howe et al., 2014), when faced with promotions such as “buy 2 and get 3”, household food purchasers must decide between “value for money” (lower relative price) or buying in smaller quantities. The first option represents a greater likelihood that food would go to waste.

It seems reasonable to admit that retail offers and promotion are motivators of waste (Cox and Downing, 2007) given that consumers are enticed by offers such as “Buy one get one free”, which can result in buying excess food (Aggidis et al., 2013) and wasting more (Schneider, 2008). On the other hand, as noted by Wansink et al. (2000), abandoned food products might have been bought for other reasons rather than promotions. Food waste, as such, is not a uniform phenomenon. It has several factors and types.

Furthermore, while commenting on retail offers and promotions, Koivupuro et al. (2012) state that people tending to buy cheaper food products, for instance due to frugality or shortage of money, also value food more and end up wasting less, which could indicate a negative correlation between price offers and food disposal. In the study conducted by Koivupuro et al. (2012), the amount of food waste was somewhat greater in those households where BOGOF (Buy One Get One Free) and discounted food products were not often bought. These findings, which might be seen as contradictory, reveal the necessity to classify food waste patterns.

In relation to these strategies to increase sales, pre-packed items, such as multipack fruit and vegetables (Graham-Howe et al., 2014), were perceived to generate food waste. Large package size is also an issue when it comes to industrialized products (Ganglbauer et al., 2013; Koivupuro et al., 2012; Williams et al., 2012) given that it increases the probability of waste in households with fewer members.

The culture of waste seems also to be related to the changes in retail. The dissemination of large supermarket chains and all-you-can-eat restaurants brought more convenience and practicality for the consumer, but is also seen as a motivating factor in the disposal of food. Confronted with buffets, some consumers fill their plates with more food than they can eat, and faced with promotions and merchandising they

put more food in their shopping cart than they will consume in their homes (Stuart, 2009).

Finally, in relation to package related variables, the literature mentions the wording of labels (Milne, 2013) and too large or difficult to empty packages (Williams et al., 2012) as drivers of waste. Thus, it seems clear that both package design and consumers' interpretation ability are related to food waste.

2.2.4 Situational variables

Routine decisions such as buying food, in the context of developed countries, have a minor influence on consumers' lives because they are less complex and involve a relatively smaller percentage of family budget, when compared, for instance, with lower income countries. In Brazil, food is the second group of expenses that impacts more on the family budget after housing (IBGE, 2009), and especially for the poor, is a relevant purchase decision that involves analyzing priorities.

Planning routines, as mentioned by Stefan (2013), are important predictors of waste. It includes not only whether someone prepares a shopping list, but also the ability to plan meals and to manage the food inventory in the pantry. The skill in planning meals might relate to the use of leftovers, given that a lack of planning might lead to more leftovers.

The consumption of food leftovers and the implications of it for family relations were studied by Cappellini (2009). For her, consuming leftovers implies a set of practices and it has analogies with the process of sacrifice. In a more recent study, Cappellini and Parsons (2011) state that given the necessity to reduce household food waste, consumers should be encouraged to reuse their leftovers. The challenge for social marketers is to increase the awareness of reusing leftovers while emphasizing that simply filling up the food waste bin is not an effective way of thinking responsibly about our food consumption.

Cappellini and Parsons (2012) theorize the consumption of leftovers as thrifty meals. Interestingly, they emphasize that dealing with leftovers is not the last point of a consumption chain, but rather a practice that can be the beginning of a new

consumption process. That being said, it might be the case that in families where the use of leftovers is a habit, the food consumption process will be more similar to a cycle, in which the last stage of disposal is postponed by this re-use or even eliminated.

Furthermore, when commenting on how consumers identify new uses for old products, Wansink (2003) posits that resourceful consumers identify alternative uses mainly to save time. There is a shift from cost-savings to convenience (Wansink, 2003), although the rising food price experienced in recent years together with the world economic crisis from 2008 might have changed this pattern again.

Behavioral good practices that can prevent the generation of food waste were the topic researched by Abeliotis, Lasaridi and Chroni (2014). Results of the survey, conducted in Greece, show that most respondents plan both their food shopping and meals. Misunderstanding of food labelling was the main problem found. These authors note, however, that results are influenced by the recession faced by Greek consumers and might not be representative of other regions. Apart from that, a self-reported data collection was used, which according to the authors is a research limitation.

When considering the consumer, planning and shopping routines are important predictors of waste (Stefan et al., 2013). Other behavioral characteristics, related to the consumption culture, are mentioned in the literature such as overprovision of food and surplus purchase, as presented on Table 6.

In a survey of 244 Romanian consumers, Stefan et al. (2013) found that consumers' shopping and planning routines are key drivers of food waste, which remind us about the influence of impulse buying and surplus purchase in food disposal. Interestingly and contrary to common belief that lack of planning increases food disposal, Ebreo and Vining (2001) point out that consumers' future orientation was found to be unrelated to their self-reported waste-reduction behaviors.

It was perceived, however, that there is a relation between future orientation and consumers' self-reported recycling behaviors. Recycling and waste reduction behaviors, thus, are considered two different classes of behavior with different antecedents and correlates (Ebreo & Vining, 2001). None of the variables predicted the number of waste-reduction behaviors performed by the respondents in the study conducted by Ebreo and Vining (2001), but future orientation, altruistic reasons, living

in a single-family dwelling, and being employed full-time were antecedents of the number of recycling behaviors performed.

The attitude of carelessness on the part of affluent consumers, who can afford the financial costs of buying more than necessary, is quoted by Stuart (2009). It should be noted, however, that in some circumstances it is not the absence of care that leads to waste. Interestingly, care can lead to waste, as in the case of the good mother syndrome (Stuart, 2009). Other reasons are the search for convenience and time constraints. In this situation, consumers tend to view stocking up food as a way of protecting themselves “from the inconvenience of having to go shopping if something unplanned or unexpected happened, simply as a means of freeing up time for other responsibilities or personal pursuits and reducing future stress” (Graham-Howe, 2014, p. 19).

2.3 CULTURE AND WASTE

Consumption and culture are intrinsically related. Food, in particular, is seen as a cultural embedded phenomenon since authors such as Barthes (1961). Foods are one of the most elementary forms of constructing and communicating identity, and it is often a source of status, class and prestige (De Solier, 2013; Anderson, 2014). For Barthes (1961), food might be conceptualized as a system of communication, a body of images, a protocol of usages, situations, and behavior capable of transmitting signs for the members of a given society.

Homemade food, such as *bacalhau* prosumption in Brazil, is permeated by religious, cultural and social elements. It communicates both cultural (e.g. how the dish is prepared and consumed) and economic (e.g. price dependent on type of bacalhau) capitals (Xie et al., 2013). Interestingly, Moiso, Arnould and Price (2004, p. 379) assert that homemade food, while expressing family identity, “opposes the market’s attempts to commodify the homemade food category”. As such, homemade is seen as a model to follow in opposition to the uniformity imposed by the market-made.

The practices related to food consumption in a household are intrinsically related to history and to what was constructed in cultural terms (Casotti, 2002). Therefore, a given behavior (e.g. preparing fried food) might be considered unhealthy, but the need

to satisfy a member of the family or to follow a traditional recipe is stronger than the awareness that something might not be healthy.

Traditions, a cultural element, play a key role in relation to food (Casotti, 2002). Practices might, thus, be not connected to what consumers recognize as being the desired behavior. For Casotti (2002), while French consumers value the charm of food variety, Americans are getting obsessed by the healthiness. Brazilians, on the other hand, give importance to both aspects, but the power of traditions might disconnect what they consider doing to the actual practice.

This characteristic highlighted by Casotti (2002) shows that behavior characteristics, when rooted in cultural elements, are difficult to change. In fact, Cascudo (1968), the author of "The history of food in Brazil", says that cultural inherited habits, particularly the ones learned in childhood, are like engravings in granite while later ones less connected to culture are engravings in plasters.

The disposal of food and other products that could still be used can be seen as a symbol of the value system of a society and it causes ethical controversies (Schneider, 2008). In some cultures, such as South Korea, wasting food is a sign of wealth and hospitality. On the other hand, among the Uighurs, people of Turkmen origin who dwell mainly in Central Asia, frugality is seen as a virtue (Stuart, 2009). In the US, frugality is far from being a characteristic of the soul food, "the old-time food of the impoverished rural South" (Anderson, 2014, p. 185), a symbol of African American culture. Several side dishes, such as collard greens, cornbread, mashed potatoes, and black eyed peas, exemplify a typical soul food meal, which brings to mind how plentiful a Brazilian lunch might also be.

In relation to food, Brazil might be described as the land of abundance and diversity. Brazilians celebrate food when it is satisfying and filling, exalting its plenitude (Fajans, 2012). Plentiful and mixed food is a cultural characteristic of Brazil, described by DaMatta (1984) as one of the most important traits in transforming the act of eating into a Brazilian gesture.

The Brazilian cuisine does not favor separate dishes, such as in China or Japan, or the combination of separate dishes that are strong and discontinuous, as in France and England, "but, rather, the possibility of establishing, also through food, gradations

and hierarchies, allowing choices between a food that is central and its peripheral adjuncts or ingredients that serve to join and mix " (DaMatta, 1984, p.64).

These aspects highlighted by DaMatta (1984) bring to mind the term *mistura* (mixture), a popular word used in Brazil's Southeast to describe the complement for rice and beans, which are usually the staple food. The *mistura* usually is beef or chicken. Given this hierarchy and the necessity of including up to three side dishes in a typical lunch, it seems that meal planning is essential in avoiding a high amount of leftovers, which might in turn contribute to food waste.

And as a matter of fact, anyone who has spent time in the *sertão* – the Brazilian dry lands biome – should have noted the plentiful variety of dishes that makes a traditional meal for the *sertanejos* (the natives from *sertão*). Even considering the financial constraints faced by this population, in a region with the lowest purchasing power in the country, a popular saying states that when there is rain, there is abundance. The same scenario might be experienced in Minas Gerais, a state with a cultural trait that links its traditional food to hospitality and family gatherings.

Diversity is inherent to Brazilian food even before the Portuguese colonization (Cardim, 1925) and the importance of abundance of food on the table has been prevalent since the colonial period (Freyre, 1933/2002). Reports more related to culture, such as Cascudo (1968), show that there was also wastage at the end of the chain. The relationship between excess food and receptiveness is described by Cascudo (1968) as a habit of the colonial period, a trace of Portuguese culture absorbed by Brazil. "They served without consulting. Brought the full plate and were supplying it relentlessly beyond the repletion [...] the food piled up confusedly, in front of the guest as a praise for the host's abundance" (Cascudo, 1968, p. 328). For the author, the act of not offering before serving is a symbolic participation of the host family.

In addressing the food preservation and supply, Cascudo (1968b) points out that the food storage is a result of a winter habit and it is absent in tropical climates. Some Brazilian popular sayings, cited by the author, have imbued in their sense the idea of not having to store the food, such as "Quem guarda o pirão, chama o ladrão" (The one who keeps the fish sauce, calls the thief); "Quem muito esconde, o gato vem e come" (The one who really hides, the cat comes and eats); and "Quem guarda, desconfia de Deus" (Those whom save, don't trust God). As these sayings indicate, and given the

descriptions done by Freyre (1933/2000), aspects related to food waste appear to be assimilated as part of the Brazilian culture in the colonial times.

The influence of Portuguese colonization, in turn, altered the Brazilian eating habits. Besides the introduction of sugar and salt, other ingredients like bacon, spices and vegetal oils were added. Likewise, the African brought seeds, roots and seedlings for food utilization (Cascardo, 1968). From this cultural mosaic of native Indians, Africans and Portuguese, the Brazilian cooking and eating habits were formed.

The Portuguese heritage may also have given rise among Brazilians the so called “good mother syndrome” (Stuart, 2009). According to the author, the role of the matriarch, given the need to take good care of the children, is to always keep the pantry stocked, which can generate more waste.

2.4 FOOD CONSCIOUSNESS

The abundance of our times might have promoted a behavior of less awareness in relation to food waste. In the northern hemisphere, as *The Economist* (2009) indicates, the generation that experienced the scarcity of resources from war times, was more disposed to avoid waste than the newer generations:

In many countries one of the side effects of the Second World War was to breed a generation that could not abide waste. Newspapers, jars and string were diligently saved and reused. Glass bottles were returned to their makers. Most importantly, though, food was never, ever thrown away. Leftovers were recycled into new meals, day after day. Fast forward to today and things have changed. (*The Economist*, 2009)

In the Brazilian scenario, the entire country did not experience an austere food scarcity derived from wars, and thus, an increase in food consciousness derived from severe lack of food supply might not had been acquired. Additionally, given the abundant food supply reached by Brazil since the Green Revolution from the 1970s, when the country started to invest more in research and development for agricultural production (Buainain et al., 2014), the abundance of foods might have promoted a state in which certain foods (e.g. rice) is perceived as having low value.

In fact, Brazil has left the condition of food importer, when the access to food was still far from being cheap and consumers faced difficulties in finding certain food products, to become a large agricultural producer. While in 1960, the food grains harvest was equivalent to 246 kg per habitant, these days the country produces 206 million tons of grains, which equals to approximately 1000 kgs per capita (Lopes, 2015). Therefore, this tremendous growth in the food supply can promote a behavior of less awareness in relation to the value of food, which in turn, might promote more food waste if awareness-raising actions are not taken.

From a behavioral contemporary standpoint, man's detachment from the countryside, with the concentration of population in large urban areas, is another dimension likely to negatively impact food consciousness. As FAO (2013e) cites, 52 percent of the world's population lives in cities. In 2008, for the first time, the world's urban population became larger than its rural population (FAO, 2013e). The result of this change in where people reside, as Aggidis et al. (2013) infer, is that more people lose their involvement and knowledge of the food supply system, turning into mere consumers at the end of the chain to a point that studies indicate the creation of a culture of little understanding about the source and value of food. This characteristic of less awareness in relation to the food system, therefore, might contribute to less concern about food waste.

In the Brazilian context, it is perceived that in 1950, 64 % of the population lived in rural areas, representing 38.2 million people. By 1970, the percentage of the rural population fell to 44 % (Camarano & Abramovay, 1999). In 2010, according to the IBGE census, only 15 % of the total resident population lived in the countryside in Brazil. Thus, the rural exodus may have contributed to consumers having less knowledge about food production, which can be an indicative of lack of concern about food waste.

This lack of knowledge about the food system might promote the perception that "the responsibility for food waste lay with the food industry and supermarkets rather than the individual", a barrier to minimize food waste identified by Graham-Howe et al. (2014, p.20). According to these authors, some of the household food purchasers justify food waste by saying that the quality of much food sold in supermarkets is poor. Food quality, especially taste, was seen as an important factor in determining whether

or not the food was eaten, especially in respect to fruit and salad (Graham-Rowe et al., 2014).

3. METHODOLOGY

This qualitative exploratory study explores the consumer decision process (selection, consumption, and disposal of food) based on the itinerary method (Desjeux, 2006; Desjeux, Suarez, & Campos, 2014), not only because it allows for a distinct perspective from most studies, but also because it permits observation of the phenomenon from a cultural angle. By doing so, I address Koivupuro et al.'s (2012) call for more qualitative studies on the phenomenon.

The itinerary method prioritizes data collection in the context of real life, where practices occur. By undertaking in situ observations it allows to reveal practices that impact on consumer behavior, which might not be easily grasped if based only in self-reports (Campos, Casotti, & Suarez, 2006). Therefore, this method assumes that consumers do not realize certain behaviors, and as such, a precise identification of daily practices demands the combination of observations and in-depth interviews. The itinerary has been applied to investigate, for instance, the consumption process of Coca Cola in families (Campos, 2004) and the consumption of medicines among French consumers aged 20 to 40 (Vincent, 2005).

As Desjeux (2006) suggests, the itinerary itself should cover the seven main stages related to the acquisition of a good or service: (1) the decision at the household; (2) the shopping trip; (3) the purchase moment; (4) organizing purchases at home; (5) the preparation for use; (6) the consumption itself; and (7) the disposal. Thus, the in-home interviews covered the entire consumer decision process related to food. The analysis was complemented by in situ observations and photographic records (Appendix D), an important tool in the method because they demonstrate the consumption process context (Desjeux, Suarez, & Campos, 2014).

Table 3 - Interviewees' profile

Informant^a	Role (food related)	Age	Family type	Household size	Occupation
Jenifer	Organizes/prepares	42	Couple with daughter and granddaughter	4	Seamstress
Helen	Buys/Organizes/prepares	65	Couple	2	Pensioner
Karin	Organizes/prepares	45	Couple with two kids	4	Small Farmer
Jessica	Organizes/prepares	54	Couple and daughter	3	Housewife
Naomi	Buys/organizes/prepares	26	Couple with one kid	3	Housewife
Sandra	Buys/organizes/prepares	52	Mother with son	2	Local government employee
Marianne	Buys/organizes/prepares	57	Couple with son	3	Housewife
Samantha	Buys/organizes/prepares	36	Couple with 5 kids	7	Housewife
Grace (daughter)	Buys/organizes/prepares	32	Mother with five sons, daughter and two grandsons	9	Nursing assistant
Emily	Buys/organizes/prepares	47	Couple with two daughters	4	Local government employee
Elizabeth	Buys/organizes/prepares	67	Couple	2	Retired
Anna	Buys/organizes/prepares	63	Couple with daughter	3	Housewife
Jasmine	Buys/organizes/prepares	63	Mother with two sons and granddaughter	4	Housewife
Victoria	Buys/organizes/prepares	34	Couple with three kids	5	Small retailer

Source: empirical data gathered by the author. ^aAll informants' names are pseudonyms.

The initial phase of data collection involved fourteen lower-middle class families (Table 3) from two distinct suburbs of Itaquaquecetuba, a municipality in the eastern metropolitan area of São Paulo. Convenience and snow-ball sampling were used. Initially, five families were recruited with the help of a community leader, who introduced the researcher to the families. Apart from the estimated lower-middle income, the eligibility criteria included having primary responsibility for food related decisions, and living in a household with at least one relative.

This study was approved by an Institutional Review Board. Mothers gave consent to be interviewed, and participant confidentiality was ensured. Since women are responsible for 85-90% of the time spent on household food preparation (Katsarova, 2014) and caregivers tend to perform the role of nutritional gatekeepers, which directly or indirectly control 72% of the food eaten by their children (Wansink, 2006), I chose to interview only women.

Families were not asked about their income, but given the location, and occupation of the head of the family, their income was estimated to be representative of the Brazilian lower-middle class (per capita household income of around US\$250 per month at the time of data collection). The two neighborhoods visited are not in the municipality urban center, which is the area with better infrastructure.

The interaction started with an informal conversation about food consumption. Respondents were told that the purpose was to research food consumption, but food waste was not mentioned initially. When the interviewees brought up the topic of food disposal, they were encouraged to talk more freely about it. A more structured, in-depth interview followed the initial talk. Following Rubin and Rubin (2012), main questions were prepared in advance to direct the discussion. To ensure the alignment between the interview protocol and the research design, questions were arranged according to each consumption itinerary phase, as shown in Appendix B.

Interviews were transcribed, and content analysis was used to interpret the data gathered. As a way to explore food consumption within households, families were also observed in the process of preparation, consumption and disposal of food (Appendix C). Field notes were written for each visit. To complement the analysis, photos were taken of the environments used to store foods (cabinets, fridge, and pantry). I also took photos of the locations used to prepare, consume and throw away food. Images are important in distinguishing what consumers say they do from what they *actually* do.

The researcher remained in the houses for 2 hours on average. However, in three families the amount of time spent was longer (up to four hours) in order to follow the preparation and serving of lunch (the main meal in Brazil) over the weekend. Five families were visited twice, one visit in the beginning of the month (when they initially bought their food supply) and another in the third week of the month. These five families had children, and the mother was identified as the nutritional gatekeeper.

To increase trustworthiness, a focus group with projective techniques was conducted with six mothers to observe data redundancy. To start the focus group, each participant made collages in a cardboard, portraying the food habits of the family, utilizing magazines provided. They were also motivated to talk freely about perceptions of food

waste in their neighborhood. Appendix F presents a conceptual network derived from the content analysis and coding of the focus group discussion.

Redundancy was observed after the 14th family was visited and interviewed, and content analysis from the focus group indicated that the core categories were saturated. Data redundancy indicates the point of diminishing returns, or when nothing new is being added (Bowen, 2008). There is no way of knowing beforehand the size of the sample for an inductive study (Stern, 2007). The sample needs to be representative, “but it’s unnecessary to collect huge amounts of data” (Stern, 2007, p.117).

The preference for this approach instead of self-reports of food waste is due to the fact that traditional surveys of food waste have proved to be inefficient, an aspect that justifies the qualitative study. Consumers tend to minimize the amount wasted on assessments of their habits (Stuart, 2009), hence the need to compare what consumers say with in situ observations.

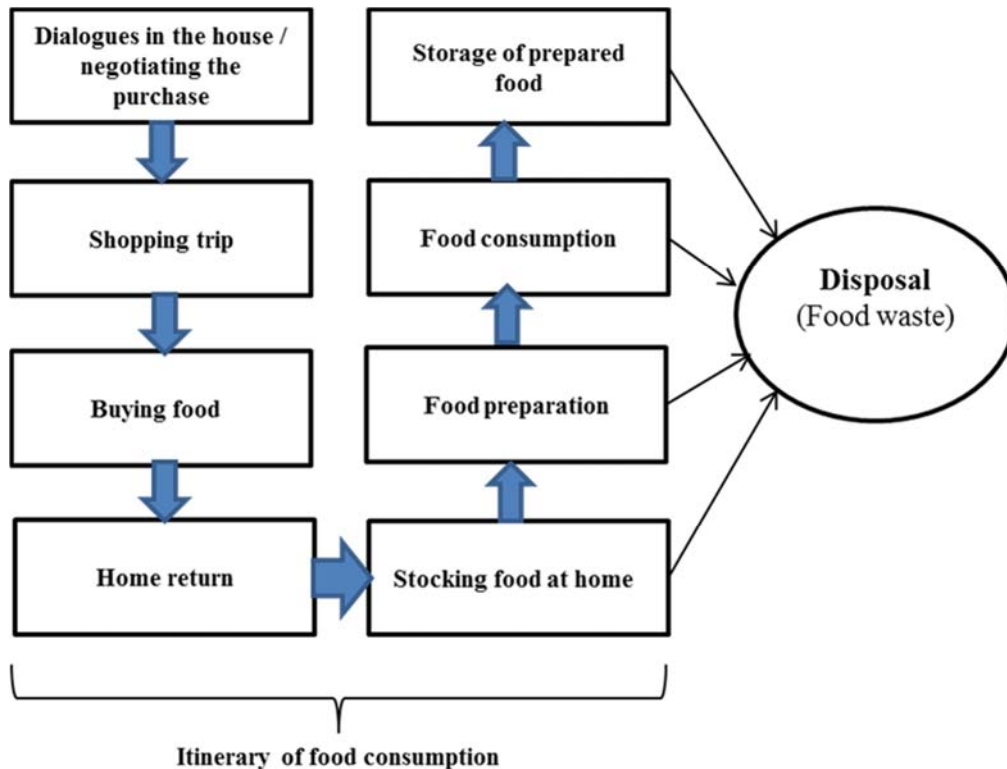
4. RESULTS

As presented in Figure 3, the last four stages of the food itinerary are associated with waste: stocking; preparing; consuming; and storing of prepared food. Empirical evidence show that drivers of food waste in the lower-middle income context include: (1) stocking too much food; (2) over-preparing or not cooking it properly (e.g. burning food); (3) leaving food on dishes after meals or not willing to consume leftovers; and (4) decaying of prepared food after long or inappropriate storage. These findings challenge the notion that food waste is a prevalent issue only in higher-income families.

While the role of over-preparation (Chandon & Wansink, 2002; Evans, 2012; Williams et al., 2012) and stockpiling routines (Wansink & Deshpandé, 1994; Koivupuro et al., 2012) on consumer food waste is also mentioned in previous research, this study expands the understanding of overlooked variables, such as routines related to reuse of leftovers. Interestingly, findings show peculiarities related to the low-income context, such as the preference for a big monthly grocery shopping; over-stocking foods as a form to decrease anxiety (e.g. the fear for running out of money); over-preparation

driven by the high social connectedness found in the low-income communities studied (e.g. the need to have prepared foods to offer); and abundant food seen as wealth.

Figure 3 - Itinerary for food waste at households



Source: elaborated by the author based on empirical data.

The earlier step in this chain linked to food waste, categorized as “stocking food at home,” relates both to excessive purchasing and the inability to manage the food stocked at home. The preference for purchasing large packages contributes to excessive purchasing, and it is justified by families due to the reduced relative price when rice, for instance, is purchased in 5 kg instead of 1 kg packages.

Similarly, the option to go to warehouse markets for bulk buying and the preference for large and economy packages seems to underpin over-preparing, which in turn tends to generate more food waste. It can be supposed, therefore, that food waste can nullify part of the efforts to save financial resources at the time of purchase.

Families reported that some foods were not consumed because they were bought in abundance and past their expiration dates, or because they had forgotten to prepare

it. These products are usually the ones more prone to be bought on impulse, such as powder for preparing gelatin, cake mix, sauces, and canned food. Evidences of such behavior were also identified in observations (home-tours) and photos taken.

“Sometimes I’m in the supermarket and I remember to buy something that I need, but often I also buy useless food stuff, because as you know, woman is like this, I mean when it is on sale, for example, we buy without the real need for it” [Sandra, 52]

It was observed, though, that expiration dates influence wasting, but they are not major drivers of wasted food in the investigated group. Observations and discourse analyzed indicate that nutritional gatekeepers tend to consider preparing food products (e.g. canned corn) even after realizing that it has passed the “best before” date. This finding is consistent with the role of endowment in the consumption of food products past their freshness dates. It is known that consumers show a greater propensity to use a product after expiration when they own it (Sen & Block, 2009).

The likelihood to consume a product past its freshness date persisted even when the monetary cost or the possibility of substitute were controlled for in the experiment of Sen and Block (2009). In this study, the food preparation is dependent on other variables, such as the amount of time that it has expired, and the product category. For refrigerated products, most mothers mentioned that they are unwilling to consume after the expiration date.

Interestingly, certain products expired for several months, as shown in Figure 4, remain in the cabinets even after the perception that they are inappropriate for consumption. The photograph taken shows a cabinet with some gelatin powder and vanilla pudding powder expired for 10 months. This finding is an empirical evidence for the maturation time mentioned by Evans (2012), for whom consumers might store food products even knowing that they are likely not to consume afterwards.

Figure 4 - Expired food products



Source: photo taken by the author during home-tour.

The mother mentioned that she was aware that these products were not suitable for consumption anymore, but at the same time she was reluctant to get rid of them. These products, as identified in discourse and observations, tend to be thrown away at some point in the future, but only after the perception that nothing else could be done to use it. This behavior mitigates the guilty for throwing away edible food.

Despite income constraints, the families studied tended not to plan grocery shopping (only two of the fourteen families studied prepare shopping lists) and in several cases the amount of food they purchased seemed to be greater than needed. Inability to plan meals, described as a subcategory of over-preparation, and excessive purchasing are among the antecedents identified, as presented in Table 4.

“I go to the supermarket once a month with my husband, and we know in our minds what is missing, then we don’t prepare a shopping list”
[Samantha, 36]

It was also interesting to note that some families avoided buying food products on sale, due to the belief that good products aren’t cheap, as well as the preference for consistently purchasing the same brands. This finding also reinforces aversion to risk, a behavior previously identified among Brazilian low-income consumers (Casotti,

2002; Barros, 2007). The risk associated with the consumption of a new food product, or with foods that aren't part of their diets, increments the loyalty to certain brands. Furthermore, the perception that lower food price is related to low quality occurs when the product on sale is not a leading brand.

“He [spouse] always thinks that food products with higher prices is the best option, then he doesn't like sales and we always get the same brands of rice, coffee and so on” [Jennifer, 42]

As stated below, brand loyalty is a pervasive tendency with some peculiarities related to the low-income context, such as the necessity to avoid “buying the wrong food”, a food product likely to be perceived by family members as not tasting good. This aversion to risk tends to be high in the group studied due to the psychological and financial costs associated with trying a new product.

“Rice I like to buy ‘Prato Fino’ or ‘Camil’, beans is ‘Caldo Nobre’ and coffee ‘Melitta’. I used to buy coffee ‘Pilão’, but I don't think it is good anymore. And beef has brands now as well, right? I like the one Toni Ramos (Soap Opera actor) advertises on TV” [Marianne, 57]

On the other hand, empirical data points to the propensity to buy products seen as great brands in abundance, particularly when they are offered in promotions.

“When we see ‘buy two, get three’ type of promotion, we end up buying, even if we have the product already at home” [Jessica, 54]

For instance, in one of the houses visited, occupied by one couple [Helen, 65, informant], I observed a food inventory of 13 kg of beans, 13 kg of sugar, 14 kg of rice, 5 kg of cornmeal, 4 kg of salt and eight bottles (900 ml each) of soybean oil and several perishable food products stocked in the fridge. This taste for abundance was prevalent both at the stock (Figure 5) and even more related to over-preparation.

The image presented in Figure 5 was taken in a household occupied by a couple and two children. It was identified unopened bags of rice (20 kg in total), sugar (8 kg), beans (6 kg), and salt (2 kg), among other products such as pasta, flavored cassava flour and industrialized potato sticks in the cabinets, while rice, beans and salt for daily cooking are stored in plastic containers (approximately 1 kg each) in the countertop. It was observed that abundance of rice contributes to over-cooking of this commodity, and it seems to promote a sense that it is a food product without much value.

Figure 5 - Stockpiling in abundance



Source: photo taken by the author during home-tour.

As seen on Figure 6, after lunch is over, some leftovers might remain in the kitchen's countertop and sometimes it is not consumed later. In relation to this scene shown in Figure 6, pasta leftovers were reserved to be thrown away later on. It was observed that it is more common to prepare rice in abundance. The excess from lunch is kept for dinner, and when it is not consumed in the night, the storage of the leftover is dependent on the amount remaining and even in the day of the week. Leftovers from Friday are usually not kept for the weekend. The weekend is seen as the time for family gatherings around food, and as such, the mother enjoys cooking from scratch the favorite dishes for the relatives.

Figure 6 - Over-preparation: a pan of pasta as leftovers sitting on the countertop



Source: photo taken by the author during home-tour.

The consumption of beef, for instance, is larger in the weekends. Homemade lasagnas and traditional recipes, related to one's cultural roots, such as chicken with okra, are also weekend foods. Large meals prepared for Sunday lunches, when relatives usually get together, do not necessarily translate into more leftovers. In such circumstances, it was observed that the main course (e.g. roasted chicken) is usually eaten entirely if not during the lunch, later in the same day.

4.1 WASTE CONTRADICTIONS

I noticed a strong contradiction in how families dealt with food waste. Despite being a widespread practice, there is a strong sense that throwing food away is inappropriate behavior. During the interviews and observation process, caregivers were quite embarrassed in admitting the existence of food waste. When food disposal was mentioned, as shown in the following speech, participants usually tried to justify it to avoid feeling shame.

“I don't like to throw food away, but sometimes it happens. Like rice... it's more rice or beef, because sometimes we prepare a great quantity. And fruits as well, because it spoils, but I don't buy much fruit, because my son doesn't eat it” [Sandra, 52]

In other families, nutritional gatekeepers initially referred to food waste as a practice not frequent in their households, but prevalent among neighbors. As the conversation progressed, they started to talk more spontaneously about the problem and food waste was described as a problem in their homes as well. Observations conducted also served as evidence, and additional questions made during home-tours were useful for informants to reflect about their practices and to provide more detailed descriptions about stockpiling, cooking and prepared food storage routines.

Families who have pets or raise chickens usually buy animal food to feed them. However, they also claim that leftovers are used to feed the animals. In the investigated sample, leftovers given to pets are not seen as waste. Families that own dogs, such as Marianne's, tend to waste rice and beans. The following speech also shows a contradictory discourse. After stating that food is not thrown away, the housewife

admits that they give the leftovers to the dog even though they continue to buy dog food.

“I don’t waste food, this rice in the pan is old already, but it goes for the dog. It is not eating dog food, but we buy it” [Helen, 65]

Another example of the relationship between the presence of animals and food disposal can be seen in raising chickens.

“I prepare food before lunch, but in a big enough quantity to have the remainders for dinner. It remains in the pans (off the fridge), then if after dinner is still food left, we give to the chickens” [Karin, 45]

4.2 GOOD MOTHER IDENTITY

The discarding of unconsumed food after cooking is also due to preparation problems such as burning the food. It can also be due to the housewife waiting on someone who doesn’t show up to lunch, as quoted below. This exemplifies the good mother identity.

“Sometimes there is plenty of food left, because I expect my sons to come, then if they don’t come, I end up giving to the dog” [Marianne, 57]

The so-called good mother identity (Stuart, 2009) is characterized by the desire to provide plenty of food and it is related to the role of the matriarch. This can generate more waste and has been also reported to be a barrier to minimizing food waste in a study conducted in UK households (Graham-Howe, Jessop, & Sparks, 2014).

Caring for the family was also found in the following quote, which also relates to the good mother identity.

“My son ate plenty of greenery today at lunch, then I prepared pasta for him to dinner, but he didn’t eat. It ended up going to the poultry” [Karin, 45]

Food is also wasted after consumption due to over-serving. Some families even show an unwillingness to reheat food that was prepared for a previous meal. This aspect also shows a lack of planning for meals.

“If there is leftover after lunch, I don’t use it. I throw away. We have a canister to dispose food, and my brother-in-law takes the discarded food to give to the poultry” [Samantha, 36]

4.3 DEALING WITH LEFTOVERS

Finally, mainly due to over-preparation, food remains after the meals. Even when stored in the fridge later, it might still be wasted. For instance, most families prepare rice on a daily basis, and if the rice prepared for lunch is not consumed entirely at dinner, it ends up being thrown away or serves as pet food. In some families I identified a “maturation time” that diminished the guilt that occurred when an edible food was discarded, an aspect also noted by Evans (2012). In such situation, food remains in the fridge or elsewhere even after recognition of the fact that it is not edible anymore and that it will be rejected later on.

Even in small families, such as Helen’s, the one in charge of cooking tends to prepare an entire pan of rice on a daily basis. This taste for abundance was related to an aversion to being identified as poor, which can also be understood as a form of compensatory consumption. Mothers recurrently stated that it is better to make more – rather than not enough – food.

Beans are usually prepared three times a week, and meals are complemented by chicken or sausages which are prepared almost daily. Beef, the preferred source of protein in most families, is more consumed in the weekends. Even in households with three members, bread rolls seems to be bought in bulk (up to 12 per day), which generates waste. In Marianne’s interview, waste, aside from over-preparation, also seems related to the usual excessive purchasing of bread, which in fact was observed in several families.

“I like to prepare a great quantity. Then, usually there is rice left, and bread as well always remains a bunch uneaten” [Marianne, 57]

When commenting on food preparation, mothers tend to also justify over-preparing due to practicality. They show a preference for preparing a greater amount of food at once to save time. Hospitality seems to be another characteristic linked to over-preparation, as does the willingness to be a good provider. This results in a tendency to serve kids larger portions of food than they can eat. Table 4 summarizes the major categories and subcategories of antecedents of household food waste.

Table 4 - Categories and subcategories identified in discourse

Food waste antecedents	Subcategories
Excessive purchase	Impulse buying Unplanned purchase Large package preference Promotion Brand loyalty Taste for tradition
Over-preparation	Hospitality Inability to plan meals Food seen as wealth Taste for abundance Good mother identity
Caring for a pet	Sense of caring Waste justification
Avoidance of leftovers	Prejudice against leftovers Freshness preference
Inappropriate conservation	Prepared food not stored in fridge Inappropriate storage in fridge

Source: elaborated by the author from the data gathered.

Ample quantity storage is also a matter of convenience and time saving. The studied families tended to prefer making a major food purchase at larger supermarkets once a month. The shopping trip occurs a few days after receiving wages, and it usually involves people outside the household. It is common for a family member, such as a son that lives close by, to offer transportation to his parents (who don't own a car) to and from the supermarket.

Another prevalent trait in the studied sample is the lack of knowledge about adequate ways to store food. In almost every family, produce and beef is improperly stored in the fridge, and prepared food remains for a period of up to 12 hours without refrigeration. Plastic bags from supermarkets are commonly used to wrap produce in the fridge. In some cases, it was observed that rice and beans were kept in pans over the cooktop for 24 hours.

5. GENERAL DISCUSSION

All 20 families studied, including the six mothers from the focus group, live in houses with small yards. They still adopt more traditional life styles, where women play a role as typical “housewives” being in charge of most domestic chores, including cooking. I also observed that all these mothers have the habit of cooking from scratch, which can lead to over-preparation and therefore to more waste.

It was observed in the two communities visited a lack of facilities for leisure activities such as parks, squares and sports courts. Sidewalks are not well-maintained as well, and wastewater often flows along the sidewalks. This reality seems to increase the time spent at home in the weekends, and as such, the involvement of families with food-related social gatherings. The spare time in the weekends is often around food preparation and consumption with family members and neighbors, a characteristic that also indicates the high social connectedness of the segment studied.

Another aspect to be highlighted, relates to the relatively fixed culinary repertoire of these families. Rice and beans are present in almost every lunch and dinner. Weekend meals, the ones more related to social gatherings, have more diversified side dishes to complement the main course. Cooking from scratch is not prevalent only on these weekend lunches.

Based on the interviews and observations, I believe that cooking from scratch – apart from the obvious need to save money on meals away-from-home - is connected to the willingness to be perceived as a good provider for the family and to show hospitality for community members and relatives. Hospitality, a category that emerged in this study, is embedded in the practice of “having a social life” as mentioned by Ganglbauer et al. (2013). Therefore, intentions are positive and the negative outcome (food waste) can be avoided if mothers improve planning skills (meals and grocery shopping) and understand that when food is wasted they are losing money.

As I presented, over-preparation and excessive purchase, along with cultural norms such as the taste for abundance, play a greater role in wasting food than, for instance, the misinterpretation of food labels. In fact, most families studied are willing to consume certain food products, particularly not refrigerated ones, even after the “best before” or

expiration date if they open it and perceive by the smell and appearance that the food remains edible.

This finding presents an opportunity for new investigations to focus more on overlooked aspects of household food waste. While there are plenty of studies analyzing how food labels influence consumption, it seems that other variables, such as the product category or for whom the food is being prepared, are not taken into account.

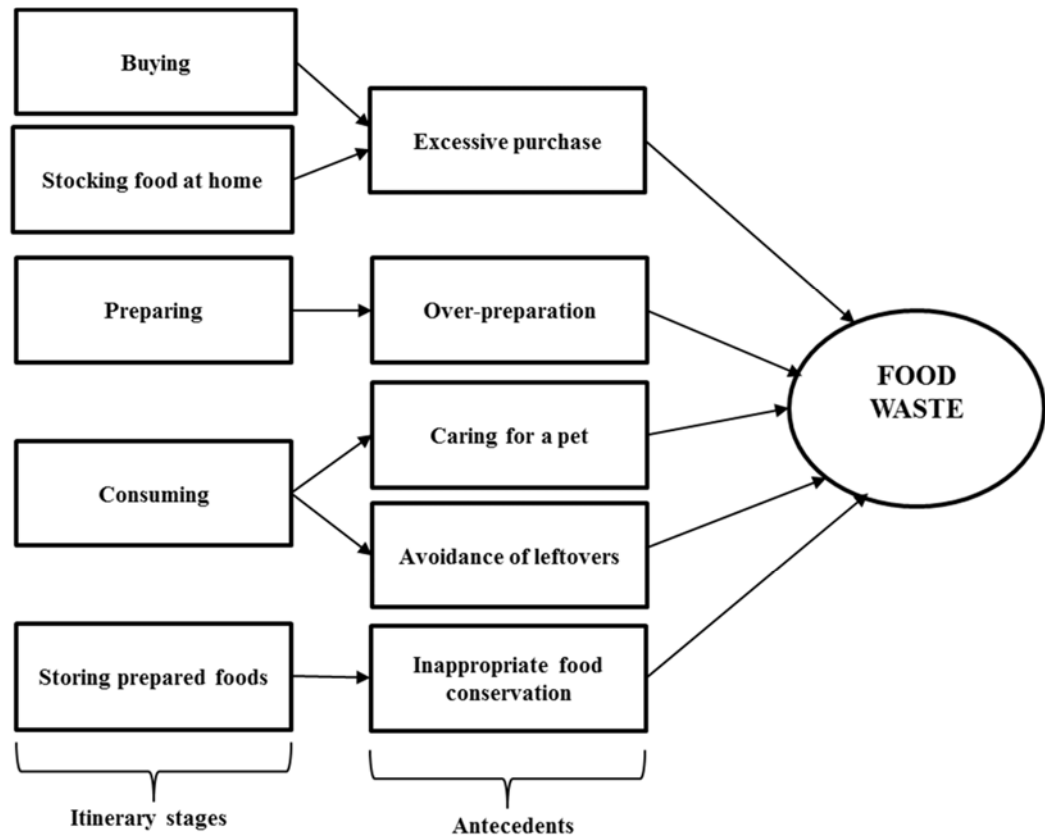
5.1 AN INTEGRATED FRAMEWORK OF HOUSEHOLD FOOD WASTE

Figure 7 proposes an integrated framework to better depict the phenomenon of food waste. This model provides an improved understanding of this phenomenon by articulating the two major sets of dimensions related to household food waste phenomenon - the different domestic itinerary phases where household food waste takes place and the major antecedents of that waste. The model can serve as a reference for future empirical studies to establish more specific relationships between the dependent variable waste and its antecedents.

Excessive purchasing, over-preparation and unwillingness to consume leftovers were some of the main antecedents of food waste identified. They are embedded in cultural practices such as hospitality, the good mother identity, taste for abundance, and food seen as wealth. The contradiction of food waste in a low-income context can be explained by the influence of these cultural aspects.

Interestingly, a key finding not explored in the literature is that pet ownership serves as a justification for food waste. Families studied do not perceive that they are wasting edible food when the leftovers are given to dogs or poultry. In relation to composting, none of the 14 families have a composter bin.

Figure 7 - Integrated model of household food waste: itinerary stages and antecedents



Source: elaborated by the author based on empirical data

On the other hand, the antecedent of inappropriate food conservation is more related to lack of knowledge about food storage. Given this circumstance, campaigns about how to preserve and store food might encourage greater practice of food conservation in households. Consumers should also be encouraged to realize that by using appropriate containers instead of, for instance, empty margarine pots to store beef in the fridge, they will end up saving financial resources by wasting less.

The study presents empirical evidence of these five antecedents in a low-income context, which fulfills the objective and contributes to previous consumer behavior studies on food waste. Overall, food waste is a real problem in lower-middle class families, and urgent action is needed in terms of educating them to make smarter purchases, to store food appropriately, and to adopt a healthier diet.

Given that most of the world is low income, a small change in the behavior of this segment has a considerable impact on society as a whole. Some strategies adopted by lower-middle class families to save money at the beginning of the itinerary – from the shopping trip until the preparation of food – are nullified by the food wasted at the end of the itinerary (Figure 3). Bulk buying (to pay a relatively reduced price) and the preparation of food in abundance, justified to save cooking time, but also related to excess food seen as a symbol of wealth, generate more food waste.

5.2 LIMITATIONS AND FUTURE RESEARCH

This qualitative exploratory study's intention was to identify and analyze evidences of food waste in the low-income segment, but not to generalize the findings. Even though the study was conducted in only two suburbs of a municipality in São Paulo's eastern metropolitan area, many of the interviewed families came from different parts of Brazil, and therefore I believe that findings would probably hold in other Brazilian regions.

There is also a need to classify families more precisely in terms of income. Data from the census conducted in 2010 (UNDP, 2013) estimate that the per capita monthly income in the area studied is R\$520 (US\$180). Compared to developed nations, this is representative of the low-income segment, but within Brazil it is classified as lower-middle class, the term used to refer to the sample in this research.

This study doesn't imply that food waste is greater in low income families than in the more affluent ones, but given the financial resources constraints the poorer face, it is inferred that they would have a better life quality if they changed their food purchasing, cooking, consumption, and disposing behavior. I also do not intend to blame families for the food they waste. In fact, it was found that even positive intentions (e.g. hospitality) might be a driver for food waste.

In order to gain a deeper understanding of the household food waste phenomenon, further investigations could replicate this study in different contexts: regions, countries, and income segments. The proposed "Integrated model of household food waste" can serve as a reference for future empirical studies to establish more specific relationships between the dependent variable waste and its antecedents. Because most antecedents identified are related to cultural aspects, it will require long-term

immersion in the field to get a deeper understanding of the phenomenon. That being said, more ethnographic oriented methods can be applied to enrich the findings. Mixed-method approaches could also shed light on this problem by focusing on specific variables (e.g. leftover avoidance).

5.3 IMPLICATIONS FOR PRACTITIONERS AND PUBLIC POLICIES

Supermarket chains, particularly ones located in low-income areas, could strengthen their relationship with consumers by offering educational sessions not only on cooking tips, but also on food storage techniques. Given the perceived lack of access to appropriate containers (e.g. glass storage containers) and the preference caregivers show for shopping in supermarkets, it could be a win-win solution in which retailers could increase their customer preference and therefore expand their sales, while consumers would benefit from wasting less.

Findings indicate that the lower-income segment would benefit from better meal planning and appropriate food storage. National food stamp programs, such as the *Bolsa Familia* in Brazil, and the Supplemental Nutrition Assistance Program (SNAP) in the US, could widen their scope by increasing the involvement of nutritional educators. In terms of communications, this is particularly important because it would involve word-of-mouth, and people tend to trust what they hear from health providers in their communities (Anderson, 2014).

The low-income segment, in particular, would benefit from a binding communication approach, which presumes involving the actors in the process by carrying out preparatory actions and encouraging them to make specific commitments (Joule, Girandola & Bernard, 2007). This strategy takes into account the role of commitment and free will compliance instead of a focus on persuasive communication.

Merely persuasive communications techniques, such as advising consumers not to throw food away, are unlikely to be effective. Information and persuasion are needed, but not sufficient to change behavior (Joule, Girandola & Bernard, 2007). As Gradjean and Guéguen (2011) suggested, commitment adds value to the persuasive

communication process by allowing the target to participate in the process and to build content.

As findings indicate, cultural norms play a key role in wasting food in households. For instance, given the habit of valuing over-preparation as a way to be perceived as a good host, or of distancing themselves from poverty, communications efforts have to be directed toward deconstructing these beliefs. Even considering that culturally ingrained habits are difficult to change, I assume that interactive communication initiatives can contribute to mitigating household food waste and these two-way communication strategies would most likely benefit from the use of behavioral economics principles to frame the messages.

Therefore, consumers should not be blamed, but encouraged to reflect on their practices in relation to food shopping, storing, and preparation. It is suggested that consumers should be involved in certain programs (e.g. discussions about nutrition in community centers) to reflect on their routines in relation to food. I assume that interactive initiatives are likely to work better than merely persuasive communications, which are considered less effective for behavior change.

In the case of household food waste, nutritional education initiatives could involve stimulating families to serve food in smaller dinnerware and to store leftovers in two or more containers in the fridge instead of just a bigger one. Cooking sessions to demonstrate ways to re-purpose leftovers could also be organized in community centers.

Apart from establishing binding communication approaches with low-income consumers, which might even include food stamps beneficiaries, attention to lower-middle income families, a segment not covered by the *Bolsa Familia* in Brazil, is also needed. Therefore, a national campaign to increase the awareness on food waste, preferably involving the private sector as well, would also be necessary. As an illustration, the importance of these campaigns are recognized by the UK's government and private sector, and more recently the Obama administration announced an investment of US\$90 million for a consumer awareness campaign to help reduce food waste by 50% until 2030 (Gunders, 2015).

Partnerships could be developed with government agencies to amplify the scope of current projects, such as “Mesa Brasil”, a national program led by the Brazilian Social Service of Commerce (SESC) which operates 83 food banks. Additionally, the Ministry of Social Development (MDS), in Brazil, has a network of 78 food banks. This network could be reformulated and amplified with public-private partnerships, as seen in the US.

Apart from contributing to the reduction of food waste, implementing food pantries could amplify the scope of *Bolsa Família* and positively impact the enhancement of food security as well. In the long run, these efforts to divert food products from waste could lead to a national plan of smarter food choices, which could also positively impact the consumption of healthier food products. In sum, it is suggested not only to amplify the scope of food banks and food pantries, but to invest also in nutritional education programs to support low-income consumers in making good use of what is given.

Overall, household food waste mitigation requires changes in food policy, nutrition education efforts, and social marketing initiatives. Not to mention, a Good Samaritan law - a form of protecting from liability the retailer or NGO donating foods and grocery products - could be implemented in Brazil following the same principles already established in the US. As of August 2015, the Bill 4747, proposed in 1998, was still being processed in the Brazilian Chamber of Deputies.

CHAPTER 4

Essay 2 – WHY GOOD MOTHERS MIGHT BE FOOD WASTERS? THE ROLE OF AFFECTION AND ABUNDANCE

Abstract

This qualitative study, grounded theory oriented, identifies familial affection and preference for abundance as major drivers of wasted food in lower-middle income American families. These positive intentions provide an improved understanding of household food waste, a problem with high environmental impact and moral implications. Based on empirical data collected with twenty caregivers via in-depth interviews, observations, and analysis of photos, this study provides novel explanations, such as on how stockpiling comfort foods in abundance – a form of both boosting positive self-emotions and showing affection for kids – can promote more wasted food. Other antecedents identified include multiplicity of choices, convenience, procrastination and unplanned routines. In sum, this research identifies a negative outcome of affection and food abundance in the family context, while providing a theoretically relevant general framework to help understand the food waste phenomenon. I suggest increasing the awareness of nutritional gatekeepers through behavioral economics principles.

Keywords: food waste, affection, abundance, low-income, food consumption

1. INTRODUCTION

Food and caring have been known to be intrinsically related (Kaplan, 2000; Neely, Walton & Stefens, 2014). Interestingly, it does not always result in wellness, as demonstrated by showing caring through feeding kids socially valued snacks (Namie, 2011) or serving snacks to reward a positive behavior (Fisher et al., 2015). In such instances, affection promotes obesity. In the context of household food waste, the same logic of positive intentions generating a negative outcome might apply.

I seek to identify and describe which factors promote wasted food, and to investigate the role that affection and abundance play on household food waste. Consumer food waste signifies a larger environmental problem since resources needed for food production, such as land, energy, water and nutrients are limited, and should, therefore, be applied in an efficient and sustainable manner (Beretta *et al.*, 2013). Considering the ongoing existence of hunger and food scarcity in many areas of less developed countries, current attention on food waste is driven not only by environmental dimensions but also by moral implications.

The reason to focus on the lower-middle class is twofold: (1) Food becomes an issue for households that do not receive food stamps, such as the Supplemental Nutrition Assistance Program (SNAP) benefits in the USA, or that receive less than the maximum benefit amount (Golan *et al.* 2008); (2) Most of the world is low-income and relatively little is known about the determinants of food waste in this segment, thus research should focus on better understanding this phenomenon in order to provide solutions for behavioral change.

This qualitative study is based on in-depth interviews conducted in households (n=20), observations and analysis of photos taken at American homes following a previous study conducted in Brazil with 20 lower-middle class families. I first provide an overview on food waste and describe affection and abundance, the core concepts for this study. Then, our research method is explained, followed by the results and a general discussion. I conclude by presenting a framework with the main antecedents of food waste and the quantification of wasted foods reported in the week before the interview.

2. METHOD

The interviews and observations in Brazilian households identified that food waste was also a major issue in the low-income segment and provided valuable insights about food waste behavior and its antecedents. Based on the investigation conducted in Brazil, a similar interview guide for the research in the US was adopted. While the previous study aimed at understanding household practices relating to the purchase, storage, preparation and disposal of food in the Brazilian lower-middle income context,

this study advances the theoretical contributions via a grounded theory (GT) oriented research with quasi-ethnographic methods.

The study was approved by Cornell University's Institutional Review Board (Appendix J); participants provided written consent and confidentiality was assured. Data were collected in lower-middle income households from four different suburbs in the Ithaca-Tompkins County, New York State. Semi-structured interviews were conducted with twenty caregivers (Table 5) in their homes. Sample was ethnically diverse (45% Afro-Americans, 35% Caucasian, 15% Latino, 5% Pacific Islander), 25% were grandmothers, average age was 37, and 20% unemployed. It was also identified that 20% are beneficiaries of the SNAP and 50% go to food pantries.

Table 5 - Profile of participants

ID	Age	Ethnicity	Role	Education	Employment	SNAP	Children	Household size
1	35	Pacific Islander	Mother	Some college	Self employed	N.A.	5	5
2	50	Afro	Grandmo.	High school	Unemployed	Yes	3	5
3	54	Caucasian	Mother	Bachelor's	Unemployed	No	2	4
4	60	Caucasian	Grandmo.	Some college	Full time	No	2	6
5	72	Afro	Grandmo.	High school	Home parenting	No	4	2
6	26	Afro	Mother	Bachelor's	Part time	Yes	1	2
7	37	Afro	Mother	High school	Home parenting	No	5	3
8	26	Latino	Mother	Some college	Home parenting	No	2	4
9	22	Latino	Mother	Some college	Part time	Yes	1	3
10	29	Caucasian	Mother	Some college	Home parenting	No	1	3
11	24	Latino	Mother	Some college	Part time	No	2	4
12	31	Afro	Mother	Associate's	Full time	No	3	4
13	48	Caucasian	Mother	Associate's	Home parenting	No	3	5
14	26	Caucasian	Mother	High school	Full time	No	2	4
15	54	Afro	Grandmo.	High school	Unemployed	N.A.	4	5
16	60	Afro	Grandmo.	Some college	Full time	No	2	3
17	32	Afro	Mother	Associate's	Unemployed	No	2	4
18	27	Caucasian	Mother	Bachelor's	Home parenting	No	2	4
19	30	Caucasian	Mother	some college	Part time	No	3	5
20	29	Afroamerican	Mother	Bachelor's	Part time	No	3	5

Source: empirical data collected by the author.

The less structured interview's format goes along with Gioia, Corley and Hamilton (2013) advice to preserve flexibility to adjust interview protocol based on informant

responses. Each conversation took on average 50 minutes. Data gathering also included home-tours and photographs of places utilized for food storage (pantries, cabinets and fridge) and preparation (stove, kitchen environment). To compensate participants for their time, given that the researcher spent on average 1h10 minutes in each home, each participant received US\$50.

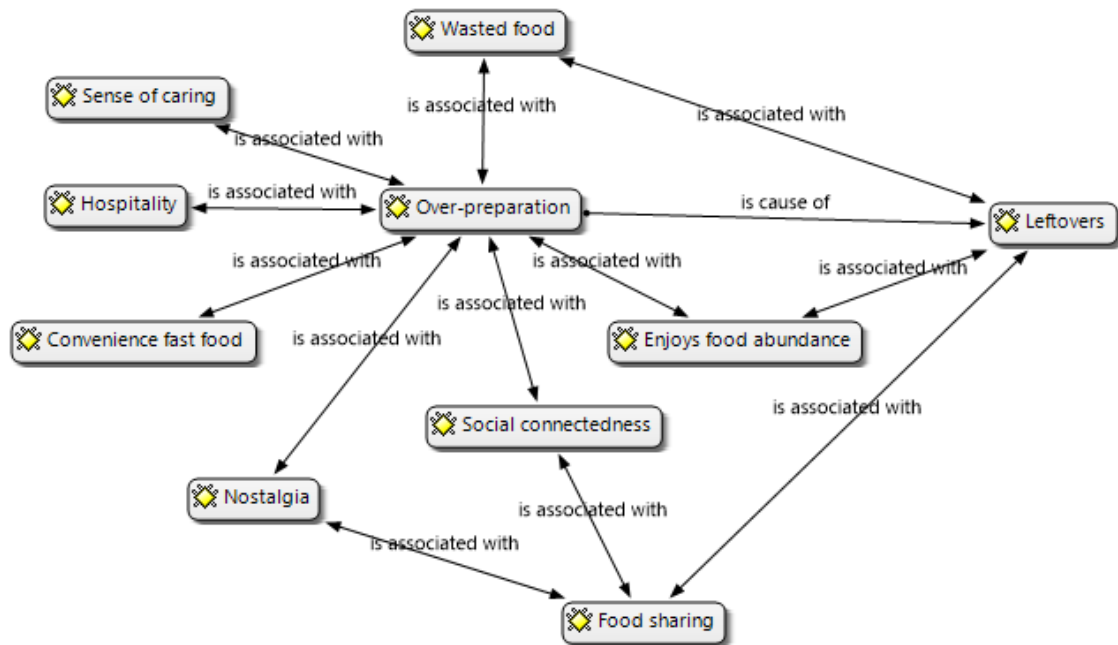
Families were recruited from Community Centers and snowballing was used. Following the guidelines from Tong, Sainsbury and Craig (2007), an experienced researcher in interviewing technique conducted the study. Field notes were taken during and after the recorded conversation. To identify insights and observe data saturation, analysis was an ongoing process since the beginning of data collection.

Every family in the study reported annual income lower than \$45,000, which can be classified as lower-middle considering a median US household income of \$51,939 (DeNavas-Walt & Proctor, 2014). The lower-middle class spends 18 percent of their income on food (BLS, 2014) while the national average is 12.9%. I assume that most of the participants have earnings of less than \$30,000/year given that 50% of them either rely on food pantries to complement their food supply or participate in the SNAP. In the County where the study was conducted 13.1% of the population faces food insecurity (Stern, 2014), with higher rates for certain subgroups, such as children (18.4%).

Photos were used both to generate categories and as a source to identify inconsistencies in discourse. Interviews transcripts were analyzed in Atlas.ti software to facilitate the identification of themes. This research followed a three step coding procedure: open coding (initial), selective coding (focused), and theoretical coding, following the assumptions of grounded theory coding (Corbin & Strauss, 2015). These stages names might vary according to each author, but recommendations from Holton (2007) and Charmaz (2014) served as guidelines. Initially, while working directly with the empirical material, data were fractured and analyzed through open coding. All the empirical material – interviews transcriptions, field notes and photos – were organized in Atlas.ti.

For each interview conducted, a conceptual map was formulated to better visualize the antecedents of household food waste, as exemplified in Figure 8. The initial data analysis was presented to a group of four researchers for intercoder reliability.

Figure 8 - Example of a conceptual network formulated in Atlas.ti (Informant 16)



Source: interview and observation conducted by the author.

For the purposes of this research, Corbin and Strauss (2015) view of grounded theory was the main guideline adopted, which assumes a constructivist viewpoint and values pragmatism as a way to provide solutions to problems. I intend to use a qualitative methodology more in line with contemporary thought which postulates that theoretical value of an analysis emerges from the researcher's interactions within the field and reflexivity (Charmaz, 2014; Corbin & Strauss, 2015).

2.1 GROUNDED THEORY

Initially presented by Glaser and Strauss (1967), grounded theory (GT) is a systematic method of collecting, organizing and analyzing data that are extracted from the empirical world, in which subjects develop practices to be researched (Strauss & Corbin, 1994). As Corbin (2009) notes, it rejects a dogmatic and rigid approach, gives voice to participants, and perceives how the researcher himself (herself) is responding and shaping the investigation.

A typical Grounded theory study involves data interpretation, interaction with the reality of participants and analysis of the collective behavior (Bandeira-de-Mello & Cunha, 2010). These three aspects are present in the current study, as a means to present relationships between concepts and emphasize social processes, which contributes to novel conceptualizations (Timmermans & Tavory, 2007).

The emphasis on social processes, as well as the applicability to investigate under-researched topics, is also emphasized by Charmaz (2006), Bandeira-de-Mello and Cunha (2010), and Tarozzi (2014). It is clear, therefore, the opportunity to apply it to the study of food waste, a scarcely researched process when it focuses on the household behavior in the low-income context. Goulding (1998) also states that GT is useful to understand the nature of consumption experiences which are not easily quantified.

Even considering that I begin the study with the previous assumption that food waste is an issue for the low-income context, which might not be recommended if following the classic Glaserian GT, there is no unanimity that a GT approach is not suitable for a non-neutral starting perspective. Several authors (Urquhart, 2013; Fischer & Otnes, 2006; Strauss & Corbin, 1998; Bowen, 1998) have also emphasized that GT can be applied, for instance, to research problems previously identified in the literature, but without a consolidated theoretical framework and imposing assumptions.

This research strategy, if conceptualized and executed rigorously, as stated by Fischer and Otnes (2006, p. 29), “holds great promise for challenging what we think we know about marketing”, and it helps “to create new understandings of marketing and consumer behavior”. Thus, this study aims to identify properties and/or dimensions of food waste, and it increments the effort to formulate typologies of food waste, two characteristics pertinent to grounded theory studies as mentioned by Locke (2001).

Glaser and Strauss have launched the idea of GT criticizing the dominant view that quantitative studies are the only form of scientific research (Charmaz, 2000). After the joint research conducted initially, the creators of the method came to a divergence on the internal construction of the method and its initial concepts.

Therefore, as Charmaz (2000) explains, two streams of GT were presented: Glaser defends traditional positivism, with the view that the observer is neutral, discovers data

and should express them objectively in their research process, while Strauss and Corbin tended to post-positivism by emphasizing the need to give voice to the subjects studied. In a contemporary standpoint, it is better to think about GT as a general qualitative method with three versions: constructivist, objectivist, and post-positivist, as suggested by Charmaz (2011).

In a post-positivist perspective, one must discover and recognize how the reality view of respondents conflicts with the researcher's view. The difference between the constructivist and the post-positivist seems to be epistemological. The constructivist view tends to be more subjective, but both Glaser as Strauss and Corbin assume the existence of an external reality that can be discovered and verified by the researcher.

The method aims, through systematic data collection and interpretation, to discover and develop a theory. As an interpretative inquiry, it must include the perspectives and voices of the people studied (Corbin & Strauss, 2015). This particularity is also highlighted by Charmaz (2011), who advocates the constructivist perspective.

As stated, it is important to note that there are linkages in the perspectives of Corbin and Charmaz. Corbin (2009, p.37) emphasized her admiration for the works of Clarke (2005) and Charmaz (2006) and "how they've applied postmodernist and constructivist paradigms to grounded theory methodology, taking up the challenge of Denzin (1994) to move interpretative methods more deeply into the regions of postmodern sensibility". Corbin (2009) share the idea that simplistic classification regarding the philosophical orientation no longer work.

That being said, I emphasize that regarding the research philosophy adopted, this study is underpinned by a critical realist ontology and an epistemology more post-positivist oriented, though I consider that some characteristics of this research, such as the concern with solutions to problems (Patton, 1990 apud Creswell, 2009) and the emphasis on the research problem instead of focusing on methods, approximate it to the pragmatic worldview as stated by Creswell (2009).

Pragmatism, in fact, is present in the GT approach since the earlier version from Strauss, who was influenced by the University of Chicago pragmatic perspective (Charmaz, 2006; Corbin, 2009). Symbolic interactionism also influences Strauss and Corbin's approach.

The possibility of pragmatic theory building based on qualitative data is emphasized by Fischer and Otnes (2006), for whom grounded theorizing can differ from the interpretive type advocated by Charmaz (2000). More recently, though, Charmaz and Bryant (2010, p. 409) notes that, despite epistemological differences, all versions of GT have the following characteristics in common: “1. begin with an inductive logic; 2. emphasize the analytic process; 3. endorse explicit analytic guidelines, although authors differ on which guidelines we adopt; 4. aim for abstract conceptualization to advance theory construction; 5. engage in an iterative process to advance the analysis; and 6. intend to encourage innovation”.

Even considering that I do not deny the constructivist oriented approach, which seeks to understand how actors in a study socially construct their own realities, it is believed that the view of Fischer and Otnes (2006) might also shed light on this study by allowing me to be less subjective and oriented towards answering the research question. In fact, Fischer and Otnes (2006, p. 20) assume GT as “a pragmatic means of building theories that import constructs and logics from existing work developed in quantitative traditions, and that are readily exportable for use by those who wish to build quantitatively on qualitative insights” and this view is in line with Charmaz and Bryant’s (2010) statement that GT has a pragmatist heritage, although the interactive characteristic is emphasized only by Charmaz’s perspective.

2.2 PROCESS OF REASONING

For the purpose of this research, the process of reasoning begun as an inductive logic and it continued using deduction for verification of categories that have emerged from data. Thus, for the first phase (empirical data → data analysis → theoretical framework) I assumed the traditional inductive guideline of GT.

Then, in a second phase (Theoretical framework + empirical data → data analysis → theory building), deduction was used for verification and induction remained present in the study as well considering that more empirical data were collected in an effort to constantly compare the building blocks of the emerging theory with new data. Along the inductive data collection, and while analyzing explanations with new data, abductive reasoning, which plays a key role in theory construction (Charmaz, 2011),

also takes place. Therefore, the abductive logic follows induction and takes it further as a way to check and refine the development of categories (Charmaz, 2006).

This movement of going back and forth between analysis and data collection is inherent to GT, because each informs and advances the other, as Charmaz (2011) states. Therefore, the approach starts primarily inductive, as a way “to explore reality without imposing assumptions” (Alami et al., 2010, p. 31), but it is concluded with abductive reasoning. The inductive prominence means that the developed “theory comes from data rather than being forced to fit an existing theoretical framework” (Stern, 2007, p. 114), but does not imply to begin researching without a theoretical background.

3. LITERATURE REVIEW

Household food waste relates to avoidable waste (Leal Filho & Kovaleva, 2015) and it might be unintentional or a habit marked by unconscious practices (Quested et al., 2013). It happens as a result of social practices (Evans, 2011) even before the preparation of the meal (Wansink, 2001; Porpino, Parente & Wansink, 2015). Even considering that the percentage of income spent on food for the lowest income US households rose from 32 percent in 2006 to 36 percent in 2013 (BLS, 2014), food related decisions involve unconscious influences (Wansink, 2014) that might be powerful enough to impact on waste. I postulate that an understanding of the dimensions of affection and abundance is needed to better explain household food waste.

Consumer food waste signifies a larger environmental problem since it accumulates the impacts from each stage of the supply chain along the way (Baldwin, 2015). Additionally, the food thrown away in rich countries sometimes had to travel around the world to reach the residence of the consumer (Aggidis, 2013). The concern on food waste has evolved from saving food to feed the army to an awareness of the negative outcomes for the environment and society at large. In the past, “conquering waste is winning the war” (Farmer & Huntington, 1918, p.10) was a motto utilized to persuade American families to save food. In that period, given the negative impacts of the war in food production and transportation, foodstuffs were seen as a valuable product. The

scarcity of food in Europe contrasted with an estimated 700 million dollars of food waste per year in the US households (Farmer & Huntington, 1918).

This lack of resources narrated by Farmer and Huntington (1918) has given place to food abundance in most of the world and attention on food waste is now driven by environmental and moral dimensions. As noted by Refsgaard and Magnussen (2009), disposal methods such as incineration and landfills, which generates greenhouse gas emissions, are environmentally questionable. Food waste increases the cost of production and it generates unnecessary additional costs to the environment, affecting biodiversity, climate and nutrients (Grizzetti, 2013).

In highly developed nations the scale of food waste is higher in households (FAO, 2013). In Germany, for instance, from 47 to 65% of edible food is thrown away by homes while in Sweden is around 35% (Leal Filho & Kovaleva, 2015). In the USA, about 31 percent (133 billion pounds) of the 430 billion pounds of the available food supply at the retail and consumer levels go uneaten (Buzby, Wells & Hyman, 2014). Household wasted food accounts for 21% of this total, and an estimated 64% is considered avoidable (O'Donnell, 2014).

3.1 AFFECTION

Affection, a social need or a wanted behavior (Cohen, 1967), is a positive emotion with interpersonal reference (Storm & Storm, 1987) and an important aspect of intimacy (Waring et al., 1980). It has been know that affection impacts family decision making and it helps to explain the interpersonal dynamics of this process (Park, Tansuhaj & Kolbe, 1991). In relation to food, specifically, “values of production, kinship, and status” show us that food is “never just nutrition” (Fajans, 2012, p. 4).

Family meals, for instance, are permeated by affection. As such, in families that value abundance on the table, this habit might translate into food waste. Additionally, a good provider identity (Graham-Howe, Jessop & Sparks, 2014; Porpino, Parente & Wansink, 2015) has been identified as an antecedent of food waste; nevertheless, relatively little is known about how affection might contribute to generating more wasted food and how it relates to food abundance.

Food provisioning routines might involve affection in ways similar to gift giving. Both are interpersonal rituals permeated by the willingness to satisfy someone or a family. Cheal (1987, p. 153) defines gift giving as an “emotionally significant” means by which individuals communicate and show love to others.

The mother’s role in caring for children is linked to food provisioning routines. The notion of “good mother” is intrinsically related to this act of showing love to the family via preparation and serving food (Ristovski-Slijepcevic, Chapman & Beagan, 2010). The good mother identity (Graham-Rowe, Jessop & Sparks, 2014) relates to the necessity to transmit affection by serving diversified and nutritious meals to their families. In a study about childhood obesity, Kaufman and Kaparti (2007) show that good parenting involves satisfying children’s wants and needs and allowing them to “eat right”. In this context, family affection might generate over-serving snacks.

Family affection, even in a context without kids, is evident in the relationship among the nutritional gatekeeper and other household members. Caregivers often seek to produce family life and the provision of wholesome family meals is a key process in this context (Southerton & Yates, 2015). When commenting about the wider cultural context of eating, Southerton and Yates (2015) mention that care plays a role in the over-provisioning of healthy or comfort foods, which might contribute to more food waste. Furthermore, even considering that housewives are an outdated concept, there is still a cooking hierarchy in most American families, in which men perform the outdoor cooking (e.g. grilling meat) and women are expected to do the daily cooking in the kitchen (Inness, 2001).

In regard to the concept of comfort foods, this relates to foods that - usually through the good memories linked to them – evoke a psychologically comfortable state (Wansink, Cheney and Chan, 2003). Therefore, comfort foods are associated with a form of affection for the self.

Furthermore, consumers tend to shop and cook in the context of “eating properly” (Evans, 2012), which also generates over-provisioning, a core antecedent of household food waste. In the context of cooking proper food, mothers want to be perceived as good providers (Evans, 2014). Affection is also present in neighborhoods with high social connectedness. In such instance, as identified in low-income families

in Brazil, hospitality promotes food waste. Families in this segment link food to wealth, and do not want to be perceived as poor (Porpino, Parente & Wansink, 2015).

3.2 ABUNDANCE

Abundance is the opposite of scarcity, but they coexist in the food system (Murcott, 1999) and they are intrinsically linked. Rather than considering abundance of resources as less important than scarcity, Alatout (2009) suggests a reconceptualization of abundance. Drawing from Latour's actor-network theory, Alatout (2009) argues that the meaning of abundance is a product of a network of relations. Abundance is surrounded by distinct meanings. Having plenty of food at home, for instance, signifies status and affluence in some countries (Stuart, 2009) as well as the preference for supersized food (Dubois, Rucker & Galinsky, 2012).

Cooking more than enough, and presenting large servings on the table, is a cultural norm in certain Latin countries (Fajans, 2012) and antecedents of food waste, such as over-preparation and overstock perceived as a security necessity, have been identified in the low-income context in Brazil (Porpino, Parente & Wansink, 2015). In a developed world perspective, given the availability of food from multiple sources (e.g. food pantries), it might be the case that it is even easier to adopt a careless approach to food. Furthermore, large package sizes, common in the US, are linked to overeating (Rozin et al., 2003; Chandon, 2013) and empirical evidences also identify it as a driver of wasted food (Koivupuro et al., 2012; Williams et al., 2012).

"Having surplus, even in excess of what is ever likely to be needed, can be reassuring" (Stuart, 2009, p. 78). The habit of buying food in bulk, usually without having planned the meals for the coming week, ends up generating a state in which food is consumed twice as fast as they normally would (Chandon & Wansink, 2002), and the cost saving effort for buying in bulk is likely to be nullified by food waste (Porpino, Parente & Wansink, 2015).

A psychology of abundance, characterized by the inability to save or the lack of awareness that resources are finite, contributes to the emergence of scarcity. People often fail to save cash or even time when they experience a state of abundance, which turns into lack of resources (Mullainathan & Shafir, 2013). Does this logic of the

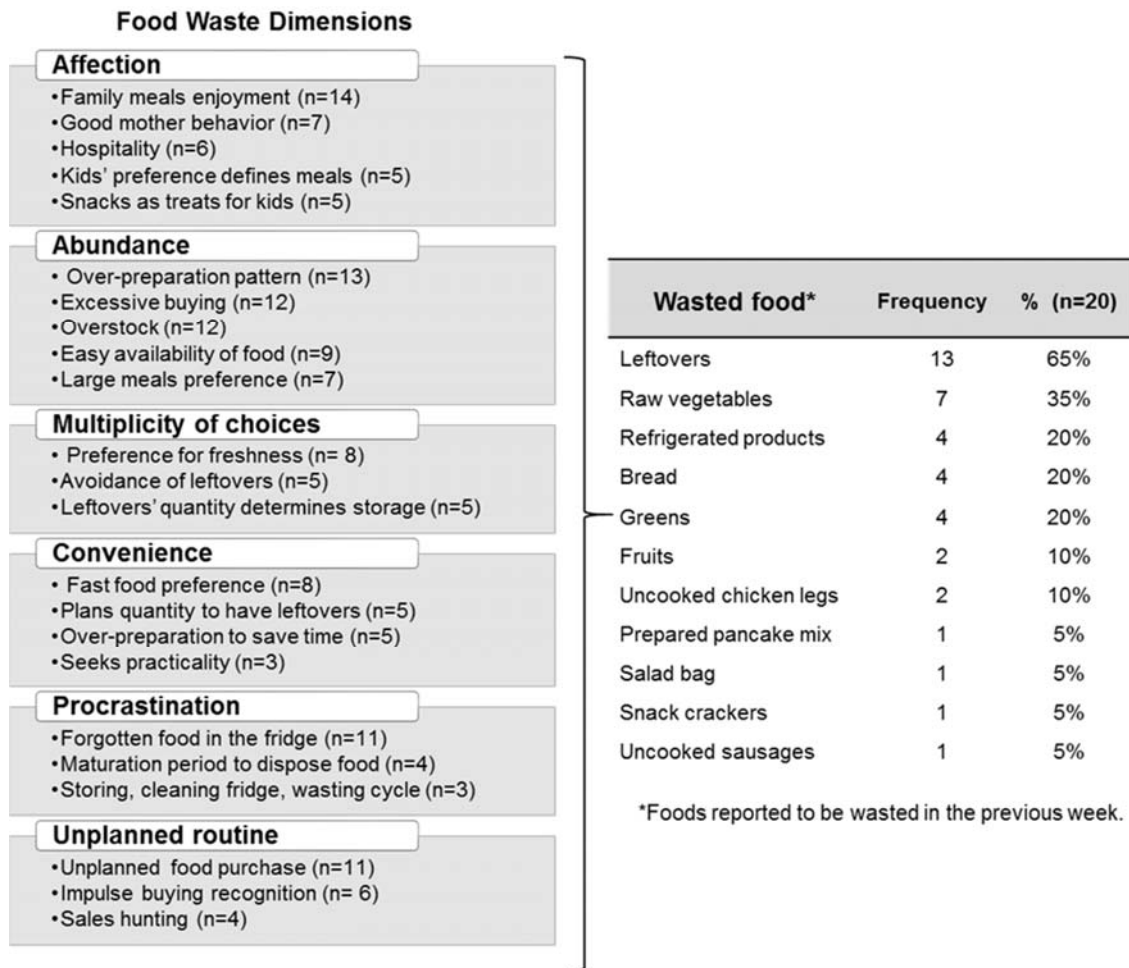
psychology of abundance also operate in relation to food? For instance, when families experience a pantry fully stocked or perceive that food pantries are easily accessible, do they mitigate their abilities to save food?

If “early abundance encourages waste” (Mullainathan & Shafir, 2013, p. 223), it is expected that low-income families might waste more food when they opt to abundant stockpiling in the beginning of the month. The habit of relying on food pantries to complement the household food stock, identified in 50% of the sample (n=10) studied, helps beneficiaries to avoid food insecurity and decreases the anxiety experienced when stockpiling is perceived to be low. On the other hand, abundance as a result of easy availability of food might end up promoting more food waste. It is known that, among SNAP beneficiaries, a cyclical pattern of abundance early in the month - when Food Stamps are received – followed by food shortages later in the month persists (Kaufman & Kaparti, 2007; Mullainathan & Shafir, 2013; Tripp, 2015).

4. RESULTS AND DISCUSSION

Affection and abundance are the two categories more prominent in the speeches analyzed. For each of the six antecedents categories identified (1. Affection; 2. Abundance; 3. Multiplicity of choices; 4. Convenience; 5. Procrastination; 6. Unplanned routine), the main subcategories and the frequency they appear among the twenty caregivers interviewed are presented, as shown in Figure 9. Over-preparing food, for instance, is associated with excessive purchase and overstocking food, subcategories of abundance, as presented in Figure 9.

Figure 9 - Proposed theoretical framework for food waste and food wasted recently



Source: empirical data collected by the author

Furthermore, Table 6 presents a sample of quotations related to the two core categories identified. These quotations extracted from the interviews conducted exemplify how affection and abundance emerged on the speeches analyzed.

Table 6 - Sample of quotations related to affection and abundance

Affection	Abundance
<p>I try to make them happy. It's kind of funny because when I make a salad, one person does not like tomatoes, and the other person does not like cucumber, so usually I cut them up and put them in separate dishes, one likes vanilla, the other chocolate, and sometimes mum can't remember who likes what [laugh] and I might mess up. [Mother 3]</p>	<p>I like my cabinets filled, I have kids in my home. See, cookies, Aldi stuff, and here in the fridge frozen hamburgers, hotdogs... I just don't want my children to go without... I mean it doesn't have to be stuffed, look these cabinets, not that bad. [Mother 2]</p>
<p>I love to cook for the family, I just like to do like in my old ages (abundant and from scratch) [...] When it comes to my grandchildren they like different kinds of cereals, the Wheaties, the Corn Flakes, the bran, and these cereals are with sugar, we didn't grow up with, our parents didn't give us that kind of cereal, when we were children we had to eat oatmeal, Cream of Wheat... [Mother 5]</p>	<p>They [her parents] were in the mindset that nothing would be wasted rather than making too much and have it wasted. I think they made less, and everyone would have to deal with that, whereas my mindset is I just want to make sure that's enough for everyone, so I might make too much. I don't really worry about it. [Mother 3]</p>
<p>I don't like cook, I don't like having to feel responsible to make sure that all nutrients are given at the time of the meal. I like leftovers, but my son does not, even chicken, he loves chicken, but he will not eat it the next day. If it has not just being prepared on the oven or whatsoever, he will not have it. [Mother 6]</p>	<p>To have plenty of food is important, because is there, so you can cook, or someone might come unexpected, just come through, and then you can just reach and find something to cook. That's the old way. That's the first thing you do, when they come, you wanna feed them. [Mother 5]</p>
<p>I love to cook. My grandkids are spoiled; they don't like cereal that much because I cook breakfast all the time. Yeah, I cook every day, I get up and I do. It makes me happy. It feels good to know that my grandkids are eating well. [Mother 15]</p>	<p>My problem is that I make too much of it, instead of two cans of vegetables for three of us, I always end up putting three or four cans of vegetables in the pot, so I make too much food at one time. It's a habit.[Mother 7]</p>

Source: interviews conducted by the author

As shown in the following quotation, mothers tend to show affection to their families in ways that involve food preparation and serving. They tend to enjoy family meals characterized by food served on the table in large portions. This positive intention promotes food waste, a negative outcome.

“I always make the plate of food, and I bring to them. I serve them, always, even when my older daughter is here with her fiancée. It's a complete plate, I put too much on the plate, they complain about that (laugh)...” [Mother 7]

Another dimension of the problem related to affection is serving snacks as treats for kids, which was frequent in 25% of the families studied. Interestingly, when the nutritional gatekeeper is a grandmother, this tendency to award kids with snacks was more prevalent. This behavior was perceived to be linked to skipping meals or having more leftovers, which are drivers of wasted food.

As Figure 10 illustrates, certain food products (e.g. Kool-Aid® and peanut butter) are stocked to serve as easily available snacks for kids or for the self. Caregivers reported feeling anxiety if they do not have a wide assortment of snacks, such as cookies, food products that serve as comfort foods.

Figure 10 - Affection: stockpiling Kool-Aid® and peanut butter



Source: photo taken during the study

The following speech exemplifies a caregiver acting as a “good mother”. While obesity might be one of the outcomes, the other is food waste given that kids might skip meals and the food prepared for them might be stored and forgotten in the fridge. Furthermore, it was also identified that parents also tend to skip breakfast and lunch when they opt for the consumption of snacks. Therefore, in such cases, skipping meals during the day tends to increase the likelihood that leftovers will expire and this behavior also leads to over-preparing foods for dinner.

“Cookies, marshmallow and rice crisps I buy to make treats for them [kids], because these are cheap snacks [...] And I love sweets too, but yes, I kind enjoy making it for them, and these are not the first things on my mind when I buy... [Laugh] I’m not gonna lie, I enjoy them with myself.” [Mother 2]

Making sure that there is plenty of food, and not just enough, was a behavior identified among 13 out of the 20 mothers studied. This taste for abundance, identified in the following speech, is linked to the good mother behavior, a driver of food waste in the category of affection.

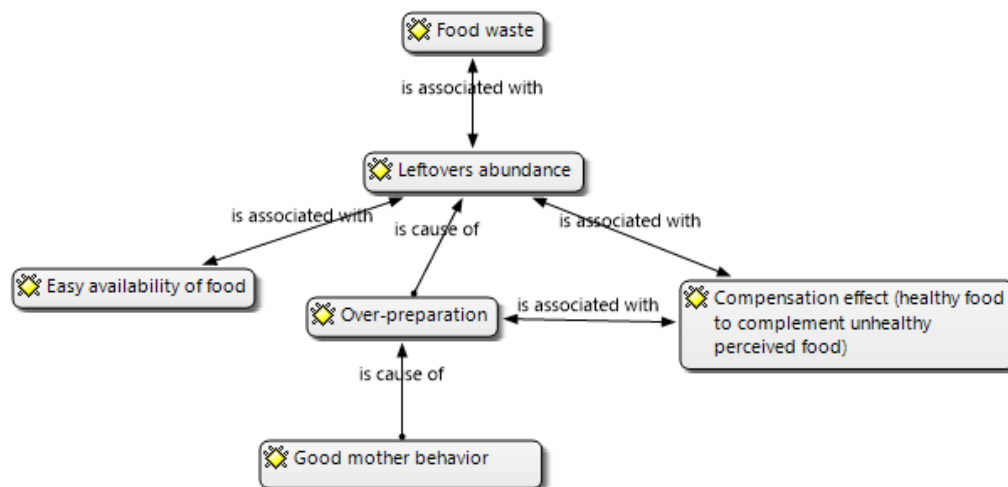
“I just cook so much because (laughs) I have my daughter and I have her kids and I have an older son. These people wanna eat something. I don’t know I just, I’m kind of getting better, I am, because I waste a lot of food, because no one really likes to eat leftovers, so that wastes a lot of food.” [Mother 15]

Interestingly, empirical evidences show also that mothers that experienced scarcity in the past, tend to overstock food as a precaution, and as a consequence they are driven to prepare abundant servings. The following quotation exemplifies this tendency.

“Because I grow up almost without having food some days. It was empty, so if I don’t have food, I have a nervous breakdown. I like to know that we have food in our cabinets, if we don’t have food in our cabinets I worry about not eating, because we were poor, I grew up that way.” [Mother 17]

To illustrate how affection and food abundance might interplay in the family context, a conceptual network is provided (Figure 11). This illustration is based on the discourse of a grandmother, identified as the nutritional gatekeeper in a household with her daughter and three grandchildren. In this particular case, over-preparation of food is boosted both by the good provider identity and due to a ‘compensation effect’ identified. When the grandmother prepares a filling meal perceived as unhealthy (e.g. fried chicken with mac and cheese or hamburgers with French fries), she tends also to prepare greens and/or some veggies to mitigate the feeling that just unhealthy food is being served.

Figure 11 - Conceptual network formulated in Atlas.ti (Informant 2)



Source: content analysis from interview conducted

In such circumstances, as the one illustrated in Figure 11, the result of the good mother behavior and the compensation effect might be leftovers in abundance, a strong driver of wasted food when the nutritional gatekeeper is not resourceful enough to re-purpose the exceeding foods. Interestingly, this finding seems to be related to what Chandon and Wansink (2007) calls “health halo”, a biasing effect of restaurant’s healthy claims on calorie estimations.

While in a restaurant setting, health claims (e.g. main course promoted as being “healthy”) lead consumers to choose side dishes containing more calories, this study presents evidence that the preparation of homemade meals can be driven by a similar bias. To mitigate the guilt associated with the perception that only “unhealthy” food is being served, caregivers tend to prepare also foods perceived to be healthier, which in turns contribute to over-preparation and a higher propensity to have leftovers in abundance.

In the families that receive food stamps (SNAP beneficiaries), caregivers reported that the first two weeks after receiving the benefits are marked by abundance while the week before getting it is permeated by scarcity of proteins and vegetables. This commentary goes along with previous findings. As noted by Tripp (2015), households tend to reduce spending in weeks two through four compared to the first week of spending following SNAP receipt. Others (n=9) mentioned that given the easy availability of foods, such as bread in food pantries, these products tend to be overstocked at homes and frequently wasted.

Overall, food abundance results in waste for different reasons. Some families reported that they faced difficult times, and it is comforting and important to them to make sure that they have a pantry and/or fridge with plenty of food. Thus, stockpiling in abundance means both food security and a higher propensity to waste food. Others justify the habit of stocking a lot of food due to the severe winter.

Afro-American mothers, and also some immigrants interviewed, tend to consider important cooking in abundance to make sure that everybody is satisfied, a cultural norm also identified previously in Brazilian mothers (Porpino, Parente & Wansink, 2015). On the other hand, a family of European origin (Informant 4) mentioned that due

to the scarcity the father faced in the past, they avoid wasting food, even though this household had the highest amount of food stocked. This house is shared by two families. The elderly couple lives with her married daughter and two grandchildren. Given that both mother and grandmother goes to the grocery stores, they tend to overstock food. The double door refrigerator was packed with food when the home was visited, there was not even space for a small container to be stored. Shared grocery shopping responsibilities was identified in other families as one driver of abundant stockpiling. The head of the family is originally from Germany and his parents experienced the second war times.

Working mothers justify cooking in abundance to save time. Some families, mainly the ones who either get food stamps or get food from pantries, say that there is food easily available, then it is easier to waste food.

Caregivers reported feeling relaxed if they have plenty of food in the cabinets. Comfort foods, in particular, were found to be stocked in abundance not only to be consumed as snacks between meals, but to provide psychological comfort. This habit of snacking impacts the amount of dinner leftovers generated, and it might generate food waste if the family is not willing to repurpose leftovers. Figure 12, a photo taken in a household in which just one person eats cereals, illustrates how stockpiling certain foods is related to the need for affection. The informant from this household cited the consumption of cereals in relation to the alleviation of stress.

Figure 12 – Abundance of comfort foods: ten opened boxes of cereals



Source: photo taken during the study

The subcategory “overstock”, which is listed on Figure 9 as a dimension of abundance, and the one “snacks as treats for kids”, described as a component of “affection”, interplay. As observed, stockpiling foods is nurtured by this need of showing affection for family members, but also as a form to improve mood for the self. The role of comfort foods seems to impact these both categories.

Abundance was also mentioned as a source for waste for families who joined the Community-supported Agriculture (CSA Farm Share), in which a consumer buys a “share” of a farmer’s harvest at the beginning of the growing season, and then produce is bagged or boxed and usually delivered to the household. They explained that given the large amount of greens and vegetables received, they end up wasting part of it. The same rationale of large portions explains why some families waste food after buying it from warehouses.

As presented in Figure 9, “Multiplicity of choices” relates to factors that result from having the option not to consume leftovers. “Convenience”, as the name implies, aggregates subcategories linked mainly to time saving efforts and practicality. Some families reported that they don’t throw away leftovers right away, but it is common to forget food on fridge. Interestingly, it was mentioned that even knowing that the food might not be consumed, it is important for them to store in the back of the fridge until it spoils. This behavior is named “procrastination”. Interestingly, a recent exploratory study conducted in Denmark has also identified “procrastination” (Blichfeldt, Mikkelsen, & Gram, 2015) as an important predictor of food waste. Finally, “unplanned routine”, also mentioned by Stefan *et al.* (2013), results from subcategories related mainly to grocery shopping behavior.

Food waste, as a result of the six categories described, is characterized by the non-use of leftovers in 65% of the families. These 13 mothers reported having wasted leftovers in the week before the interview was conducted. Most families (n=11) tend to have a problematic relation with leftovers, which are often stored for too long in the fridge for reasons that go beyond not remembering that they had it in there. Three caregivers described a cycle of storing food in the fridge until the cleaning day, when the food stored for too long is finally thrown away. This habit, as the content analysis indicates, mitigates guilt.

Regarding food habits, it was perceived a high consumption of canned food (e.g. corn, spinach, and beans), macaroni and cheese, cereals, snacks and drinks such as sodas and Kool-Aid®. Some families reported having someone with diabetes in the household, but they still consume products rich in sugar. Eight mothers (40%) were clearly overweight.

5. CONCLUSION AND IMPLICATIONS

The reasons for providing food abundance in the family context, and affection itself, are positive intentions that might have a negative outcome when analyzed by their impact on wasted food and health. Another aspect of theoretical relevance identified is the perceived relation between the habit of stockpiling comfort foods (e.g. peanut butter, cereals, and sweeties) and the need for affection. Most families have a separate cabinet for snacks, which resembles both abundance (e.g. variety and quantity of cereals) and care (e.g. need to provide comfort for the self or for the children).

Facing food abundance, in particular, creates a dilemma in most families studied: the decision between over-eating or wasting food. Both situations carry threats to be avoided. While obesity might be a consequence of over-eating, wasting food negatively impacts the family budget, the environment and it promotes feelings of guilt. To mitigate this problem, the most basic strategy would be to warn families to prepare less food.

Over-preparing food or stockpiling in abundance are sometimes convenient-driven strategies and might even be considered an easy choice due to the several opportunities low-income American families have to access food products. Fighting poverty and food insecurity must be a priority, but concomitantly families could be encouraged to be more resourceful. Feeding America, for instance, which is the largest private food assistance program in the U.S., involves a network of 200 food banks (storehouses) and 60,000 food pantries (distribution centers).

While commenting on the behavioral science of food choices, Wilson (forthcoming 2016) points out the need to food pantries administrators to put in practice behavioral economics interventions based on the themes of salience, social norms and mental accounting to drive clients to make healthier food decisions. The same logic could be used to influence consumers to waste less food. However, changing behavior in the

low-income context in the U.S. involves specific challenges, because they can access food products free of charge. Thus, simply communicating that food waste is a waste of money is unlikely to be effective for consumers that go to food pantries.

These findings expand the understanding on household food waste, and present an opportunity for theorizing it in a novel manner. Firstly, the focus in the lower-middle income segment is counterintuitive given the prevalent view that consumer food waste is an issue related to more affluent families. Secondly, given that most of the world can be classified in the low-income segment, efforts to diminish food waste demand an understanding of the base of the pyramid. Even considering the sample size limitation, the findings of this qualitative study are consistent with the previous study conducted in Brazil, and findings presented observed the criteria of data saturation.

Instead of simply blaming consumers for wasting food, this study shows that in order to decrease the potential negative consequences of positive intentions, behavioral economics principles could be used to change the way nutritional gatekeepers deal with food related decisions. For instance, showing affection by over-preparing food might be replaced by other forms of affection if caregivers, especially from the lower-middle income families, perceive that they are throwing away financial resources when food is wasted. This observation takes into account that about 50% of our sample did not get food products from pantries and it is not beneficiary of the SNAP.

Communication strategies, though, should not simply be persuasive messages aimed to increase the awareness on food waste. They might be more effective if based in behavioral economics principles without blaming consumers. As our results indicate, intentions are positive. Then, nutritional gatekeepers have to be stimulated to reflect about their practices in order to change their behavior in relation to food. Overall, dealing with the problem of food waste in the low-income context demands amplifying the role of nutritional educators in social programs (e.g. SNAP) and, even more important, to integrate food pantries in efforts to communicating and training mothers about saving food.

CHAPTER 5

Essay 3 – UNDERSTANDING FOOD WASTERS: A BEHAVIORAL TYPOLOGY

Abstract

Drawing from a multi-method qualitative study conducted with 44 caregivers, both in the U.S. (n=20) and Brazil (n=24), an empirically derived food waste typology is proposed. The identification of five distinct food wasters' types - (1) Caring mothers; (2) Heavy cooks; (3) Leftovers killers; (4) Procrastinators; (5) Resourceful mothers - contributes to theory, whilst a number of potential implications for educators involved in food-related programs (e.g. nutritional education), government agencies and policy makers are explored in light of the findings. To illustrate each waste profile, a conceptual network based on the analysis of empirical data is presented. Interestingly, the proposed typology identifies both a segment characterized by the willingness and skills to reuse leftovers, named as "resourceful mothers", and another driven by a prejudice against leftovers associated with the habit of cooking from scratch, called "leftovers killers". Additionally, to improve the understanding on the five wasters types described, a comparative analysis between the Brazilian and the American sample is presented. Findings indicate that "leftovers killers" were more prevalent in the Brazilian sample while "procrastinators" – a behavior related to feelings of guilt for wasting food - were more frequent in American families. Perceived waste levels per country are also discussed as a form to provide insights for food waste reduction programs.

Keywords: food waste; consumer typology; food wasters types; food consumption; low-income

1. INTRODUCTION

Consumers, even ones living in the same neighborhood, are not a uniform group. These market attributes of diversity and heterogeneity have been known for a long time, as Smith (1956) indicated on his classical work on product differentiation and market segmentation. When it comes to household food waste, we need to improve

our understanding of this phenomenon by identifying distinct behavioral patterns of wasted food in order to delineate effective strategies for mitigating it. Furthermore, in theoretical terms, a typology of household food waste is a novel contribution to the consumer behavior literature.

The elaboration of typologies has been widely used to expand the understanding of marketing phenomena. For instance, typologies of older shoppers (Angell et al., 2012) and the different types of online consumers (Karimi, Papamichail & Holland, 2015) have improved our understanding about consumer behavior. Furthermore, drawing from four dimensions of e-service quality, Bressoles, Durrieu and Senecal (2014) proposed a predictive typology of e-satisfaction. In a food-related research, Memery, Megicks and Williams (2005) proposed types of ethics and social responsibility concerns in grocery shopping decisions. These segmentations improve our understanding about the market heterogeneity and it allows for marketing actions aligned with customer needs.

As one can expect, the household behavior towards waste is not homogeneous. Nevertheless, it was not found any existing work or structured information about how household waste behavior differs. Due to the global priority in reducing overall food waste (FAO, 2013b) and the rising importance of sustainability from a marketing perspective (Martin, 2015), it is imperative to identify the fundamental differences and types of behaviors leading to waste. This knowledge will be particularly relevant to guide the development of public policies related to food waste mitigation and/or improving food security, and it is likely to contribute to specific educational messages to better reach the different types of food wasters.

Since consumer food waste carries the highest environmental impact compared to losses earlier in the food chain (Parry, James & LeRoux, 2015; Baldwin, 2015), negatively impact family budget (Porpino, Parente & Wansink, 2015), and it's a behavior expected to increase given the rising consumption of meat and cereals in the developing world (West et al., 2014, Borlaug, 2007), it is suggested that a typology of household food waste presents both a theoretical contribution and implications for private and public sector agents in the food sector.

Even though food waste studies are growing in importance as the analysis of recent literature indicates, our understanding about household waste patterns is still limited.

Drawing from data collected in Brazil and the US, two culturally distinct countries, this study aims to empirically demonstrate differences in the consumer food waste behavior exhibited by each proposed type. By analyzing the determinants of food waste, I seek to answer the following questions: how can we differentiate families according to their major driver of food waste? Are there consumer behavioral profiles associated with higher levels of food waste? What behavioral characteristics can define a caregiver more prone to save food? Are there differences between American and Brazilian caregivers concerning their food waste profiles?

By answering these questions, a contribution to policy makers and retailers is provided. As cited by Martin (2015, p. 1), “marketing’s role within the issue of sustainable consumption is to help consumers and businesses understand the problem, and drive policy initiatives at the governmental level”. Therefore, from a broader perspective, consumer food waste studies pertain to the helms of sustainability research and they can contribute to win-win solutions, as to be outlined.

Additionally, a comparison between the types identified per country is presented as a form to further explain the behaviors associated with each type. By delineating a typology, this research fulfills the need to identify patterns of household food waste behavior and, therefore, it contributes to food waste prevention programs.

Furthermore, the sample is comprised of low-income families and, as such, food waste in this context might jeopardizes initiatives aimed at reducing food insecurity. Thus, this typology is also an attempt to highlight the importance of addressing consumer food waste in the low-income context, as a form to both maximize the food security efforts (e.g. *Bolsa Familia* in Brazil, SNAP and WIC in the US) and to answer the societal call for sustainability. As West et al. (2014) states, a major opportunity to increase crop availability, and thus to improve food security and the environment, is decreasing food waste.

After briefly analyzing the literature pertaining to consumer food waste, the research design, data collection and analysis are presented in the methodology section. The analysis of the findings begin with describing the sample characteristics. Subsequently, drawing from data previously collected in the US, core food waste categories taken into account for proposing the typology are presented. Additionally, each proposed type that emerged from the entire dataset analyzed is described and a network of

factors presented to illustrate the typologies. The analysis concludes with a comparative analysis between Brazil and the US. Finally, the conclusion presents the implications for food waste prevention campaigns while analyzing the core characteristics of each type.

2. LITERATURE BACKGROUND

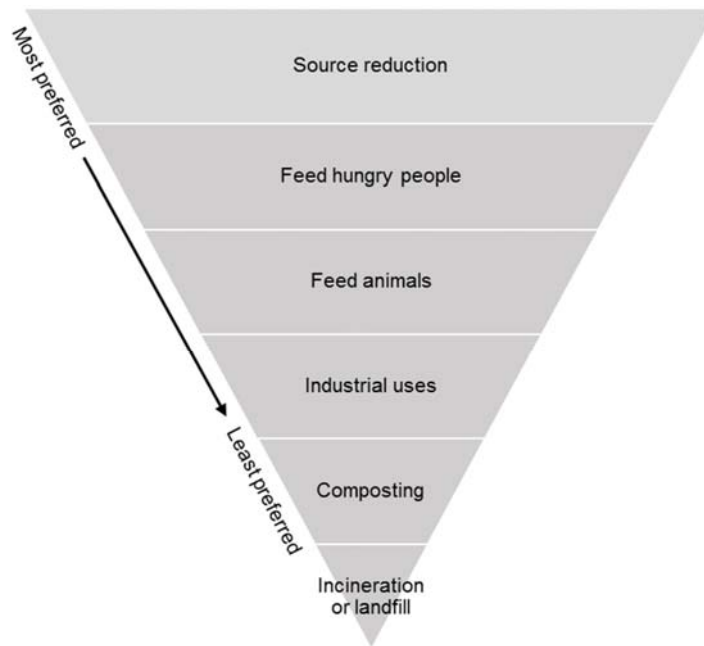
In this study, I follow the classic distinction between food loss (losses occurring in production, post-harvest and processing of foods) and food waste (losses at the distribution and consumption stages), originally proposed by Parfitt et al. (2010) and followed by authors such as Gustavsson et al. (2011), Stancu, Haugaaard and Lahtenmaki (2016). Recently, FAO (2014b) referred to food waste as the “removal from the food supply chain of food which is fit for consumption, or which has spoiled or expired, mainly caused by economic behaviour, poor stock management or neglect”. In this broader view, food waste is part of food loss.

Parry, Bleazard and Okawa (2015) argue that food waste occurs more through intentional actions whereas food loss is unintentional. However, based on findings that positive intentions and cultural norms drive food waste (Porpino, Wansink, & Parente, 2016 forthcoming), I assume that food waste can also be unintentional.

Given these unclear definitions regarding both the differentiation of food loss and waste and the role of intentionality, for the purposes of this analysis, food waste is conceptualized as losses of food produced for human consumption derived from behaviours or mismanagement at the retail and consumer levels, whether it was intentionally or unintentionally kept beyond its expiration date, left to spoil or thrown away for any reason.

If a family, for instance, chooses to feed pets with leftovers an appropriate means to discard food might have been reached, but the waste itself was not avoided. As a matter of fact, feeding pets or composting foods mitigates the environmental impact of waste, but does not eliminate the problem itself (EPA, 2015b). Therefore, as recommended by EPA’s food recovery hierarchy (Figure 13), the most sustainable scenario involves preventing wasted food in the first place, which is a matter of educating and persuading consumers to save food.

Figure 13. Food waste recovery hierarchy



Source: adapted from the Environmental Protection Agency (EPA, 2015b)

Several European countries are taking actions to mitigate household food waste and, recently, the Obama administration announced a US\$ 90 million awareness-raising campaign (Gunders, 2015). While the United Kingdom has acquired good results by increasing the awareness on food waste with the Household Food Waste Prevention Programme promoted by the Waste and Resources Action Programme (WRAP), national initiatives – jointly managed by the public sector and private firms - are still absent in most developing countries and even among global players of the food sector such as Brazil. In the WRAP campaign case, it is estimated that for every £1 spent on the Love Food Hate Waste initiative £8 of costs in disposing of the waste were saved (West London Waste - WLWA, 2014).

How might scientific studies, while filling knowledge gaps, could contribute to the desired scenario of decreasing food waste? In order to reach the top of the inverted pyramid, as presented in Figure 13, first and foremost, there was a need for research to elucidate drivers of consumer food waste. This first step of knowledge building has progressed considerably in the last two years, but there is still a need to identify and explain household food waste patterns, which is likely to contribute to segmented actions in order to reach the recommended “source reduction”.

As recent findings indicate, abundance and affection are two core dimensions of food waste in the family context (Porpino, Wansink & Parente, 2016 forthcoming). These dimensions, as to be detailed, are important for identifying possible patterns of household food waste among nutritional gatekeepers, those who are most involved with food-related decisions in a household.

In terms of abundance, stockpiling food products in excess might contribute to over-preparation, which in turn is a driver of food waste. Over-preparation (Kantor et al. 1997; Quested and Johnson, 2009; Koivupuro et al., 2012; Williams et al., 2012; Beretta, Stoessel, Baier, & Hellweg, 2013) and excessive purchase (Harrison et al., 1975; Koivupuro et al., 2012; Beretta et al., 2013; Ganglbauer, Fitzpatrick, & Comber, 2013) are the most salient factors already mentioned in the literature as antecedents of wasted food.

When food is prepared in abundance, there are usually leftovers. For Evans and Welch (2015), the social significance of meal occasions also contributes to over-preparation, and thus, it increases the propensity of having leftovers. Findings from Porpino, Parente and Wansink (2015) also indicate that families are less likely to consume leftovers during weekend meals, when family gatherings usually happen.

The consumption of leftovers is permeated by several practices, such as classifying, selecting, storing and re-using, which transform these surplus foods from dirty to clean food re-admissible to the table (Cappellini, 2009). Interestingly, this view of leftovers as psychologically contaminated food is also defended by Rozin (2014), for whom consumers may not be driven by safety data, but by the perception of the degree of contagion in the food.

In the low-income Brazilian context, consumer's relation with leftovers is even more complex. Leftovers are frequently quoted as "comida dormida" (Foods stored overnight), and the consumption of it is often considered a practice that approximate families with the state of being poor or as a "stingy" habit (Porpino, Parente & Wansink, 2015). Therefore, leftovers might be discarded unconsciously to avoid the perception that family members can't be fed with fresh homemade meals.

The disposal of leftovers might also involve a maturation time, which is linked to the procrastination dimension. Variables that drive this delay-mechanism are under-

researched, but Porpino, Wansink and Parente (2016 forthcoming) suggest that the role of religiosity might provide an explanation. Therefore, families that pray before meals might be more likely to store leftovers in the fridge regardless of the amount, but this practice does not necessarily translate into less wastage.

Drawing from Evans and Welch (2015), it is important to differentiate surplus food from food waste. The first is a result of over-cooking or buying food products in large packages, and it is often a determinant for having leftovers. Food waste, on the other hand, happens when this excess is not consumed. "Fridges allow for surplus food to be quite forgotten" (Evans & Welch, 2015, p.4) and at the same time the postponement of disposing foods decreases feelings of guilt associated with wasting edible food (Evans & Welch, 2015; Porpino, Parente & Wansink, 2015).

In relation to affection, it is known that a good provider identity is linked to over-serving (Graham-Rowe, Jessop & Sparks, 2014). This need to show affection to family members generates more food waste when leftovers are not consumed. Another dimension of affection relates to stockpiling comfort foods, a form of boosting mood or even to reward kids for behaving well (Porpino, Wansink & Parente, 2016 forthcoming). Therefore, stockpiling in excess might be driven by affection - a positive intention - but which can generate food waste, a negative outcome.

Apart from the dimensions of abundance and affection, there may be a segment of consumers more likely to save food via several practices, such as re-purposing leftovers. It is known that resourceful consumers have the ability to find new uses for old products (Wansink, 2003). For instance, utilizing lemon juice to remove stains or ground coffee as fertilizer for indoor plants. Therefore, resourcefulness is assumed to be important to decrease household food waste as well.

From a more sociological view, Blichfeldt, Mikkelsen and Gram (2015) examined in an exploratory study the construction of edibility in ideological and cultural terms and how it affects household food waste. For these authors, younger consumers (aged 20-25) have a more hedonistic approach to food waste, focusing on the economic dimension, while older ones (aged 45-65) were more altruistic, and thus more aware about the social and environmental consequences of wasted food.

More recently, attempts have been conducted to clarify how aware consumers are about food waste as well as about food waste-related beliefs, attitudes, and behaviors in the U.S (Neff, Spiker & Truant, 2015), Canada (Parizeau, von Massow & Martin, 2015) and New Zealand (Tucker & Farrelly, 2015). These surveys are important to assess certain behaviors, such as the extent to which consumers perceive food waste as a cause of environmental damage; but as form of measuring the scale of the problem they are ineffective, as Neff, Spiker and Truant (2015) recognizes. The problem is that consumers self-report very low amounts of wasted food and tend to over-report their effort levels (Neff, Spiker & Truant, 2015).

Therefore, instead of attempting to quantify wasted food, qualitative studies can contribute to knowledge building by explaining the phenomenon among overlooked groups, such as the low-income segment. Alternatively, as intended with this proposed typology, the contribution might come from analyzing how different profiles relate to food waste.

3. METHODOLOGY

3.1 RESEARCH DESIGN

This study is the third phase of a broader research project on household food waste. It is an interpretative inquiry concentrated on meanings and processes. After the completion of a qualitative study involving 14 lower-middle income Brazilian families and 20 low-income American families, another ten low-income families were investigated regarding their food shopping, consumption and disposal habits in a different region of Brazil. Every family in the total sample of 44 households was visited and the family member identified as the nutritional gatekeeper was interviewed. Findings to be discussed do not rely only on the content analysis of in-depth interviews, but also on participant observations, analysis of photos taken at households, and field notes. It is assumed that the in-depth interviews combined with observations approximate this study to the helms of ethnographically inspired research.

Ethnographic oriented methods in marketing are characterized as primary qualitative research on a particular group, such as the low-income, and using multiple data

sources to increase methodological robustness (Belk & Casotti, 2014; Alami, 2005). This qualitative approach allows, as noted by Belk and Casotti (2014, p. 7), dealing with the specific characteristics of groups that are “powerless to lift the cloak of invisibility”. Therefore, by focusing on the low-income segment, this research both uncovers the peculiarities of such an under-researched group and it contributes to giving leverage to this segment in the sense of giving voice to low-income families.

This ability of qualitative research to give voice to overlooked segments “creates rich opportunities for discovery of new concepts rather than affirmation of existing concepts”, as commented by Gioia, Corley and Hamilton (2013, p. 17). Furthermore, qualitative methods have been utilized to derive consumer’s typologies. In line with the approach utilized by Angell et al. (2012), who provided a typology of older grocery shoppers, it is intended to identify distinct wasters’ types as a means to provide theoretical contributions and implications for nutritional educators, policy makers and government programs.

3.2 DATA COLLECTION

Data gathered from forty four caregivers were utilized to propose the typology. In order to increase the sample size, after collecting data from 14 caregivers in São Paulo eastern region and 20 families in Central New York State, an additional 10 informants took part in the study. This additional data collection increases the trustworthiness of the proposed typology. For this last phase, participants were mothers from Itapoã, a suburb of Brasília, Brazil, with per capita income of R\$750,77 (\cong US\$235), according to the Federal District Planning Company (Codeplan, 2014). In the chosen suburb, 35% of household have monthly income lower than 2 minimum wages (\cong US\$500) and 15% are beneficiaries of *Bolsa Família* (Codeplan, 2014), a cash transfer program administered by the Ministry of Social Development aimed at decreasing extreme poverty in Brazil.

Convenience and snow ball sampling were used in every phase. In Central New York, communities’ centers in low-income areas were visited and caregivers invited to participate in the study. In São Paulo, a community leader guided the researcher in two distinct suburbs to recruit families. In every family visited, the places utilized to store, prepare and discard foods were observed. For the third phase of data collection,

after a first visit to a low-income neighborhood in Itapoã to explain the research to a community leader, willing participants were contacted by telephone both to confirm their eligibility and to schedule the in-home interview. Informants were caregivers, who lived with at least two family members, identified as the nutritional gatekeeper for their families.

Before interviewing and taking photos, written consent was provided and confidentiality was assured. Digitally recorded interviews ranged from 45 to 1h15 minutes (50 minutes on average). An interview protocol was elaborated to explore possible antecedents of food waste and its associated behaviors, but the format was flexible enough to allow additional “why-type” questions. Following a laddering interview technique, participants were motivated to elaborate on their initial answers. Thus, “soft laddering” was applied as a means to “yield more redundant data”, as suggested by Grunert and Grunert (1995, p. 223), with a focus on uncovering implicit linear links (Bradburn, Sudman & Wansink, 2004).

Photos were taken to serve as “cultural inventories” to enhance the scientific description of the research context (Rohani, Aung & Rohani, 2014, p. 302). To complement the data collection, field notes were written after the home-tour. The researcher was a PhD candidate, with previous experience in media interviewing and trained on laddering technique.

3.3 DATA ANALYSIS

The interpretative analysis conducted draws from the method utilized for the older shopper typology (Angell et al., 2012). Given the amount of data from interviews and field notes, empirical data and photos were organized in a fieldwork database utilizing the Atlas.ti software, which was also used to elaborate the networks to be presented. For each participant, a conceptual network was generated (Appendix K). Field notes were elaborated based on participant observations.

The initial analysis highlighted that certain families had waste levels higher than others, which was perceived since the visit to the families. Interviews were codified line-by-line, and then data were grouped into more general categories. The coded material

both from the 14 families visited in São Paulo and the 20 families studied in the US was presented to a group of five researchers for scrutinizing the pertinence of the reflexivity. Subsequently, two independent researchers checked the coded data from the ten families visited in Itapoã.

Initially, families were classified into two major clusters according to the perceived food waste levels: the ones that waste food frequently, and the ones perceived to be more resourceful in relation to food-related routines. As such, when food waste was perceived to be a frequent pattern, this group was further classified according to the type of behavior which mostly contributed for wasting food.

Through analyzing the categories that emerged from grouping the data (e.g. a behavior favorable to abundance, or over-servings symbolizing familial affection), behavioral types began to emerge. Concomitantly, as a means to facilitate the identification of distinct waste behavior patterns, an Excel spreadsheet was elaborated using 17 variables identified as relevant for grouping the families into behavioral types. These variables were not the only ones taken into account to elaborate the typology since some insights were also derived from observations (field notes) and analysis of photos.

Apart from the demographics, for each family in the study, it was identified whether they (1) get food from pantries; (2) receive a government subsidy to buy food; (3) do a monthly grocery shopping; (4) bulk buy; (5) over-buy, which relates to impulse buying and sales hunting behavior recognition; (6) have shared shopping responsibilities (e.g. two or more household members shop for food); (7) stockpile food products in abundance; (8) show leftovers avoidance; (9) have a family meals atmosphere; (10) inadequately store food; (11) feed pets with leftovers; (12) frequently snacking; (13) unplanned meals; (14) prepare nostalgic meals; (15) present good mother behavior; (16) constantly over-prepare food; and (17) prepare a shopping list. Nutritional gatekeepers also reported which foods, if any, were wasted in the previous week of the interview. The perceived waste level for the 44 informants was based on the content analysis and observations.

4. FINDINGS AND DISCUSSION

4.1 SAMPLE CHARACTERISTICS

The sample comprised 39 mothers and 5 grandmothers, which were also identified as the nutritional gatekeepers of their families; aged between 18 and 72 years (median age 36; mean 40). Median household size was 4 (mean 3.79). Several participants (n=18) stay at home parenting, and four were unemployed. Regarding education, 28 completed high school, 6 earned an Associate's degree and 4 completed a Bachelor's degree. As expected, the Brazilian sample had less years of education compared to the American one. While every participant from the U.S had at least high school (20% reported having a Bachelor's degree), in Brazil just 1/3 reported having completed high school.

Families visited were distributed in seven different lower income locations from the three areas of data collection, as follows: two suburbs of a municipality in the eastern region of São Paulo metropolitan area, one from Itapoã near Brasília-DF, and four districts in the Tompkins County (New York State). This ample coverage allowed for recruiting an ethnically diverse sample. For instance, the 24 Brazilian families were found to be originated from seven distinct states, and the American sample involved Afro-Americans, Caucasians, Latinos, and a Pacific Islander. The last phase of data gathering, conducted in Itapoã-DF, comprised families that live near the poverty line, and four of them reported being beneficiaries of *Bolsa Família*.

4.2 A TYPOLOGY OF FOOD WASTERS

Behavioral aspects leading to food waste, previously identified in the consumer decision process (Porpino, Parente & Wansink, 2015, and Porpino, Wansink & Parente, 2016 forthcoming), were taken into account to elaborate the typology. For instance, attributes related to familial affection (e.g. hospitality) were indicators considered to identify the "caring mothers" cluster.

Following the analysis of food waste dimensions and its subcategories, as coded and organized in Atlas.ti, each interview transcript and field notes were reviewed as a form of identifying the core determinant of food waste per participant, which allowed sorting

cases into clusters. Photos taken in each family were also reviewed to elucidate certain aspects (e.g. leftovers amount). For example, in certain families, photos taken show an almost full leftover pot of rice (Appendix D), in such cases this data served as an evidence of cooking in excess.

Drawing from data gathered in the three phases (São Paulo, Tompkins County and Itapoã), Table 7 lists the five distinct food wasters behavior's types emerged from the analysis: (1) Caring mothers; (2) Heavy cooks; (3) Leftovers killers; (4) Procrastinators; (5) Resourceful mothers. As Table 7 outlines, each type has major behavioral characteristics based on the dimensions of food waste behavior and its main subcategories considered in the proposed typology. Furthermore, drawing from the itinerary of food waste in households (Porpino, Parente & Wansink, 2015), Appendix G presents illustrative comments taken from the interviews.

Table 7 – Typology of food wasters

Clusters	Major behavioral characteristics
Heavy cooks	Over-preparation pattern; excessive buying; stockpiling in abundance; easy availability of foods; large meals preference; filling foods preference; large packages purchase.
Caring mothers	Family meals enjoyment; sense of caring (good mother behavior); hospitality; snacks as treats for kids; over-serving comfort foods, snacking for the self.
Procrastinators	Forgotten foods in the fridge/cabinets; maturation time for wasting food; storing-cleaning-wasting cycle in the fridge; guilty mitigation.
Leftovers killers	Food seen as wealth; prejudice against leftovers; leftovers consumption as a stingy practice.
Resourceful mothers	Skills to re-purpose leftovers; meals planning skills; likely to use recipe's books; awareness of food waste.

Source: empirical data from the three phases of data gathering

Abundance is a prominent dimension for household food waste (Porpino, Wansink, & Parente, 2016 forthcoming) and it emerges in several stages of the consumption process, such as buying in excess due to influence of sales, the easy availability of foods via food pantries, over-stocking as a form to mitigate the fear of running out of foods, and over-preparation due to the good mother behavior or given the preference for filling foods.

Therefore, abundance might be manifested in several forms and it was perceived that it permeates all wasters types proposed. Notwithstanding, when what drives abundance is analyzed in the interviews content, certain differences emerged. For example, while for a "heavy cook" it is a widespread behavior to abundantly prepare

from scratch filling foods such as rice and beans, for a “caring mother” abundance derives from the need to show affection, and it usually involve the role of over-serving comfort foods such as sweets between meals.

Table 8 - Illustrative quotations for food wasters’ types

Waster type	Illustrative quotations
Caring mothers	<p>“There are quite a few times in the month that they (children) are not even hungry, but I just cook it. I have done that quite a few times, I just feel I need to keep everybody fed [...] then, they might not eat meals because they are already full”.</p> <p>“I do my own Mac and Cheese. I use three different types of cheese and my macaroni. I love to cook for the family, I just like to do like in my old ages [...] a big family meal from scratch”</p>
Heavy cooks	<p>“Instead of two cans of vegetables for three of us, I always end up putting three or four cans of vegetables in the pot, so I make too much food at one time”.</p> <p>“I cook more than needed, because if I’m sitting down for dinner, and if somebody walks in, you can say ‘have some’. Now, see that pot? When nobody is here, just me and my husband, I cook it to the top, that’s not necessarily, but I do”.</p> <p>“Here we are a few people, but we cook a lot of food. I don’t want food to lack”.</p>
Leftover killers	<p>“I don’t like to store leftovers, I prefer to cook fresh foods, I got used with that”.</p> <p>“No one really likes to eat leftovers. Nobody wants to eat leftovers, because I’m supposed to be cooking”.</p> <p>“There are always leftovers after dinner, then I have for lunch, but if I still have leftovers, I throw away, because every day I cook dinner”.</p> <p>“I cook rice for lunch and in the night I cook again. If there are leftovers, I throw away. We don’t like food from the previous day”.</p>
Procrastinators	<p>“Sometimes I store leftovers in the back of the fridge, and it remains there for a couple of days. I know we probably won’t going to eat it, but I keep it in there until it looks like a science experiment”.</p> <p>“Some people throw out, others don’t. I don’t, but if it is there for a couple of days and then they don’t want to eat, it’s different”.</p> <p>“If after a day, we haven’t eaten leftovers, they will stay in the fridge until go bad”.</p> <p>“There are some ribs in the refrigerator, but I won’t eat it anymore. I don’t always save. Rice and beans I throw away, but beef like that I store for a while and I might give to street dogs”.</p>
Resourceful mothers (low wasters)	<p>“I’m more comfortable with a larger number of recipes to utilize the foods. I know, for instance, that if I have Brussel sprout, I can roast it. And now I know which tools to use with different foods”.</p> <p>“I freeze leftovers in small containers, and we eat quickly enough so they don’t spoil”.</p> <p>“I try to add something new to leftovers, or I mix with rice”.</p>

Source: extracted from interviews conducted by the author.

Table 8 illustrates how the content of the interviews facilitated the identification and differentiation of the proposed types. As to be detailed further, each type has intrinsic characteristics. To name each group, the more salient category for the given group was taken into account. Drawing from the analysis of interviews, photos, and observations, the core behavior identified as driver of food waste was utilized to classify the participant in the pertinent cluster. For example, when a caregiver mentioned over-preparing foods, the “whys” behind the behavior were explored in the interview and it served as a guideline, for example, to classify them either as a “caring mother” or a “heavy cook”. Further observations also facilitated the differentiation of the participants among these types.

The most frequent type, as shown in Table 9, was the “leftover killer”, followed by “heavy cook”. These two types account for 24 participants, which represents 55.4% of the sample. Resourcefulness characterized the low wasters, a behavior perceived in 9 (20.4%) participants.

Table 9 - Proposed types frequency and waste levels

Waster type	%	Perceived waste level
Heavy cooks (n=11)	25	Medium (n=5), High (n=6)
Leftover killers (n=13)	29.5	Medium (n=8), High (n=5)
Caring mothers (n=6)	13.6	Medium (n=3), High (n=3)
Procrastinators (n=5)	11.3	Medium (n=4), High (n=1)
Resourceful mothers (n=9)	20.4	Low (n=9)

Source: elaborated by the author based on empirical evidences.

As Table 10 outlines, each type has prominent characteristics and it is driven by a core category. The role of over-preparation in food waste, as described, may be noted in more than one type, but when analyzed in conjunction with other variables, the differences appear. For instance, “caring mothers” tend to over-prepare foods as a form of showing affection to their families. This need to be perceived as a good provider seems to be more frequent for weekend meals, when this type might cook from scratch. Over-preparation in this type also assumes the form of over-serving comfort foods (e.g. sugary cereals) to the self or to family members.

Table 10 - Characteristics of each type identified

Types	Major characteristics	Empirical derived example	Core behavioral driver
Caring mothers	Good mother behavior (e.g. over-serving as a form of affection); over-preparation to be perceived as a good provider; snacks as treats for kids; family meals enjoyment.	A grandmother who constantly gives snacks to their grandkids between meals, and then cooks to them a full course meal likely to be wasted.	Affection related over-servings
Heavy cooks	Cooking from scratch frequently; taste for abundance; enjoys big servings; full course meal pattern.	A caregiver who often cooks from scratch rice and beans in abundance to complement the main dish.	Frequent over-preparation driven by scratch cooking
Leftovers killers	Leftovers avoidance; consumption of leftovers seen as stingy; preference for freshness; pet feeding; less likely to feel guilty.	A family that doesn't want to be perceived as poor, and prefers to cook rice again rather than storing and re-purposing leftovers.	Leftovers avoidance
Procrastinators	Stores leftovers for a long period; feels guilty; likely to be more religious.	A mother aware of food waste who stores leftovers after meals in the fridge, but it is likely to leave it in there until spoilage.	Delay-mechanism for wasting food
Resourceful mothers	Skills to re-purpose leftovers; meals planning skills; likely to use recipe's books; awareness of food waste.	A creative caregiver who prepares shopping lists, enjoys searching for new recipes and re-purpose leftovers.	Food-related resourcefulness

Source: empirical data from interviews and observations.

In relation to “heavy cooks”, over-preparation and cooking from scratch was perceived to be the usual behavior. This type is more likely to over-prepare due to the habit of cooking from scratch frequently. The taste for abundance is prominent in this type and revealed by the pattern of cooking full pans of rice and beans, as it was observed. In the American context, soul food lovers were more likely to be classified as “heavy cooks”.

4.3 CARING MOTHERS

To illustrate this behavioral type, I present Sharon (pseudonym), a 72 year old grandmother who was interviewed at her home. She lives with her husband and she

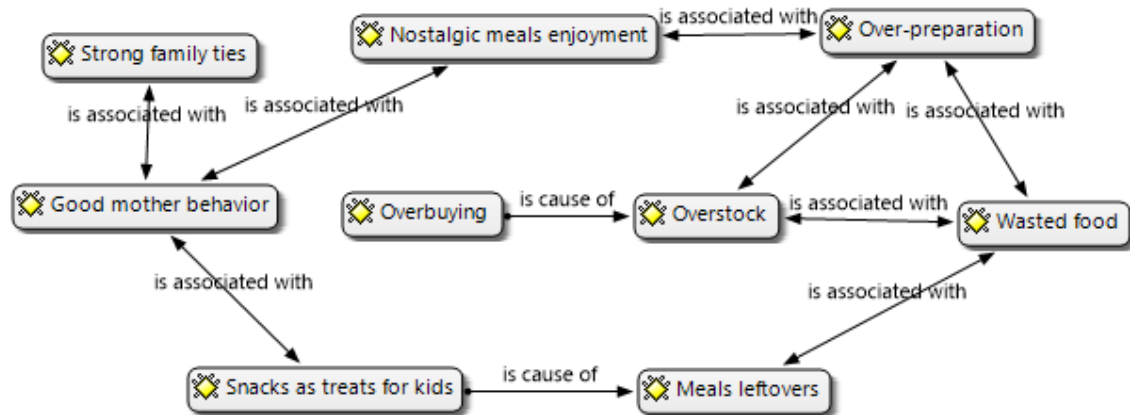
has two daughters and a son that live close by. Her house is an extension of her children's homes and their grandchildren are around on a daily basis. On the top of the side-by-side fridge, there were five opened boxes of cereals. She mentioned that she has diabetes, so these food products are mainly for her grandchildren.

She was interviewed at around 9:30 am at her kitchen table while having a mug of coffee with creamer and a bagel with Philadelphia cream cheese as breakfast. She seemed to be very relaxed and she was laughing, because she said that she usually does not have breakfast before 10 am. There was a small TV turned on in the kitchen and her granddaughter was sitting very close to it watching cartoons and eating a bowl of milk and cereal.

On the top of the kitchen table, there were three loaves of white bread. One of them was unopened. There were as well a pot with sugar, a blueberry pie with one slice eaten, six bagels and four small cake rolls with chocolate filling. In the kitchen floor, in the side of a horizontal freezer, there were 14 bottles of spring water. The freezer is used to store meat and turkey. She mentioned preparing turkey not only for special dates such as Thanksgiving, but for family gatherings on Sundays. Turkey preparation brings good memories to her, and it seems to be a comfort food. She referred to the "past times" several times as "good" and, in relation to food as diverse, healthier and nourishing.

As seen in Figure 14, Sharon exemplifies how a good mother behavior associated with nostalgia for traditional meals might contribute to over-preparation. Additionally, this phenomenon appears to have another dimension, yet to be explored in detail by the literature, related to hospitality. In particular, in the context of low-income households, social connectedness promotes hospitality and the need to cook more food than is necessary, in order to be prepared to serve many mouths (Porpino, Parente, and Wansink, 2015). In Sharon's discourse, was identified the sense of caring for grandkids leads her to reward them with candies as treats, which might contribute to an increase in leftovers on a plate.

Figure 14 - Food waste network of a caring mother type (Sharon)



Source: empirical data collected / Lower-middle income family in NY State (Porpino, forthcoming)

The taste for abundance is another prominent aspect identified as contributing to food waste in the “caring grandmother” type. Stockpiling food is justified as a security necessity, and so is given priority. Content analysis showed that caregivers that faced financial constraints in the past tend to enjoy providing plenty and diverse food to the ones they care for.

4.4 HEAVY COOKS

Evidence from empirical data points to enjoyment of cooking from scratch as a characteristic of this type. “Heavy cooks” justify preparing big meals for several reasons. Apart from the preference for abundance perceived, they tend to appreciate a family meal atmosphere, which relates to preparing a table for dinner and serving food on large dinnerware. This group was also identified as the one more prone to excessive buying and, thus, to stockpile food products in abundance.

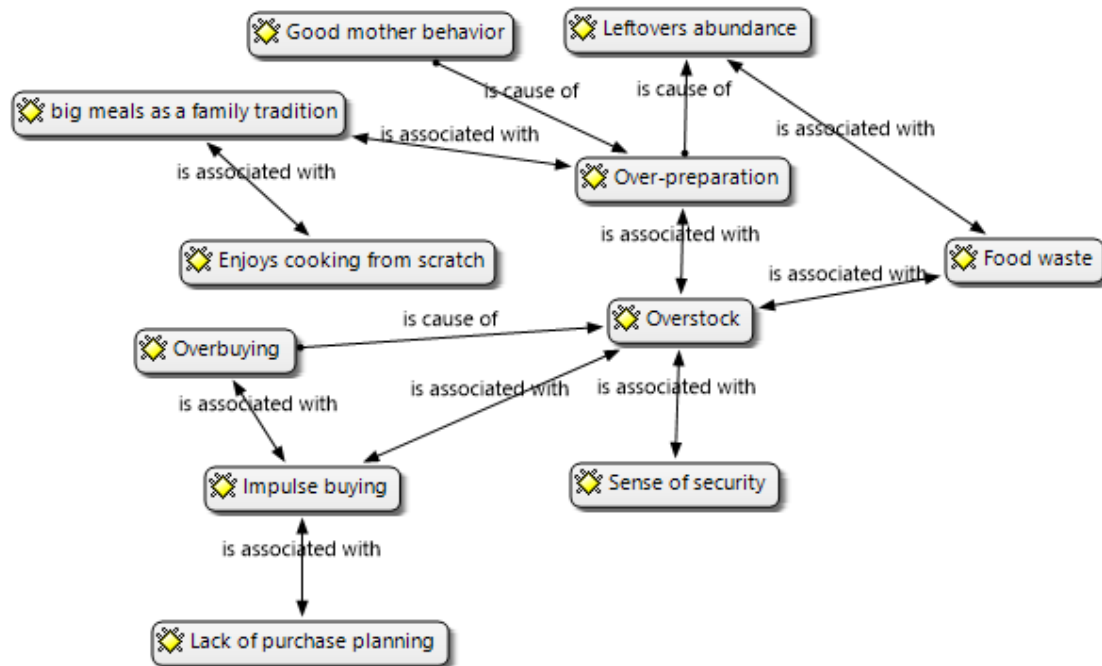
To illustrate a “heavy cook” here is presented one informant. Brittany (pseudonym), a 37 years old mother, who was born and raised in South Carolina, where she learned how to cook from scratch. She has five children, but just her 7 year old daughter lives with her. She lives in a two bedroom apartment with her boyfriend and her daughter. Another daughter of her lives in the same apartment complex. She does not have a full-time job and she goes to food pantries to stock her home with food. Her boyfriend got a job recently, and they reported receiving US\$200 of food stamps per month.

As a cooking lover, she prepares dinner daily. She is Afro-American and in her family cooking big meals from scratch is a tradition. She recognizes that servings are often too big for her daughter, but she does not like the feeling of perceiving that there isn't much food at the table or in the pantry, as quoted below:

“Dinner is usually chicken, hamburgers, veggies... I like to prepare a full course meal, large, because it was like this in my home and I keep doing it. I know I make too much food, it is my problem” [Brittany, 37].

When she goes shopping for food, she never takes a shopping list, which seems to generate impulse buying. As seen in Figure 15, her over-preparation pattern is fueled by a family tradition, overstock and the good mother behavior.

Figure 15 - Food waste network of a heavy cook type (Brittany)

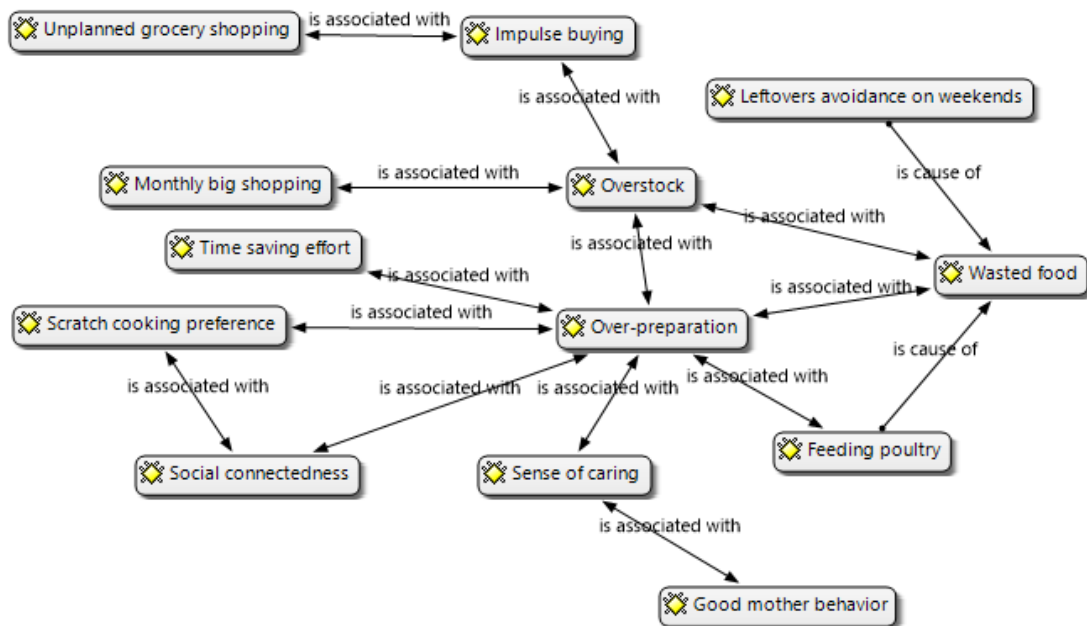


Source: empirical data collected by the author (Lower-middle income family in NY State)

The joy of cooking from scratch was a stronger driver of wasted food among the Brazilian sample, where over-preparation is amplified by this preference for homemade meals. Figure 16 illustrates the antecedents of wasted food in Renate's (pseudonym) household. Renate is a Brazilian mother who lives with three others (husband and two daughters) in a municipality about 20 miles from São Paulo. Along with some of her neighbors, she has a dog and poultry, a habit less common in the urban center but still prevalent in the surrounding low-income suburbs. She works full-time from Monday to

Friday, but cooks dinner on a daily basis, as often as possible from scratch. To save time on shopping trips, she goes to the supermarket once a month for most of their food shopping, but almost never takes a list with her. Food stock in the pantry is abundant, consisting mostly of rice, which is prepared daily in large portions. Beans and meat, also cooked in excess, are prepared every two days from Monday to Friday. Therefore, leftovers occur frequently.

Figure 16 - Food waste network of a heavy cook type (Renate)



Source: empirical data collected / Lower-middle income Brazilian family

The combination of a monthly, large shopping trip, over-preparation during weekdays to save food for the husband's next day packed lunch, and avoiding leftovers on weekends generates a complex network of antecedents of wasted food, as seen on Figure 16. The analysis of the interview content and observations conducted point to scratch cooking preference aligned with over-preparation as a major driver for wasting food.

This pattern of over-preparation, either to save time or due to the enjoyment of having a table with plenty of food, was observed in other Brazilian families studied. Leftovers are consumed over weekdays, but seen as inappropriate for weekend meals. Rice and beans leftovers are commonly given to poultry or dog.

As a final note, “heavy cooks”, mainly in the Brazilian sample, but also among the Latinos interviewed in the U.S., tend to over-prepare rice, which is seen as an affordable commodity, and thus it is frequently wasted. As stated by West et al. (2014), food waste reduction should focus on commodities with the greatest impact on food security. This bias identified in the preparation of rice demands actions in nutritional education initiatives.

4.5 LEFTOVERS KILLERS

The core characteristic of this profile is leftovers avoidance, which is related to preference for fresh foods, but this inclination for freshness does not provide a complete understanding for wasting leftovers as the empirical evidence suggests. It was observed and drawn from content analysis that low-income families are more prone to waste leftovers and perceive the consumption of foods prepared in previous days as inappropriate for certain occasions (e.g. weekend meals). Furthermore, this type tends to perceive the consumption of leftovers as a practice that will approximate them to the feeling of being poor.

Drawing from Southerton and Yates (2015, p. 146), who stated that “circumstances in which leftovers are produced appear to underline the significance of moral and cultural dynamics around the display of care, food diversity and extravagances”, it is suggested that in the low-income context having leftovers might be also a cultural norm. By having surplus foods, caregivers seek the assurance that their families have plenty to eat.

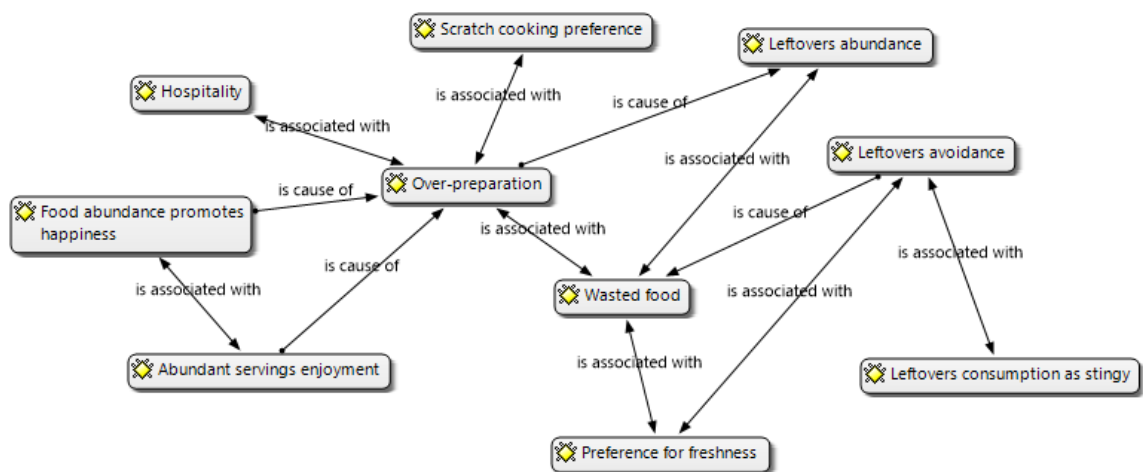
“Leftovers killers” are less likely to feel guilt for wasting food. They tend not to perceive edible leftovers given to pets as waste. When consumers in this type combine over-preparation and leftovers avoidance, a high level of food waste was identified. Based on the observations and on what consumers reported buying and throwing away it is estimated that up to 25% of the rice purchased is wasted among the Brazilian sample.

In the U.S sample, this profile is more likely to throw away - just after dinner without any delay-mechanism - pasta dishes (e.g. Mac and Cheese) when prepared in abundance. Interestingly, certain families, among different types, determine the storage of leftovers based on the quantity. If the amount is perceived not be enough to

make a new meal from it, it is likely to be discarded, but “leftovers killers” seem to be less influenced by this behavior due to the stronger avoidance to leftovers.

To exemplify a “leftover killer” another informant is presented. Anne (pseudonym) is a working mother living in a four-person household [husband, two sons]. Over-preparation for her results from, among other factors, from the willingness to offer food in case someone shows up unexpectedly. Social connectedness is high in her neighborhood and abundant food is often linked to hospitality. In her discourse, she mentioned that having plenty of food on the table makes her happy and she does not like the feeling of perceiving that there isn’t food in excess.

Figure 17. Food waste network of a leftover killer type (Anne)



Source: empirical data collected by the author (Lower-middle income Brazilian family)

As seen in Figure 17, not only abundance enjoyment generates waste. The preference for fresh food negatively impacts the consumption of leftovers, but the core driver of food waste is related to a bias against leftovers. In these families, leftovers are often cited as “comida dormida” (food that was kept overnight), and it infers that the consumption of it is a practice to be avoided.

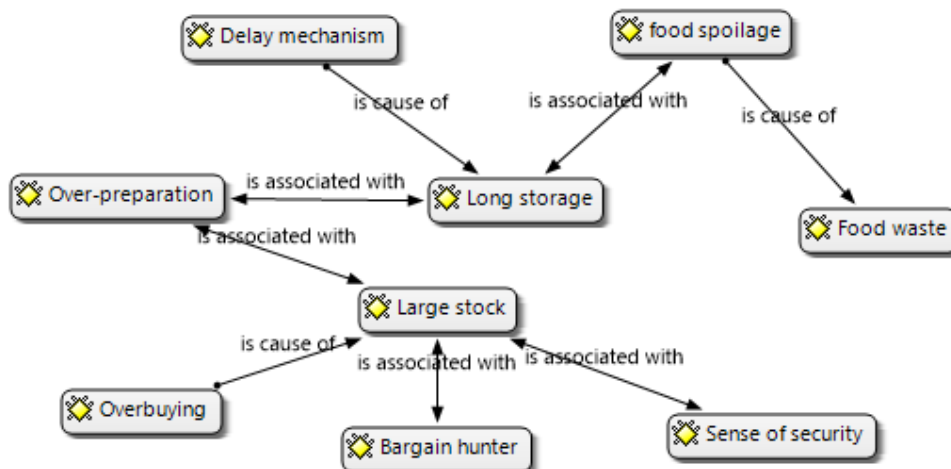
For reasons that go beyond food safety, even considering that inappropriate storage of meats and other perishable products was identified, rice and beans leftovers, for instance, are thrown away because family members might not simply enjoy the taste of food that was kept for two or more days or, even more important, because the consumption of leftovers is seen a stingy habit. Therefore, the consumption of leftovers is a practice that would approximate these families to the condition of not having the

financial means to prepare fresh meals when needed. As such, in this context, edible foods are thrown away also as a form of people assuring themselves that they can afford to prepare a fresh homemade meal rather than re-purposing leftovers.

4.6 PROCRASTINATORS

This profile interplays with heavy cooks, but it is distinct due to the habit of storing leftovers as a means to mitigate feelings of guilt. This maturation time between after-consumption and disposal became clear in some statements analyzed. Mothers with these characteristics reported storing excess food in the fridge after finishing meals, but at the same time admitted that wasting it is likely to happen. In terms of bias towards leftovers, it is more acceptable to eat reheated foods than “leftovers killers”. As illustrated on Figure 18, this behavioral type presents a delay mechanism characterized by storing food after consumption for a long period until it becomes spoiled.

Figure 18 - Food waste network of a procrastinator informant



Source: empirical data collected by the author (Lower-middle income American family)

4.7 RESOURCEFUL MOTHERS

“Resourceful mothers” are less likely to waste food. This type is characterized by the willingness to reuse leftovers. They show the ability to re-purpose leftovers and tend not to perceive it as “psychologically contaminated food” (Rozin, 2014). These mothers

might also over-prepare food, a tendency prevalent among all types identified, but given the ability to store foods appropriately and to prepare planned meals, they are less prone to waste rice, for instance.

This type is also more socially connected. To illustrate how interacting with friends and relatives might mitigate food waste three profiles can be described. In the U.S. sample, two informants mentioned sharing food as a practice adopted frequently. They interact with neighbors and enjoy giving them leftovers, which might contribute to diminish food waste.

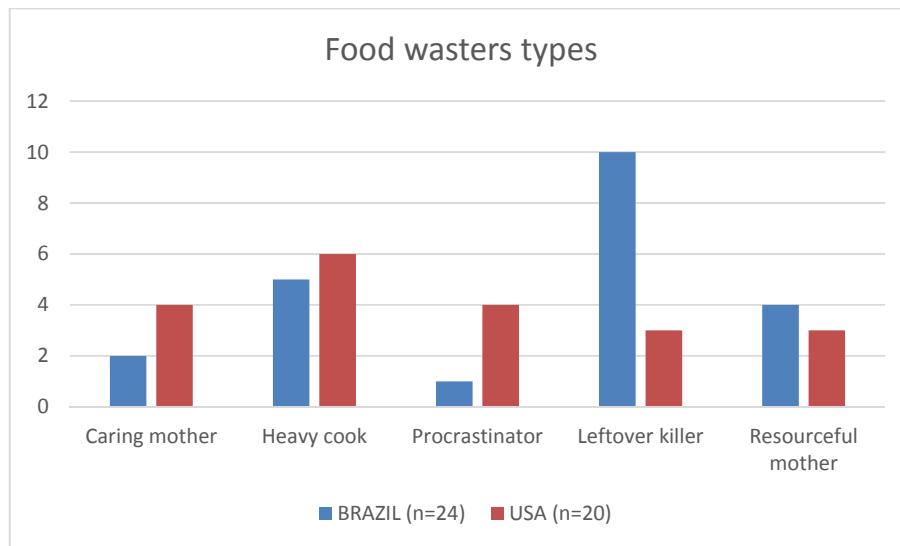
Another example comes from a Brazilian mother. This informant described that taking part in activities at the local community center helped her family to learn how to prepare fruit juices. She also used to work as a maid and, by interacting with her former mistress, she became more aware of ways to avoid food waste, such as separating leftovers and storing it in containers after meals.

4.8 COMPARATIVE ANALYSIS BETWEEN BRAZIL AND THE US

Even considering that it is not an objective of this study to draw a comparative analysis between data collected in Brazil and the US, the illustration of the two samples separately improves our understanding on the wasters types described. As shown in Figure 19, “leftover killer” is a typology more associated with the Brazilian caregivers studied, while “procrastinator” is more frequent in the US.

The prevalence of avoidance to leftovers in Brazil compared to the US can be explained by the habit of cooking from scratch, more perceived in the Brazilian families studied. The role of cultural norms (e.g. over-preparation signaling care or hospitality) were more evident in Brazil as well, and families in the “leftover killer” type present a prejudice against repurposing leftovers.

Figure 19 - Typologies identified per country (Brazil vs. USA)



Source: empirical data collected by the author

The comparison between the two groups of “leftover killers”, based on the content analysis, demonstrates that the American caregivers have different reasons for not consuming leftovers. Instead of the more evident cultural norms found in Brazil, in the US some families choose not to consume leftovers due to the more frequent preparation of processed foods, such as Macaroni and Cheese. In these cases, leftovers are not consumed because processed foods are perceived not to taste good in the next day or due to food safety reasons.

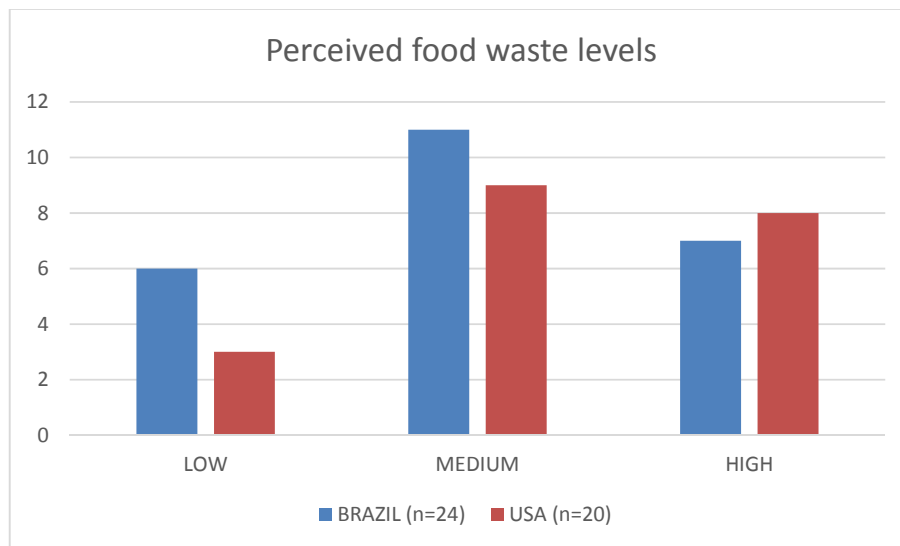
The higher occurrence of “procrastinators” in the US sample derives from feelings of guilt associated with wasting food. While among the Brazilian families caring for a pet (e.g. feeding dogs or poultry) mitigates guilt, in the US the habit of storing leftovers in the fridge and not consuming it later was perceived more frequently. Interestingly, the habit of praying before meals (e.g. thanking God for the food) was observed in the US, and it might influence the relation of guilt and wasting food. I deduce that more religious families might feel more guilt for wasting food, and thus manifest the delay-mechanism of storing leftovers in the fridge, even when assuming that it is unlikely that it will be consumed in the future.

Forgetting to consume leftovers more frequently in the US sample can also be explained due to the abundance of processed foods both in the fridge and in the cabinets. Based on the observations and analysis of photos, American fridges were perceived to be more crowded as well. As such, I assume that it might be harder for

an American family to locate a container with leftovers in the fridge when compared to a Brazilian family. While a typical Brazilian low-income pantry would be filled with staples such as rice, beans, sugar and cornmeal, in the US a wider variety of processed foods was noted, such as sauces, canned vegetables, cereals and peanut butter, products that can be accessed free of charge in food pantries as observed.

Despite the ample network of food pantries, this greater assortment of processed foods among the lower income American families can also be explained due to the wide scope of the social programs aimed at fighting food insecurity, such as the SNAP and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Furthermore, SNAP beneficiaries can only buy food products with the government subsidy, whereas in Brazil there isn't a food stamps program, but a cash transfer initiative targeted to families facing or near extreme poverty.

Figure 20 - Waste levels identified per country (Brazil vs. USA)



Source: empirical data collected by the author

The role of over-preparation in most Brazilian families is aligned with the perception that in order to be considered “food” for a real meal the dish to be prepared must be filling. Therefore, as mentioned in interviews and observed, even when lasagnas or pasta Bolognese are prepared, caregivers cook rice and beans to “fill” their families. Interestingly, this cultural norm was also identified in the US, but mostly among Latinos and Afro-Americans.

In relation to waste levels, both samples have a higher occurrence of the medium pattern. As Figure 20 illustrates, five out of twenty Brazilian caregivers studied were identified as low wasters, a characteristic of “resourceful mothers”. It might be the case that variables such as time spent out of home, cooking skills, social connectedness, and past experiences with food scarcity can explain the variance between the two countries in relation to the low waste pattern. Finally, the relatively high percentage of high wasters in the US derives from the role of abundance and care, as I have outlined. Not to mention, in the US food products are more easily available free of charge, which might contribute to a sense that food has low value.

Regarding the perceptions about food wasted, Brazilian families visited do not perceive food waste as an environmental issue. They often do not realize it as a waste of financial resources as well, especially, when leftovers are given to dogs or poultry. Constantly, food waste is referred as a sin to be avoided or a problem with moral implications given the recognition that people in need could be eating the wasted food.

5. CONCLUSION AND IMPLICATIONS

In terms of theoretical implications, the key component of this study which adds comprehension to household food waste is the proposed typology of different waster types within the lower income context. This novel contribution sheds light on an under-researched segment by identifying both drivers of wasted food embedded in cultural norms and behaviors that contribute to saving foods from waste.

When the core categories identified are analyzed taking into account each respondent profile, there is evidence of distinct types, as outlined in the description provided. The five types described are the first attempt to classify household food waste behavioral patterns.

It was found that convenience and unplanned routine, mentioned as dimensions of food waste by Porpino, Wansink, and Parente (2016 forthcoming) were behaviors found in most families. Therefore, what differentiates participants sufficiently to group them into clusters is more linked to categories abundance, affection, procrastination and leftovers avoidance.

Furthermore, multiplicity of choices (Porpino, Wansink, and Parente, 2016 forthcoming), a dimension identified in the US sample, derives mainly from the easy availability of foods from the food insecurity relief network (e.g. food pantries, SNAP, WIC). When the entire dataset was analyzed, taking into account data collected in São Paulo and Itapoã, this dimension loses power while one of its subcategories (leftovers avoidance) gains momentum.

Another prominent aspect with theoretical relevance, identified across more than one type, but prevalent among the so-called “leftovers killers”, is avoidance of leftovers. Overall, especially in the Brazilian context, it seems that the consumption of leftovers are seen as a “stingy” habit as some informants stated.

Leftovers avoidance is a cultural norm. First, abundance (e.g. excessive stockpiling and over-preparation) promotes a surplus of prepared foods. Subsequently, the route of the leftovers is dependent upon several variables, such as the type, perceived amount and the degree of the bias against leftovers. This complex relation with leftovers carries potential to be explored in research aimed toward providing an improved explanation for the bias against leftovers.

Caregivers from Brazil often mention that their moms did not use to save leftovers from one day to the next, but given that a household without a fridge is rare these days, saving leftovers would be expected to be a common practice. While in the past, non-consumption of leftovers seemed to be more driven by a food safety concern, nowadays it seems to be a means of self-affirmation - a practice embedded in the necessity to feel part of the new middle class. There is need to deconstruct the view that saving leftovers is a sign of poverty, and communications – both at the point of purchase and via broader campaigns - can play an important role in that.

5.1 IMPLICATIONS FOR POLICY MAKERS

By separating caregivers into types, some peculiar characteristics have risen, which is useful to delineate strategies for reducing food waste in the low-income context. Overall, communications initiatives via awareness raising campaigns have to deconstruct the characteristics found to be related to food waste. Most factors are culturally embedded habits and an alternative to positively impact on consumer

behavior change would be to portray a “resourceful mother” type in an educational campaign.

The identification of “resourceful mothers” is valuable for food waste prevention programs to work on these characteristics found to be related to saving food. For instance, these major attributes of “resourceful mothers” could be presented via storytelling as a form to involve the public in the desired behavioral scenario to be acquired. Interestingly, mothers mentioned that being resourceful was a learned behavior after a self-evaluation or the recognition that food waste was an issue in their families. This insight increases the importance of awareness raising campaigns for mitigating food waste.

On the other hand, awareness is unlikely to increase in the US if the campaigns highlight predominantly the potential for saving money by decreasing food waste. In the low-income context, it was found that several families waste foods due to the perception that certain products are easily available. However, in the Brazilian case, messages targeted to highlight the cost-benefit of wasting less food are likely to be more effective given that the lower-middle class families do not rely on food pantries to complement their food supply.

As outlined, the caring mother type is driven by a positive intention and, as such, it might be the case that this food waste behavior is harder to mitigate. As a feasible solution to reduce it, it is assumed that involving kids in food-related activities in schools (e.g. growing a community garden and discussing about foods) would help them to act as agents of change in their homes. Overall, education initiatives are needed in several steps of the food chain. Even retailers could play a part, as to be outlined herein.

Given that over-preparation was found in every type presented, it is likely that delineating behavioral changes to mitigate the cultural norm of cooking in abundance has the potential to considerably reduce household food waste. Caregivers over-prepare food in the context of other social practices, such as caring for the family, hosting a neighbor or relative, or simply celebrating life in a weekend meal. It is also clear that the necessity to stockpile foods is influenced by the fear of running out of money, and therefore of food, a peculiar characteristic of the low-income segment, the focus of this study.

5.2 MANAGERIAL IMPLICATIONS

Would a scenario of more sustainable consumption, and therefore less household food waste, decrease supermarket sales? The proper answer for this question might elucidate the willingness of retailers to contribute with consumer food waste reduction initiatives. It is clear, for economic reasons, that retailers are willing to decrease in-store food waste. If assumed that the involvement in sustainability initiatives positively impact consumer patronage, then it would be wise for retailers to put in practice educational campaigns aimed at fostering sustainable consumption. The importance of retailers to get involved with such actions is due to their interaction with consumers.

For instance, Pão de Açúcar in Brazil and Dansk Supermarked, Denmark's largest retailer (Overgaard, 2015), have created a section in which foods near expiration are sold at reduced prices. What they – and other retailers - could do to reach the next level, contributing to less food waste by consumers in their homes?

Interestingly, supermarket chains such as UK based Sainsbury and Walmart have showed the willingness to educate consumers. The UK case is boosted by initiatives (e.g. Love Food Hate Waste campaign) that involve both public and private actors. Sainsbury, for example, have promoted the “Make Your Roast Go Further” campaign, an initiative to show consumers ways to re-purpose leftovers during Christmas (Vizard, 2013). Furthermore, Walmart announced recently that it is willing to contribute to consumer education by creating awareness raising videos with simple tips to reduce food waste at home, such as the proper interpretation of date labels, planning meals, and organizing foods at home (Yiannas, 2015).

As evidence from this study suggests, consumers most prone to waste food, such as “caring mothers” and “heavy cooks”, tend to buy certain products in abundance. While the ones that cook more from scratch stockpile rice, beans and seasoning, for example, affection-driven caregivers tend to over-buy comfort foods, such as cereals, crackers, and sugary beverages. It might be the case that, in a scenario of higher awareness about food waste, instead of decreasing the total amount spent in-store on food purchases, consumers would diversify their purchases more. Therefore, if communications initiatives advance to the next level – contributing both to decreasing

consumer food waste and promoting a healthier diet – a win-win solution would be reached in benefit to the wellness of society as a whole.

5.3 LIMITATIONS

Even considering that the proposed typology relies on diverse data gathering methods and prolonged fieldwork in two culturally distinct countries, the findings should be considered within the typical limitations of a qualitative investigation. Future research could evaluate if these behavior patterns are also prevalent among other socioeconomic profiles (e.g. upper-middle class families). In relation to typologies, this study can be extended with the application of alternative methods, such as a quantitative study based on cluster analysis to provide further generalizations.

CHAPTER 6

FUTURE RESEARCH AGENDA

Abstract

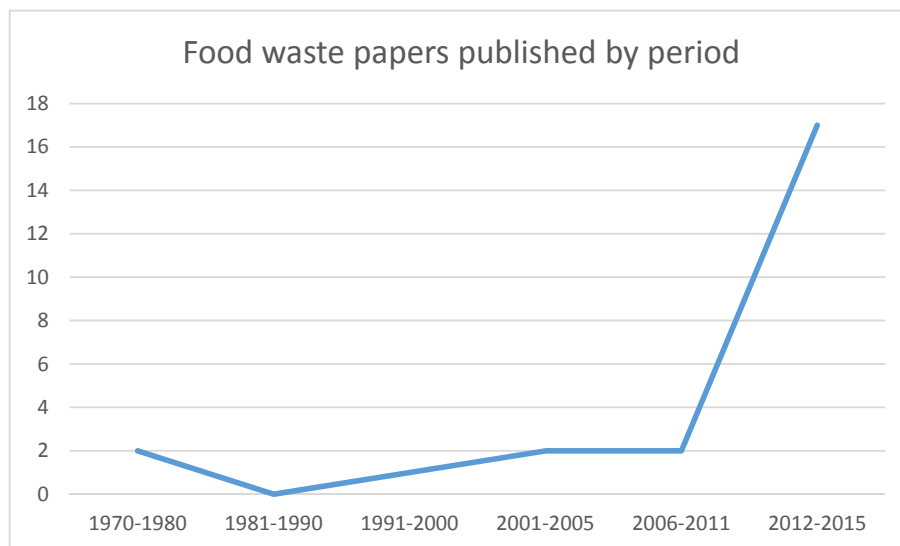
Drawing from previous studies, this review proposes a research agenda in regard to household food waste, an almost neglected topic within the field of consumer behavior. Consumer food waste has remarkable social and environmental relevance when one considers that it occurs at the end of the food chain, and thus, wastage at this stage implies losses of resources required for food production. This study aims to provide a framework and solutions for conducting future research in this area. Academic opportunities identified suggest that further theorizing is needed related to consumer food waste, in addition to studies aimed at testing the impact of communication initiatives on behavioral change and at providing a standardized methodology to measure consumer food waste. This future research agenda is inserted at the end of the thesis due to the recent boom in food waste studies, as Figure 21 indicates. Several studies were published in 2015, when data for this dissertation had already been collected and analyzed.

1. INTRODUCTION

Food wasted by consumers carries the highest environmental impact (Baldwin, 2015) and it is expected to rise in nations with growing middle-classes such as China (Liu, 2014). In the developed world context, considering the case of the European Union, food waste is projected to rise to about 126 million tonnes a year by 2020, which represents an increase of 30% from the baseline of 89 million tonnes estimated in 2006 (European Commission, 2015). Consumer behavior studies can respond to this tendency by further investigating the phenomenon, and thus, contributing to positive behavioral changes.

Historically, it seems that consumer research has paid more attention to how consumers purchase (Taherzadeh & Rajendran, 2015), but the need to contribute to sustainability demands another perspective. As Ekström (2015) states, it is time to understand how consumers relate to waste and what can be done for consumers to act in an environmentally friendly way. Until recently food waste was considered “a hugely under-researched area of interest for social scientists” (Evans, Campbell, & Murcott, 2013, p. 5). In recent years, as shown in Figure 21, the problem is deserving attention by academics. As to be outlined, a focus on consumer behavior and marketing issues is still needed.

Figure 21 – Peer-reviewed papers published by period



Source: literature search conducted by the author on databases

Since the Food and Agriculture Organization of the United Nations (FAO) stated that roughly one third of the food produced in the world is discarded (Gustavsson et al., 2011; FAO, 2013), academics (Leal Filho & Kovaleva, 2015; Graham-Rowe, Jessop, & Sparks, 2014; Stefan, van Herpen, Tudoran, & Lähteenmäki, 2013; Quested, Marsh, Stunell, & Parry, 2013) have attempted to explain why the majority of wasted food in developed nations is a product of consumer behavior.

In the developing world context, there is a clear need to further investigate consumer food waste (Liu, 2014) as a form to demystify the notion that only affluent families waste considerable amounts of food. The negative environmental impact of food waste is even greater in the developing world, where most of the wasted food ends up in

landfills. In Brazil, for instance, just 4,5% of the total amount of organic waste produced, estimated to be 94 thousand tons per day, is composted (Alvarenga, 2015).

This rise in food waste studies is also explained by the importance the theme has gained recently in the political agenda. Food waste was the central theme of the G20 Agriculture Ministers Meeting held in Istanbul in May (G20, 2015), in which participants stressed that intensifying pressures on natural resources and biodiversity and the impacts of climate change demand the minimization of food waste as a form to contribute to a more sustainable food system. Additionally, the growing realization of the importance of sustainable lifestyles has brought the problem of food waste more to the front in global discussions as empirical evidence suggests. The Save Food initiative from FAO and partners, for instance, supported seven conferences on food losses and waste reduction in 2015, such as the "Fight Food Waste, Feed the Planet", a research seminar held at the Expo Milan by the European Commission.

As I outline in this review, further research on consumer food waste is needed and should focus on acquiring a deeper understanding of such phenomenon, given that several studies only perform descriptive analysis. There is also a clear need to more profoundly comprehend this phenomenon in developing economies such as Brazil, a breadbasket for the world (Reuters, 2011).

If we consider that a hypothetical reduction in food production as a result of less wastage appears to be a good solution for resource efficiency and environmental impacts, but "in practice it is not attractive to the business objectives or to the existing economic systems" (Grizzetti, Pretato, Lassaletta, Billen, & Garnier, 2013, p. 193), a strong reason for academic studies to shed more light on this topic is provided. It is clear that food waste is both influenced by and influences many aspects of economics, consumer behavior, and societal well-being, and deserves more attention.

This proposed agenda calls for more attention on food waste as a research topic within the consumer behavior literature. Drawing from a literature analysis, and findings of an empirical study conducted in the USA and Brazil, I propose avenues for future research aiming to provide solutions that can positively impact consumers' behavior. After briefing analyzing the drivers of household food waste, a methodological analysis is presented and research opportunities discussed. To conclude, a framework outlines avenues for future research.

2. LITERATURE ANALYSIS

The literature focused on household food waste was almost nonexistent until the start of the current century. It was only around 2012, when I began to investigate this theme, that the first analytical studies appeared. As presented in Table 11, recent findings identify some predictors of wasted food. By analyzing the data they provide, several research opportunities have arisen. As noted by Stefan et al. (2013), acquiring a deeper understanding of food waste and its relation to the food provisioning process in households demands more research on how consumers develop and use food-related skills. For Ekström (2015), although food waste is a practical problem, theorizing about it is a necessity in order to comprehend it and promote a more sustainable society.

Table 11 - Previous peer-reviewed studies on household food waste

Reference	Country	Findings	Journal
Neff, Spiker and Truant (2015)	USA	Saving money and setting an example for children identified as leading motivations for waste reduction. Concern about foodborne illness and a desire to eat only the freshest food as the core reasons for discarding food.	PO
Parizeau, Massow and Martin (2015)	Canada	Food awareness, waste awareness, family lifestyles, and convenience lifestyles identified as related to food waste production.	WM
Porpino, Parente and Wansink (2015)	Brazil	Excessive purchasing; over-preparation; caring for a pet; avoidance of leftovers, and inappropriate food conservation identified as the major antecedents of wasted food in the low-income context.	IJCS
Tucker and Farrelly (2015)	New Zealand	Food waste increases according to the number of individuals in a household, and in particular the number of younger people.	LE
Farr-Wharton, Foth and Choi (2014)	Australia	Supply knowledge; ability to locate food items; and food literacy are identified as core drivers of wasted food.	JCB
Graham-Rowe, Jessop and Sparks (2014)	UK	Desire to avoid experiencing negative emotions motivates avoiding waste. Four core categories of barriers to minimizing food waste were identified: a 'good' provider identity; minimizing inconvenience; lack of priority; and exemption from responsibility.	RCR
Abeliotis, Lasaridi and Chroni (2014)	Greece	Consumers show positive attitudes towards food waste prevention, but about 40% misunderstand the meaning of expiration/sell by date labels.	WMR
Silvennoinen et al.(2014)	Finland	Identifies spoilage (e.g. mold), plate leftovers, and preparing more food than needed as main reasons for discarding food.	BFJ
Quested et al.(2013)	UK	Food waste prevention has less visibility to others (e.g. neighbors) than other pro-environmental behaviors (e.g. recycling), and therefore social norms around 'waste' play a reduced role compared to more 'visible' activities.	RCR

Stefan et al. (2013)	Romania	Consumers' planning and shopping routines are important predictors of food waste. Planning and shopping routines are determined by moral attitudes towards food waste and perceived behavioral control.	FQP
Ganglbauer, Fitzpatrick and Comber(2013)	Austria/UK	Food waste is the unintended result of multiple moments of consumption dispersed in space and time across other integrated practices such as shopping and cooking, which are themselves embedded in broader contextual factors and values.	TOCHI
Wansink and van Ittersum (2013)	USA	Visual consumption norms influence how much food we serve and waste on different sized dinnerware. Large plates result in more food served and more wasted food.	JEP
Oelofse and Nahman (2013)	South Africa	Overall food waste, in South Africa, is estimated at 177 kg/capita/year and consumption waste at 7 kg/capita/year.	WMR
Koivupuro et al. (2012)	Finland	Household size, the gender of the individual responsible for grocery shopping, the frequency of buying discounted food products, the respondent's own view of the potential to reduce food waste and the respondent's own view of the influence of purchasing particular food packet sizes influence the amount of food wasted.	IJCS
Williams et al. (2012)	Sweden	Around 20 to 25% of the households' food waste could be related to big or difficult to empty packages, and wastage due to "best before" date.	JCP
Evans (2012)	UK	Disposal of surplus food is enacted via a graduated process in which it first enters a 'gap' where ambiguities and anxieties surrounding its residual value and onward trajectory are addressed.	SOC
Nahman et al. (2012)	South Africa	Household food waste alone costs South African society an estimated US\$2.7 billion per year.	WM
Evans (2011)	UK	Household food waste cannot be conceptualized as a problem of individual consumer behavior.	CPH
Evans (2012b)	UK	The passage of 'food' into 'waste' arises as a consequence of the ways in which domestic practices are socially and materially organized.	SOC
Terpstra et al.(2005)	Netherlands	Consumers tend to be more careful with the storage of meat, sliced cold meats and dairy products than with vegetables, fruit juices and leftovers.	BFJ
Bolaane and Ali (2004)	Botswana	Waste generation rate was not directly related to household income. Packaging fractions of plastic and paper measured as volume had a direct relationship with household income.	WMR
Thogersen (1996)	USA/Mexico	Growth in household solid waste in industrialized countries can be satisfactorily explained by quantitative growth in consumption.	SJM
Wenlock, Buss and Derry (1980)	UK	Food wastage was significantly influenced by the composition of the family, with adults wasting more in absolute terms than children, and larger households wasting less per person than smaller households.	BJN
Harrison, Rathje and Hughes (1975)	USA	The average household wasted between \$80 and \$100 worth of edible food per year.	JNE

NOTE: BFJ (British Food Journal); BJN (British Journal of Nutrition); CPH (Critical Public Health); FQP (Food Quality and Preference); IJCS (International Journal of Consumer Studies); JCB (Journal of Consumer Behavior); JCP (Journal of Cleaner Production); JEP (Journal of Experimental Psychology);

JNE (Journal of Nutrition Education); LE (Local Environment); PO (PLOS One); RCR (Resources, Conservation and Recycling); SJM (Scandinavian Journal of Management); SOC (Sociology); TOCHI (ACM Transactions on computer-human interaction); WM (Waste Management); WMR (Waste Management & Research).

If we consider that most research on this topic is being published in journals focused specifically on waste or food, it might be the case that a marketing or behavioral economics perspective is missing. Waste Management and Research (n=3), Resources, Conservation and Recycling (n=2) and the British Food Journal (n=2) are the most frequent sources of publication on the topic. Opportunities for future research are blooming with the increasing awareness of the environmental consequences and costs of discarding food at the end of the food production and supply chain.

There are two predominant theoretical lens adopted in food waste studies. Some studies published, such as Stefan *et al.* (2013), analyze food waste from an individual perspective and use the Theory of Planned Behavior (Ajzen, 1991). While these micro level focused studies have an individual responsibility frame, another strand of research aggregates followers of the social practices theories (Evans, 2011a; Ganglbauer et al., 2013; Southerton & Yates, 2015). This broader stream of research denies the emphasis on the micro level. This sociological perspective is useful in understanding the cultural context, but the consumer-focused prospective can also contribute to delineating nutritional education initiatives.

It might be the case that, instead of focusing solely on a given behavioral model, studies might be of greater contribution if they incorporate behavioral economics principles. Quested et al. (2013) mention that the complexity of consumer food waste behavior requires investigation into the issue from multiple disciplines, such as social research, economics, and system-think approaches from within operational studies.

A methodological analysis of papers published (Table 12) also sheds light on avenues for future research. For instance, to the best of our knowledge, just one experiment was conducted to test the extent to which some variables affect wasted food. Cluster analysis is also absent from the literature. Over 40% of the papers are survey-based, and most of them only present descriptive statistics.

Table 12 - Methodological analysis of previous studies

Household food waste literature		
Type of study	n	%
Empirical	20	83
Conceptual	4	17
Study design		
Survey	11	46
Interviews	4	17
Literature review	4	17
Ethnographic oriented	4	17
Experiment	1	4
Sample size		
>500	2	8
200-500	6	25
50-199	3	12
<50	9	37
Main analysis methods		
Descriptive	7	29
Descriptive stats/correl.	7	29
Qualitative coding	5	21
Chi-square tests/correl.	2	8
CFA / SEM	1	4
Regression	1	4
Analysis of variance	1	4

Source: elaborated by the author

3. INSIGHTS FOR FUTURE IMPACTFUL RESEARCH

It seems evident that more qualitative and mixed-method studies are needed to clarify how certain cultural aspects impact food waste. As shown in Table 13, further studies on how avoidance of leftovers and abundance enjoyment, for example, generate waste might find plausible explanations through a cultural lens. Apart from theorizing, experiments could also be conducted aiming to identify effective communications strategies for behavioral change. This type of study could both fill theoretical gaps and contribute to nutritional education initiatives.

Food waste studies could also benefit from the application of Structural Equation Modelling (SEM) to investigate the role of emotions on food disposal. There is empirical evidence linking stockpiling in abundance to the necessity to feel calm, over-preparation as a form of showing affection, and storage of leftovers as a delay-mechanism to mitigate the guilt associated with throwing away edible foods. By testing a theoretical framework with SEM, authors could propose which emotions impact on

each stage of the food consumption process and which of them drive or mitigate food disposal.

Table 13 - Shortcomings of previous studies and suggestions

Shortcomings	Suggestions
<ul style="list-style-type: none"> Lack of analysis on the role of emotions 	SEM as an analytical method could be useful to test how certain emotions (e.g. guilty and happiness) might relate to variables linked to wasted food.
<ul style="list-style-type: none"> Inconsistent findings on how income relates to household food waste 	Mixed-method studies could be conducted in two distinct areas, one being low-income and another higher income to compare differences in both the amount of food wasted and drivers of waste.
<ul style="list-style-type: none"> Cultural factors lack explanations 	Qualitative studies are still needed to more profoundly explain behaviors such as avoidance of leftovers and abundance enjoyment. Mixed-method approaches (qualitative and survey) could also be useful.
<ul style="list-style-type: none"> Focus on marketing is missing 	Most studies utilize a sociological lens, which is useful, but marketing insight is missing. Therefore, more focus on consumer behavioral factors (e.g. impulse buying) could shed light on under-researched aspects.
<ul style="list-style-type: none"> Lack of experiments to test the efficacy of strategies for behavioral change 	Experiments could be conducted to identify which interventions are likely to work better. Communications strategies, for instance, could be tested with the use of persuasion and subtle messages as well as new media versus traditional forms.
<ul style="list-style-type: none"> Surveys with lack of analysis 	More analytical tools, such as cluster analysis, can help to identify consumer profiles which are more prone to waste food.
<ul style="list-style-type: none"> Lack of methods to quantify household food waste 	Mixed-methods such as food waste diaries (self-reported) and analysis of garbage content could be combined to provide an improved estimation of household food waste

Source: analysis based on the literature

Further theorizing is also needed to advance our understanding of how income impacts food waste. Relatively little is known about the determinants of wasted food in the lower-income context and opportunities for future research should focus on better understanding this phenomenon in order to provide solutions for behavioral change. The commonsensical view that food waste is preponderant only among upper-middle classes should be questioned. If we consider that in certain cultures food signals wealth, it might be the case that the pursuit of status promotes over-preparation, and thus it can be a driver of food waste among low-income families as well. Not to mention, if we better understand the lower-middle class, it is likely that a greater impact will be achieved given the majority of worldwide consumers are in this segment.

The knowledge on consumer food waste, and even more importantly the identification of strategies that positively impact consumer behavior, is likely to advance by

conducting more experiments. These studies might be closer to applied science than to mere theoretical contributions, which should not be seen as a drawback. For instance, experiments can compare and test which interventions work better to avoid food disposal in buffet restaurants.

Table 14 - Research opportunities in food waste research

Suggested topics	Research questions
<ul style="list-style-type: none"> The role of marketing communications on food waste 	Is marketing making consumers waste more food? Are marketing, impulse buying and food waste related?
<ul style="list-style-type: none"> Food waste in the low-income context in medium and high income nations 	Is food waste preponderant among the less privileged? Are there peculiar factors to the low-income context that lead them to waste food?
<ul style="list-style-type: none"> Environmental consciousness and food waste 	How does environmental awareness impact food waste? Are more environmentally friendly consumers wasting less or, for example, do households with composting bins tend to throw more leftovers away?
<ul style="list-style-type: none"> Emotions and food waste 	Can positive emotions (e.g. happiness and affection) have a negative impact on food waste? How do negative emotions (e.g. guilty and sadness) relate to waste?
<ul style="list-style-type: none"> The role of religion in food waste 	Are consumers who are more religious less wasteful? Do more religious people experience more guilt when food is wasted? Are there significant differences between distinct religious practices?
<ul style="list-style-type: none"> Communications initiatives for mitigating food waste 	Do consumers respond better to persuasive techniques or to subtle messages? How likely are consumers to adopt new technologies (e.g. APP) and be influenced by them?
<ul style="list-style-type: none"> Social connectedness and food waste 	Are more socially connected households wasting more or less food? What drives and mitigates food waste in such scenarios?

Source: elaborated by the author

The research opportunities identified are summarized in Table 14. Cross-cultural studies, for instance, could be performed to provide comparisons between northern and southern hemisphere countries. In relation to food abundance, qualitative studies could clarify which cultural aspects might lead consumers to waste more food while quantitative methods can test moderating and/or mediating variables between leftovers abundance and wasted food.

Understanding the role of religiosity in relation to food waste might also contribute to explaining certain behaviors, given that food is often considered as sacred. Additionally, the process of preparing, serving and discarding food in a household involves several emotions. How are they related to food waste? The current literature

mentions guilt as a consequence of food waste, but more insights can be gleaned by investigating different emotions (e.g. anger) with the application of other methods.

Another research opportunity involves exploring the retail relationship with the consumer. Marketing communications, food pricing strategies and the eating environment bias food consumption (Chandon & Wansink, 2012). For instance, consumers are not always aware of some forms of marketing communications, such as the use of games on the internet for introducing food products. Furthermore, lower-income consumers are predominantly affected by temporary price promotions and quantity discounts (Chandon & Wansink, 2012), which might be hypothesized as drivers of waste.

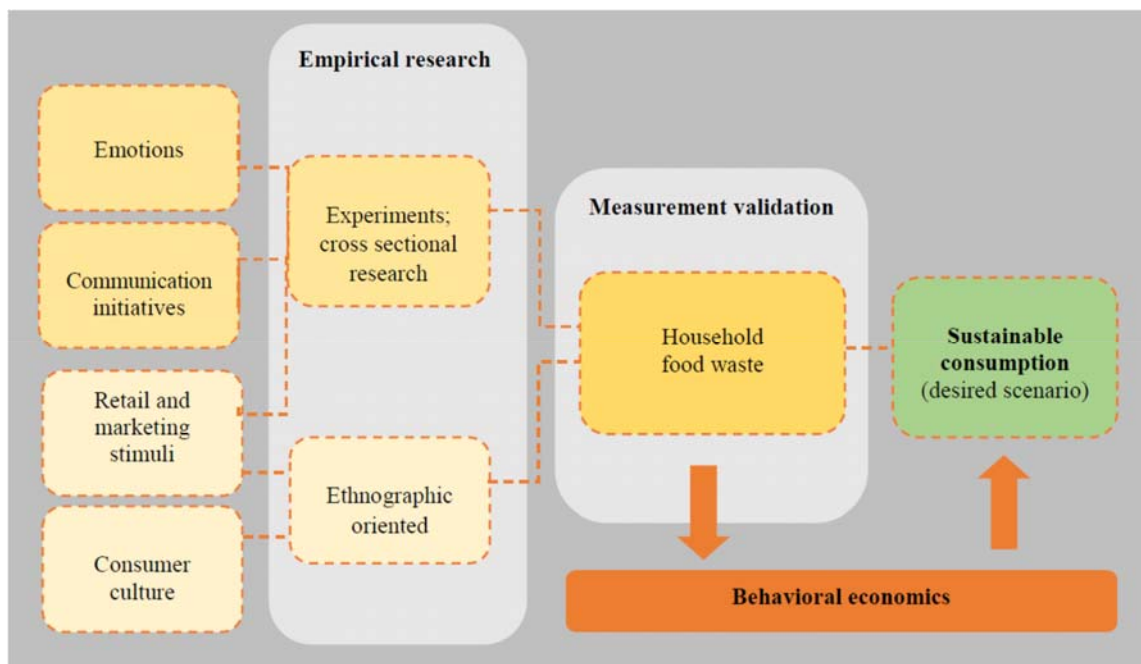
Thus, similarly to the analysis of food marketing in relation to obesity, it seems feasible to investigate if marketing practices might be relevant antecedents of food waste. In both cases, win-win solutions could be proposed, in which retailers would increase profits (e.g. offering half-sized portions for a relatively higher price) and consumers would benefit from consuming fewer calories and wasting less.

4. CONCLUSION

Overall, there are opportunities to both, expand the body of theory related to consumer food waste, which would help to explain and predict behavior, and, additionally, to conduct studies aimed at fostering nutritional education campaigns. As an area of boundary research, food waste will most quickly evolve and make contributions to the extent it can develop rigorous taxonomies, discover new correlations between behaviors, and then systematically test these relationships (Wansink & van Ittersum, 2016 forthcoming). Because of this, it is clear that a more standardized methodology to estimate consumer food waste is absent, and the results of this difficulty in measuring are fragmented and inconsistent estimations of consumer food waste. While reliable estimations can point to where action is needed, it is likely that experiment-based research can contribute to theoretical advances, given the prevalence of surveys to investigate this phenomenon. More ethnographic-oriented studies can also shed light on overlooked cultural factors, as indicated by Figure 22.

As Figure 22 shows, behavioral research can be a driver of change if an understanding of how to frame messages to change behavior is gained. It is herein postulated that science-based data to be acquired with more empirical research will contribute to an improved understanding of the phenomenon; a prerequisite to advancing to the next level: a sustainable consumption paradigm. The proposed framework does not comprehensively incorporate all of the research opportunities presented, but summarizes what may be seen as the core lines of research which demand further study. Future research recommendations related to the role of retail and marketing stimuli on food waste could make use of both experimental research and ethnographic-oriented methods.

Figure 22 - Framework for future research on food waste



Source: proposed by the author based on the analysis of previous research

This conclusion reiterates the growing importance of aligning academically oriented research with solutions that positively affect society as a whole. In this sense, food waste is a research topic that deserves attention, given the tremendous amount of food loss worldwide at every stage of the food chain.

Furthermore, food waste studies should not be considered as too narrow. If we consider that wasting edible food might contribute to infringing on opportunities for others to feed themselves, then there is a link between this phenomena and hunger

relief programs. Often unmentioned, is the need to improve our understanding of how low-income families, such as the beneficiaries of food stamps initiatives, consume food products.

Improving our understanding of household food waste in the low-income segment can shed light on another under-researched issue: hidden hunger, a major public health problem in developing nations caused by a lack of essential vitamins and minerals in given diets. Individuals suffering from this may even be overweight, due to the high consumption of staple foods such as rice and maize but do not have appropriate access to fruits, vegetables and proteins, which provide important micronutrients for their health and well-being (CGIAR, 2015). Interestingly, a question that demands explanations, would concern whether or not hidden hunger and food waste may coexist in certain households.

When it comes to satiety, evidence drawn from previous studies leads to the postulation that consumers may face a dilemma between over-eating or wasting food. This problem demands further investigation, and may be studied beyond the context of economic development. For instance, obesity is no longer a problem related to the more affluent segment, and abundance of staples is prevalent in some low-income regions. That being said, it is clear that consumer food waste studies aren't of narrow scope, and it can actually provide implications for the food security and nutrition agenda when analyzed in a macro-perspective.

CHAPTER 7

GENERAL CONCLUSION

Apart from the theoretical contributions provided in the studies, the analysis of household food waste, particularly in the low-income context, present us with several opportunities for action. Nutritional educators, government agencies and retailers could join forces to diminish food waste, a scenario that would benefit society as a whole. National campaigns and the alignment of hunger relief programs with nutritional education projects are two feasible initiatives presented.

By presenting a contextualization of food consumption and waste, the second chapter contributes to illustrating the importance of reducing consumer food waste to achieve a sustainable food system. When the phenomenon of consumer food waste is analyzed taking into account its relationship to food security, its negative environmental impact, and the potential for government, NGOs and retailers to take action, as described, it becomes evident that this phenomenon is not of a narrow scope, and has remarkable social relevance. It also presents opportunities for advancing consumer behavior knowledge to benefit society as a whole.

In terms of knowledge building, in the first essay, I contribute to demystify the notion that food waste is a prevalent phenomenon only among upper-middle class families. The core contribution of the first study, though, is to present the food waste itinerary in households, which helped to identify wasted food even before meal preparation. It also presented the delay-mechanism for wasting food: storing food in the fridge even knowing that it was unlikely to be consumed later. This behavior was later also identified in our second study and mentioned as well in an exploratory study by Blichfeldt, Mikkelsen and Gram (2015).

Interestingly, families might show a prejudice against leftovers for reasons not necessarily linked to food safety, as the analysis presented in the first essay indicate. The option to not consume leftovers might be driven by an unconscious necessity not be identified as poor, as I have described. This finding goes along with the results from a recent study by Stancu, Haugaard and Lahteenmaki (2016), for whom leftovers reuse

routines are the most important contributor for food waste followed by shopping routines. Also worth mentioning, excessive purchasing – a practice related to shopping routines - was cited in the first essay as a core driver of food waste.

Furthermore, in the lower-middle income segment, as outlined in the first study, families tend to do a big monthly grocery shopping for stockpiling. This strategy mitigates the fear of running out of food. The drawback is that buying all that is needed at once requires well-planned meals, and most families do not have this ability.

The shortcoming of buying in bulk is that it increases the propensity of certain food products not being consumed entirely. Consumers also tend to over-prepare food when they have an abundant stock. As such, the intended savings for choosing to buy in large packages can be mitigated by food waste, an interesting finding presented in the first essay.

Cooking from scratch, a characteristic prevalent in the sample studied in the first paper, should not be avoided, but it requires the ability of planning for the quantity of food to be prepared. Quite often, when caregivers choose to cook from scratch they over-prepare and leftovers are frequently discarded if perceived that it is not enough for another meal.

Finally, the first article presented core food waste antecedents in a framework. This first attempt to identify and analyze wasted food in the low-income context, the so-called “food waste paradox”, did not have the intention to build theoretical dimensions, but to precisely present which consumer’s actions (e.g. over-preparation) were contributing to the generation of more wasted food.

In the second article, which is more focused on theory building, a grounded-theory oriented coding was utilized aligned with ethnographic methods. By interviewing in-home and observing caregivers, an improved explanation of the role of abundance and affection in the production of household food waste was provided. Additionally, a theoretical framework is presented with the core dimensions associated with household food waste and its subcategories.

Among the relevant theoretical implications of the second study, I highlighted the role of stockpiling comfort foods in food waste. Overstocking was described as a category that resembles both abundance and affection. It was also described how food

abundance creates certain dilemmas for consumers, such as the decision between over-eating or wasting food.

In the third essay contained in this research, drawing from all of the data gathered in the first two studies, but also taking into account a new sampling with ten low-income families in a suburb of Brasília (DF), I attempted to provide a food wasters' typology, a novel contribution to the field of consumer behavior. Given that the typology describes five distinct types, which includes both heavy wasters (e.g. leftovers killers) and low wasters (e.g. resourceful mothers), it is a useful instrument to identify behaviors associated with the propensity to save food.

The three articles can be seen as a logical sequence of research initiatives, and united they provide an improved understanding of such a relevant social topic. The attempt to provide implications for public policies and campaigns is an effort to contribute to the mitigation of household food waste worldwide. In the Brazilian context, since the country is a global player in the food sector, these opportunities for taking action gain even more relevance. Various evidence points to our country as a nation that wastes more food than is needed to feed those who face food insecurity, which is estimated to be 22% of the Brazilian population (IBGE, 2014).

I assume, drawing from FAO studies, that acquiring a “zero waste” goal is utopic and even unnecessary. It is known that the costs to mitigate food waste sometimes are higher than saving the food, but there is also “an optimal level of wastage in a society – a level considerably lower than the wastage level of today” (FAO, 2014, p. 8). To accomplish it, academic studies might shed light on the food waste problem as a form of increasing the societal awareness needed to decrease food waste at the household level and, as noted by Tucker and Farrelly (2015), there are environmental, moral, economic and social reasons to reduce food waste.

Overall, this study provides evidence that wasting food can be an issue even among beneficiaries of hunger relief programs, such as the *Bolsa Família* in Brazil, and the Supplemental Nutrition Assistance Program (SNAP) in the USA. The SNAP has 46.5 million participating households (USDA, 2014) and the Brazilian program involves 14 million families according to the Ministry of Social Development (MDS, 2015).

The low-income segment has some peculiarities as presented. They might see food as wealth, and certain food products perceived as cheap or easily available, such as processed foods in the US and rice in Brazil, are more likely to be wasted.

It became clear that consumers studied tend to enjoy food abundance. Over-preparation is a consequence of excessive buying and/or overstock, but it also signals hospitality on certain occasions or it might be an attempt to save cooking time. Most caregivers work and they do not have much time for cooking meals, thus over-preparation is sometimes driven by the necessity to have cooked meals on hand.

The problem of over-preparation, as identified in this research, is that many families show avoidance of leftovers. They might store leftovers in the fridge, but they are not really willing to consume it later. It is just a delay-mechanism to mitigate the guilt associated with wasting food, as previously mentioned.

Interestingly, this bias against leftovers is not really related to food safety. White rice, for instance, can be eaten without any risk after two days stored in the fridge, but several families prefer to throw away and cook “new” rice. Evidence indicates that preference for freshness drives the leftovers disposal, but also cultural norms such as perceiving leftovers as “used” food or the consumption of it seen as a stingy practice contribute to wasting edible leftovers.

As mentioned in studies conducted in the US, low-income families are prone to biased spending trends, characterized by an abundant food purchase in the week of SNAP receipt (Tripp, 2015). In the Brazilian scenario, there is a need to improve the understanding of food spending patterns among this segment. Interestingly, and as a final note, in this thesis was found a perceived relation between over-stocking in the beginning of the month and over-preparation of food, two drivers of household food waste.

Additionally, findings presented show the complexity of mitigating food waste given that even positive intentions might lead consumers to throw away food. To build a more sustainable food system, one in which consumers would be aware of the difficulties associated with food production and the value of food itself, demands efforts from every actor in the food chain, as to be presented in Table 15. Farmers, industry, retailers, and public agents have to align initiatives to get better results in mitigating losses at

every stage of the food chain. Communications and technology are a good start to narrowing the gaps in the chain, both approximating consumers to the rural world and improving the ability of retailers to communicate with their shoppers.

Lastly, the sixth chapter contributes to providing several avenues for future research. Even considering that each article in this thesis cites opportunities for future studies, an additional agenda was developed given the recent boom in food waste research. As outlined, the phenomenon is gaining more attention by academics and government agencies, and several possibilities for scientific knowledge-building can improve our understanding of consumer food waste.

Opportunities for wasting less food

As a final remark, I provide some suggestions to reduce household food waste. These insights are based on findings from the studies and I also draw from existing worldwide projects, as listed in Table 1, which I believe could be adapted to the context of different countries. Table 15 lists proposed actions and it indicates which public (1. Industry; 2. Retail; 3. Consumers; 4. NGOs; 5. Government) would most likely lead these initiatives.

The industry sector, for instance, has the opportunity to join forces with retailers, NGOs and the government to discuss and implement consumer education campaigns. As recently stated by Frank Yiannas, vice president of food safety for Walmart, education is the key to prevent food waste and consumer education initiatives can start at the retail level (Yiannas, 2015).

In order to increase consumer's awareness, another feasible initiative would be bridging the farmer-consumer gap, which could involve storytelling at the point-of-purchase, an effort to be fulfilled most likely by retailers. As observed in the Whole Foods supermarkets in the US, it is assumed that providing additional information about how food is produced is likely to increase the awareness of the value of foods (Porpino, 2015).

Table 15 - Suggested actions to mitigate household food waste

Action	INTENDED TARGET PUBLIC					Existing initiative ⁽¹⁾
	Industry	Retail	Cons.*	NGOs	Gov.*	
Single serve packaging	X					
Resealable packaging	X					
Reusable packaging	X					
R&D investment for new technologies (e.g. edible packaging films)	X				X	Embrapa
Consumer education campaigns	X	X		X	X	Stop Wasting Food
Behavioral economics based communications		X		X	X	Smarter Lunchrooms
Bridging the farmer-consumer gap		X				Wholefoods
Redistributing surplus foods		X		X		Last Minute Market
Offering half-sized portions		X				Satisfeito
Creating/supporting food banks		X		X	X	OBA
Creating/supporting food pantries		X		X	X	Feeding America
Implementing a Good Samaritan Act					X	EU and USA
Align hunger relief programs with nutritional education					X	FNS-USDA
APPs for shopping planning		X		X		Love Food Hate Waste
Prepare a shopping list			X			Micro-level initiatives
Plan meals			X			
Avoid cooking side dishes in abundance (e.g. rice)			X			
Avoid showing affection via over-servings			X			
Avoid awarding kids with sweets			X			
Freeze leftovers in small portions			X			
Organize the fridge and pantry (e.g. close to expire in the front)			X			
Improve cooking skills			X			
Re-purpose leftovers			X			
Share leftovers			X			

Source: Based on initiatives listed on Table 1, additional secondary data, and insights from the studies conducted. *Cons. (consumers); Gov. (government).

The best contribution the industry itself could provide would be to invest in new packaging technologies. Respondents from the studies conducted reported difficulties in emptying packages, and especially in the Brazilian context, observations show that

empty margarine pots are used to store leftovers and raw foods (e.g. beef). As such, resealable and reusable packages could provide a means to preserve certain food products longer. Another dimension of the problem, related to the industry, is the need to increase the assortment of single-serving packages.

In terms of new technologies for packaging, the industry and the government can also provide a contribution by investing in nanotechnology research. The Brazilian Agricultural Research Corporation (Embrapa) and partners, for instance, are transferring to private firms edible coating technologies with antimicrobial properties that can extend the shelf-life of certain foods (e.g. fruits).

The implementation of more food banks and the creation of food pantries would also help to decrease food waste in Brazil and in other countries, but in order for such initiatives to gain momentum the Good Samaritan Act should be approved, as it was implemented in several European countries and the US. The legal support for encouraging retailers to donate surplus foods would be a win-win solution. Retailers would decrease their costs to dispose food products, low-income consumers would have more access to foods, and the government would benefit by amplifying the scope of hunger relief programs.

Food pantries, in particular, are rare in Brazil and the implementation of them could even stabilize the budget necessary to attend beneficiaries of cash transfer programs. Instead of just transferring money to beneficiaries, the government would jointly work with retailers and NGOs for redistributing foods that otherwise would most likely be wasted.

The aforementioned Table concludes listing ten actions consumers could take to reduce food waste behavior. These insights come from observations and field notes, and were perceived among the type classified as resourceful mothers. Resourcefulness in relation to food demands not only planning skills, but the ability to reinvent dishes in order that leftovers not be perceived as “old” foods.

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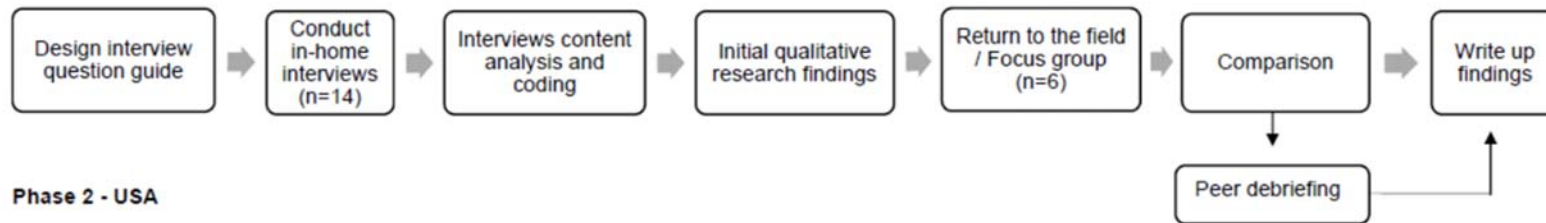
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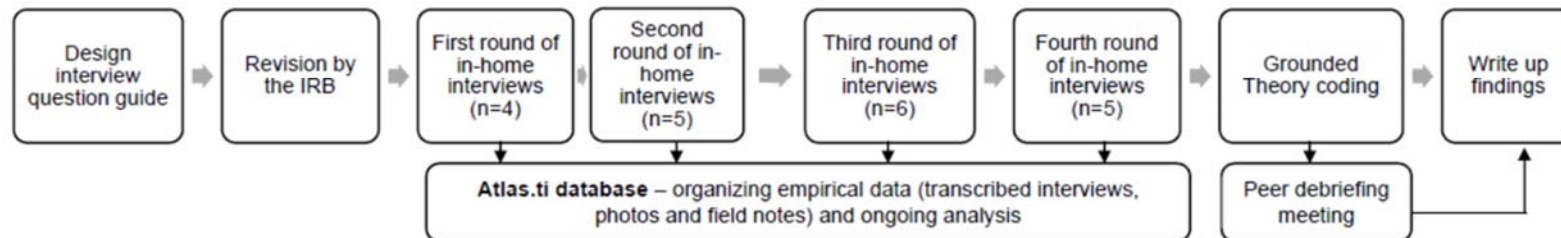
APPENDICES

APPENDIX A – Research process

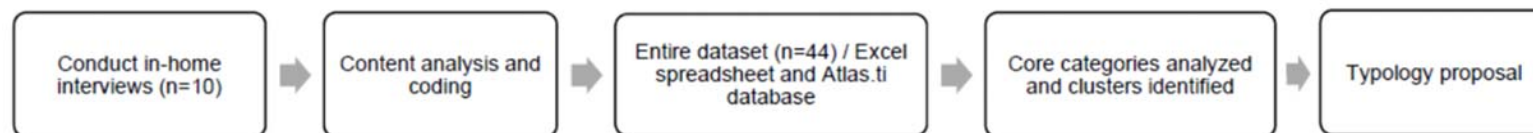
Phase 1 - Brazil



Phase 2 - USA



Phase 3 - Brazil



Appendix B - Interview script

INTRODUÇÃO

Bom dia / tarde / noite, o meu nome é (nome do entrevistador) e eu sou estudante de Doutorado da FGV. Como havia explicado, nós estamos realizando uma pesquisa sobre o consumo de alimentos.

Para facilitar nosso trabalho, nós gravamos as entrevistas. Assim não perdemos detalhes importantes da nossa conversa. Essa gravação é para uso interno da pesquisa, o(a) Sr(a) não será identificado em nenhum momento, ok?

CONTEXTO DE VIDA

Antes de começarmos a falar do tema da nossa pesquisa, gostaria de lhe pedir que falasse um pouco de você. Você poderia se apresentar?

- Nome, idade, estado civil, formação, se trabalha fora, se tem animal de estimação, com que pessoas vive em casa (nome e idade), breve rotina da casa (horário das pessoas na casa).
- Qual a comida favorita da família? E qual a comida que a família menos gosta? E o prato que você mais gosta de preparar?
- Quantas refeições fazem em casa de segunda a sexta? E nos finais de semana?

Rotina em dia típico

Eu gostaria que você pensasse em um dia normal. Um dia típico da sua rotina. Nesse dia, o que você faz normalmente? Descreva todas as suas atividades profissionais, pessoais e em relação a alimentação.

Por exemplo, normalmente, a que horas você toma café da manhã? A família está reunida no café? Qual o café da manhã do dia a dia?

E o almoço onde costuma acontecer? Com quem? No jantar, come-se a mesma coisa do almoço? A família está reunida no horário do jantar?

Domingo

Sobre a rotina de alimentação em um dia de domingo, o que muda em relação aos dias de semana? Como é o preparo do almoço?

ETAPAS DO CONSUMO DE ALIMENTO

- **Diálogos anteriores à compra** / Como a compra de alimento é decidida? Quem participa da discussão e de que forma? Há negociações? É preparada lista de compras? Quem é encarregado de comprar? Como é decidido onde comprar o alimento? Prefere supermercado, mercadinho ou feira livre? Em quais situações preferem ir ao mercadinho do bairro? Com que frequência compram alimento?

- **A ida às compras** / Como se dá a locomoção até o local da compra e o retorno para casa? Preferem ir só ou acompanhadas? Se acompanhadas, quem acompanha normalmente?
- **Momento da compra** / Até que ponto procuram o que está na lista? Se não há lista, o que motiva mais na escolha? Preferem comprar alimento em embalagens menores ou maiores? Como as promoções e ofertas influenciam suas compras? Gostam de ofertas do tipo “Pague 2 leve 3”? Conversam com outras clientes do mercado? Conversam com pessoal da loja? Tiram dúvidas com atendentes sobre algum uso culinário de alimento? Gostam de comprar novidades ou preferem os mesmos produtos? Buscam algumas marcas em particular? O que colocam primeiro no carrinho? Prestam atenção em quanto (de dinheiro) já está no carrinho? Acontece de às vezes tirar coisas do carrinho antes de chegar no caixa?
- **Estocagem** / Ao chegar em casa do mercado, quando guardam os produtos? Quem guarda? Onde e como os produtos são colocados? Onde depositam os não perecíveis? Usam geladeira e freezer? Qual o volume do estoque?
- **Preparo do alimento** / Quem prepara o alimento? Como decide o que vai ser preparado para a refeição? Como decide a quantidade que vai ser feita? Como cada alimento é preparado? Usam panelas grandes? Forno micro-ondas? Quanto tempo antes a refeição é preparada? Em geral prepara alimento que dê para mais de uma refeição? Por que?
- **O ato de comer** / Hoje, por exemplo, o que tinha para o almoço? Tomaram algum líquido na refeição? O que? Quem e quantos se sentam a mesa e de que forma? Fazem as refeições em horários distintos ou reunidos? O que muda entre o almoço e o jantar? Mesa quadrada, retangular ou redonda? Conversam durante a refeição? O alimento fica sob a mesa ou no fogão? Quem serve o alimento? Se há visitas, o que muda? Como comem? Com garfo e faca? Colher?
- **Pós-refeição** / Com é feita a lavagem de pratos e panelas? Normalmente há sobra de comida? O que é feito com a sobra de alimento? Guardam após o consumo na geladeira? Gosta de reaproveitar a sobra no dia seguinte? Por quantos dias a sobra de comida costuma ficar na geladeira? O que fazem quando sobra alimento? Em toda casa, em geral existe um pouco de comida que vai para o lixo. E aqui em sua casa? O quanto de alimento termina indo pro lixo? Com que frequência? Com é feita a escolha se o alimento vai pro lixo ou é guardado?

APPENDIX C – Observation script

Observação mais geral

- Há gêneros alimentícios em locais visíveis da sala? Quais? E em que quantidades?
- Nos armários e/ou despensa, quais alimentos estão mais visíveis? E em que quantidades?
- Microondas ou algum outro compartimento não destinado para este fim também serve de local para acondicionar alimento?
- Há alimento/bebida sobre a mesa? Café, sacos com pães ou potes de margarina?
- Há cestas básicas fechadas na despensa, cozinha ou área de serviço?

Estoque

- Prazo de validade dos produtos armazenados no armário/despensa – há produtos fora do prazo? Quantos? Quais?
- Quantidade de alimento estocado nos armários e/ou despensa e geladeira – Volume em kgs, quais?

Preservação

- Como alimento é guardado na geladeira? Quais os depósitos utilizados para guardar?
- Sobras de alimento são estocadas de que forma e onde. Qual a quantidade da sobra em relação ao que foi preparado?

Observação do excedente

- Há panelas com comida sobre o fogão ou dentro do forno?
- Há resto de comida em pratos sobre a pia? Ou nos depósitos de lixo?
- Tem vasilha com resto de comida para o cachorro ou outro animal no quintal e/ou área de serviço?

APPENDIX D - Sample of photos taken by the author during home-tours in Brazil



Photo 1. Overprovision: pan of rice as leftover; 2. Food storage; 3 and 4. Food disposal.



Photo 1. Bulk buying leading to ample storage; 2. Expired products; 3. Ample storage.



Photos 1 and 2. Leftover after lunch (overprovision)

APPENDIX E - Sample of photos taken by the author during home-tours in the US



Photo 1: Planned behavior / Shopping list on the fridge; Photo 2: Stockpiling snacks; Photo 3: Bulk-buying / potatoes in abundance; Photo 4: Ample storage of canned foods.

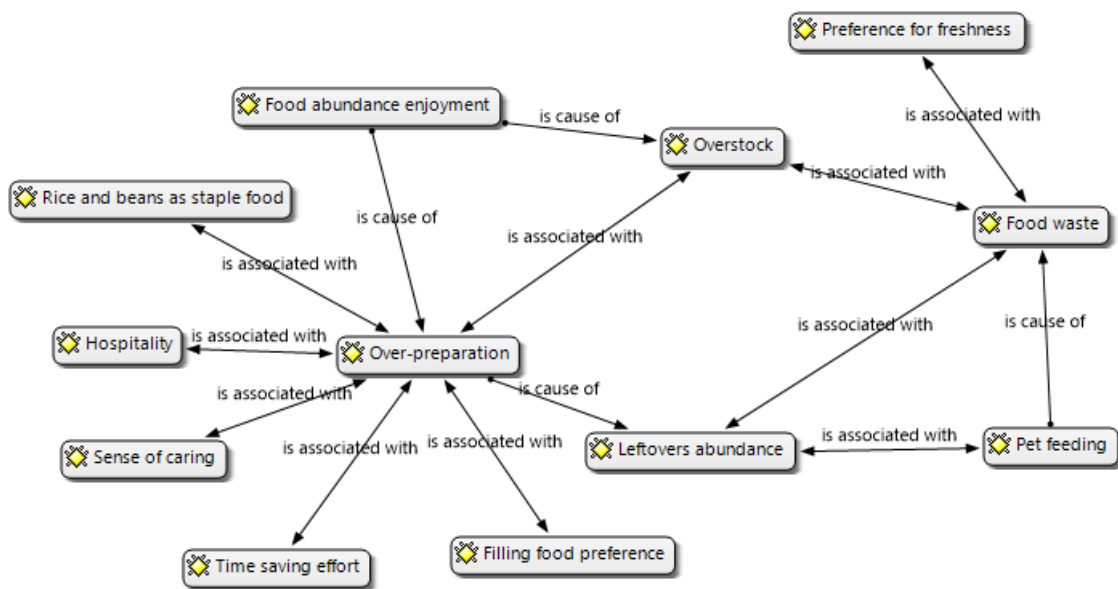


Photo 5: Cereals abundance; Photo 6: Over-preparation.



Photo 7: Non stored leftovers; Photo 8: Composter bin for leftovers and scraps.

APPENDIX F – Conceptual network based on focus group conducted in Brazil



APPENDIX G – Illustrative comments for household food waste factors

Itinerary phase and categories	Illustrative comments
<p><i>Negotiating the purchase</i> Demanding kids</p> <p>Lack of planning</p> <p>Preparing a list</p> <p>Supermarket preference</p>	<p>“My children will start saying 'we need this and that', but they didn't really looked if they used it up, so they are bad at letting me know what they have used, what is still in the pantry”.</p> <p>“I don't really plan the quantity. It goes by the size of the pan”.</p> <p>“I never make a shopping list, because it's already in my mind. I know what we need”.</p> <p>“I prefer going to supermarkets. Food is fresher and for some reason is less expensive”.</p>
<p><i>Shopping trip</i> Catching a ride</p> <p>Going by bus</p> <p>Returning by car</p>	<p>“I ask my neighbor a ride. She knows I like going to the grocery with her”.</p> <p>“I often go by bus. It doesn't take much time and I can save money”.</p> <p>“My son might pick me up when the grocery shopping is over, or we will take a taxi”.</p>
<p><i>Buying food</i> Big monthly shopping</p> <p>Shared shopping responsibilities</p> <p>Impulse buying</p> <p>Parental yielding</p> <p>Sales hunting</p>	<p>“Once a month I do the big grocery shopping. Only thing I normally have to run back to the store for is milk”.</p> <p>“My husband likes to go (grocery shopping) more frequently, and he will buy eggs, milk, he likes to buy pasta, beans, canned tomatoes, those things can multiply here a little bit”.</p> <p>“If I let my husband do the grocery shopping, he definitely comes home with everything we don't need. Just a bunch of junk food, and my kids would be really happy with that”.</p> <p>“When I go to the store I know the types of things that she (daughter) likes, and I will grab them, but it makes harder if I take her to the store with me, because I will end up getting, I always do what my kids want and I end up not budgeting on the food stamps”.</p> <p>“We just bought a lot of bacon on sale, we can't say no to it [emphatic]... because it was buy two, get two free... so, we bought a lot of bacon”.</p>
<p><i>Home return</i> Organizing stock as mother's duty</p>	<p>“I organize everything. The pantry, when I set it up, in the front goes the things I cook most”.</p>

Storing meats as male's duty	"We will put things in the cupboard first. The meats – the ground beef we actually buy in bulk –and my husband will usually pack it in four separate containers and freeze it."
<p>Stocking food at home Stockpiling enjoyment</p> <p>Anxiety embedded stock</p> <p>Comfort foods abundance</p>	<p>"I love fully stocked cabinet, because that's how I was raised. We always had a lot of food. My mother was a stay-at-home mom and she cooked everyday a full course meal, so yeah I love seeing a lot of food".</p> <p>"I feel better when I go to the supermarket and my stock gets full. If it's bit empty, I don't like, I guess I feel anxious".</p> <p>"She likes chips, Doritos, Cheerios, Chicken in a Biskit crackers, rice crackers... cookies... we like Chips Ahoy, gummies, suckers, Tootsie Roll... all types of junk food! I know it's crazy, but my daughter likes sweet and I'm sweet too".</p>
<p>Preparing food Big meals preference</p> <p>Food seen as wealth</p> <p>Nostalgic meals preparation</p> <p>Good provider identity</p>	<p>"I always prepare extra, I don't like to prepare anything in small quantities. I like abundance, because if someone shows up, they will eat as well".</p> <p>"We always have leftovers, thank God. It is better to have always a bit more than needed".</p> <p>"I like to do like in my old ages. It's a full course meal".</p> <p>"I enjoy preparing food, because it's for my family. I like it, and I try to diversify what I cook".</p>
<p>Food consumption Family meals atmosphere</p> <p>Preference for freshness</p> <p>Compensation for unhealthy perceived food</p> <p>Snacks as treats for kids</p>	<p>"I like to see my family seated on the table, eating together, that's the correct way. I enjoy when everybody is together".</p> <p>"We are not big leftovers people. I prefer to make something fresh".</p> <p>"We do a lot of mac and cheese, but we try to add as many vegetables into mac and cheese as possible".</p> <p>"Lot of times they ask for things that they know I'll buy. Like, for treats, they go for the boxes section where candies are. Candies, jelly beans..."</p>
<p>Storage of prepared food Guilt mitigation</p> <p>Storing, cleaning fridge, wasting cycle</p> <p>Inappropriate storage</p>	<p>"If after a day, we haven't eaten leftovers, they will stay in the fridge until go bad".</p> <p>"Every month, before going to the supermarket, I clean my fridge and throw away some food stuff".</p> <p>"I end up putting the food right in the refrigerator, in the pans, that's another reason why I don't</p>

Leftovers avoidance	<p>cook a couple of days later, because my pans are being used to store leftovers”.</p> <p>“We cook a lot and there is leftovers. We store in the fridge, but in my home we don’t like these foods from the previous day”.</p>
<p><i>Food disposal</i></p> <p>Feeding pets</p> <p>Abundant waste perception</p> <p>Composting to mitigate guilt</p>	<p>“My dog is a washing machine. If we don’t eat it, he will get it”.</p> <p>“We see plenty of wasted food in plastic bags in the sidewalks. Street dogs come and rip it to eat”.</p> <p>“I hate to waste food. I feel guilty, I don’t like it at all, that’s really hard for me, and that’s part of the reason why we have the composter”.</p>

APPENDIX H – Consent form signed by participants in the US**CONSENT FORM****Study: Household food consumption behavior**

You are being asked to take part in a research study of how families take decisions about grocery shopping, food preparation and serving meals. In order to take part, you must be living in a household with at least two other family members to take part in this study. Please read this form carefully and ask any questions you may have before agreeing to take part in the study.

What the study is about: The purpose of this study is to understand how families make food related decisions.

What we will ask you to do: If you agree to be in this study, we will conduct an interview with you at your home and take some photos related to food. The interview will include questions about how do you plan grocery shopping, how do you stock and prepare food, how meals are served, and how do you deal with leftovers. With your permission, we would also like to tape-record the interview. After the interview, we would like you to show us the places where food is stocked, prepared and discarded. Photos of these places will be taken. No family members will appear on the photos. The interview and photos will take a maximum of 3 hours to complete.

Risks and benefits:

There is the risk that you may find some of the questions about your food habits to be sensitive.

There are potential benefits to participants after the completion of the study. In particular, you may learn something about your own food decisions. The goal of the study is a deeper understanding about household family consumption to educate them to make smarter food choices. If you so choose, these results will be made available to you upon the completion of the study

Compensation: You will earn US\$50 for allowing us to interview you at home and to take the photos. If needed, and with your consent, a second visit might be scheduled and you will be entitled to earn an additional US\$50 (only as needed).

Your answers will be confidential. The records of this study will be kept private. In any sort of report we make public we will not include any information that will make it possible to identify you. Research records will be kept in a locked file; only the researchers will have access to the records. If we tape-record the interview, we will destroy the tape after it has been transcribed, which we anticipate will be within two months of its taping.

Use of photos. Most photos taken as a part of this study will not be published, however, a small sample of photos may be published in a research paper, but no person will appear in the images.

Taking part is voluntary: Taking part in this study is completely voluntary. You may skip any questions that you do not want to answer. If you decide not to take part or to skip some of the questions, it will not affect your current or future relationship with Cornell University. If you decide to take part, you are free to withdraw at any time.

If you have questions: The researchers conducting this study are Gustavo Porpino and Prof. Brian Wansink. Please ask any questions you have now. If you have questions later, you may contact Gustavo at gpa32@cornell.edu. You can reach Prof. Wansink at foodandbrandlab@cornell.edu or (607) 254-4960. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board (IRB) at 607-255-5138 or access their website at <http://www.irb.cornell.edu>. You may also report your concerns or complaints anonymously through Ethicspoint (www.hotline.cornell.edu) or by calling toll free at 1-866-293-3077. Ethicspoint is an independent organization that serves as a liaison between the University and the person bringing the complaint so that anonymity can be ensured.

You will be given a copy of this form to keep for your records.

Statement of Consent: I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

Your Signature _____ Date

Your Name _____ (printed)

In addition to agreeing to participate, I also consent to having the interview tape-recorded and photos taken.

Your Signature _____ Date

Signature of person obtaining consent _____

Date _____

Printed name of person obtaining consent _____

Date _____

APPENDIX I – Consent form signed by participants in Brazil**TERMO DE CONSENTIMENTO LIVRE**

Pesquisa: Comportamento de consumo de alimento em famílias.

Você está sendo convidada a participar de um estudo sobre como as famílias tomam decisões sobre a compra, o preparo, e o consumo de alimentos. Este estudo faz parte de uma tese de Doutorado da Fundação Getulio Vargas e não tem ligação com nenhuma empresa. Por favor, leia as explicações seguintes a respeito da pesquisa.

O que você fará: Se você concordar em participar, você será entrevistada em sua casa. A entrevista terá perguntas sobre os hábitos de compra, estoque, preparo e consumo de comida da sua família. Com sua permissão, a entrevista será gravada e serão feitas fotos dos locais utilizados para preparo e estoque de alimentos. Nenhuma pessoa aparecerá nas fotografias e suas respostas na entrevista não serão identificadas. Seu nome será mantido em sigilo. A entrevista e as fotos levarão um máximo de 3 horas.

Compensação: Você receberá R\$10,00 (Dez reais) caso concorde em participar do estudo e concorrerá a um brinde (Cesta de produtos alimentícios) a ser sorteado entre os participantes.

Informações sobre o estudo: O pesquisador responsável é Gustavo Porpino. Caso necessite de informações sobre a pesquisa, pode entrar em contato pelo e-mail gporpino@hotmail.com ou pelo telefone (61) 3254 5292.

Brasília-DF, _____ de 2015.

Eu, _____, declaro para os devidos fins que estou ciente dos termos do estudo descrito acima e concordo em participar voluntariamente.

Assinatura do participante do estudo

Assinatura do pesquisador responsável

APPENDIX J – Flyer utilized to recruit families in the US



Help with a study about family food choices and receive money!

You are invited to participate in a research project being conducted by the Cornell University Food and Brand Lab.

Why is this study being done? This study will look at the food choices of families and how small changes in your home might affect how you make decisions about grocery shopping, food preparation and serving meals.

Why is the study important? This study is important because it will help us find out about the choices people make about food and about other issues that have an impact on how food is stored, prepared and disposed.



Who is eligible to participate? To be eligible, you must be a mother living in a family household with at least two relatives. Your household income should be lower than US\$45,000/year.

What will I get from being in this study? If you choose to participate in the study, you will receive US\$50 for the initial in-home interview and for allowing us to take photos of the environment. If needed, a second visit will be scheduled and you will be entitled to an additional US\$50. First visit will be scheduled, preferably, for the beginning of the month.

Voluntary nature of participation: Taking part in this study is voluntary and you can choose not to answer certain questions or to drop out of the study at any time.



What will I be asked to do? You will be asked to participate in two in home interviews as well as fill out surveys. We also ask your consent to take digital photos of the places where food is stocked (eg. fridge and pantry), prepared (eg. stove) and discarded (eg. trash bin). No family members will appear in the photos.

Who is doing the research? Cornell University is running the study. The researcher in charge of the study is Gustavo Porpino. Any questions about the study should be emailed to gpa32@cornell.edu. Questions can also be directed to 607-254-6302.



APPENDIX K – IRB approval letter



Cornell University
Office of
Research Integrity and Assurance

East Hill Office Building, Suite 320
395 Pine Tree Road
Ithaca, NY 14850
p. 607-254-5162
f. 607-255-0758
www.irb.cornell.edu

Institutional Review Board for Human Participants

TRIENNIAL PROTOCOL APPROVAL- NO FEDERAL FUNDS

To: Gustavo Araujo
From: Carol Devine, IRB Chairperson *Carol M. Devine*
Protocol ID#: 1408004889
Protocol Title: Household food waste: a qualitative study of the antecedents of food disposal
Approval Date: September 30, 2014
Expiration Date: September 29, 2017

Cornell University's Institutional Review Board for Human Participants (IRB) has reviewed and approved the inclusion of human participants in the research activities described in the protocol referenced above.

Special Conditions for Triennial Approval of this Protocol: This protocol was granted approval for three years until **September 29, 2017** as it does not involve federal funding and is therefore eligible for Triennial review under the IRB policy #21 (www.irb.cornell.edu/policy). As Principal Investigator for this project, you are responsible for informing the IRB and seeking re-review if at any point during the course of this project, Federal funds may be used to support any part of it. Failure to seek timely review and approval could result in an inability to use research data for the purposes of the Federal grant. Please refer to IRB policy #21 (www.irb.cornell.edu/policy) for more information.

The following personnel are approved to perform research activities on this protocol:

- Gustavo Araujo
- Brian Wansink

This approval by the IRB means that human participants can be included in this research. However, there may be additional university and local policies that apply before research activities can begin under this protocol. It is the investigator's responsibility to ensure these requirements are also met.

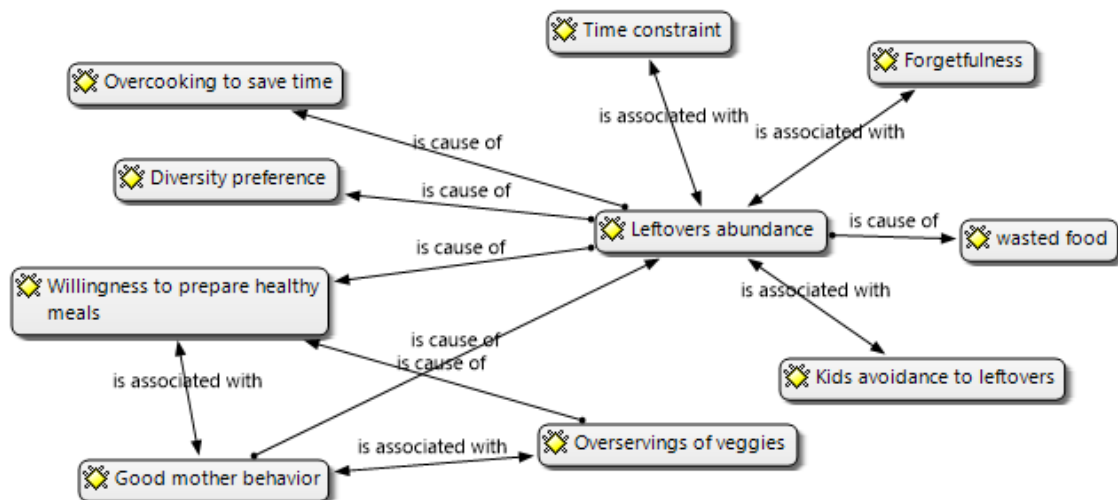
Please note the following important conditions of approval for this study:

1. All consent forms, records of study participation, and other consent materials **must** be held by the investigator for **five years** after the close of the study.

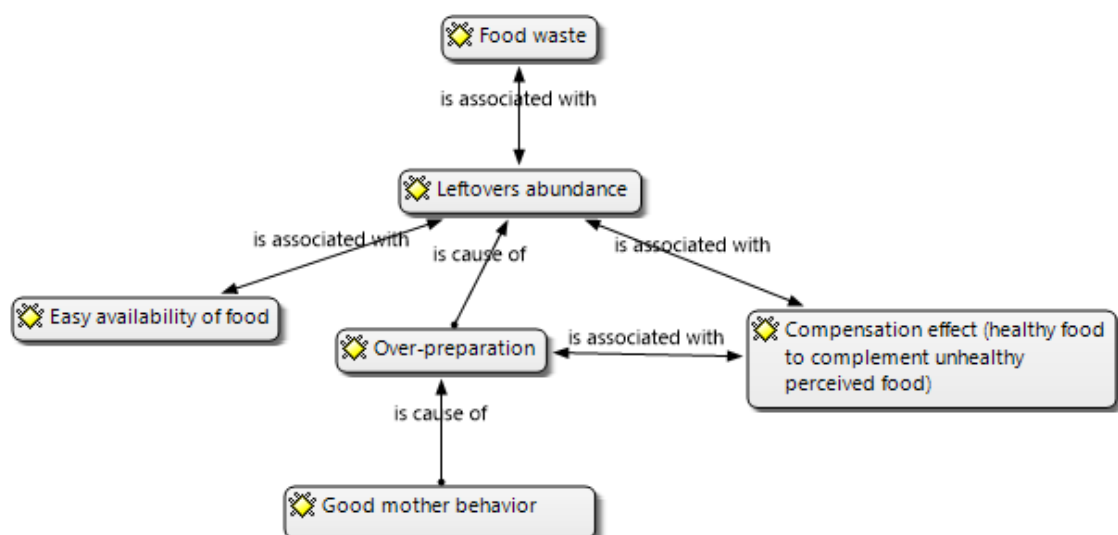
For questions related to this application or for IRB review procedures, please contact the IRB office at irbhp@cornell.edu or 255-6182. Visit the IRB website at www.irb.cornell.edu for policies, procedures, FAQs, forms, and other helpful information about Cornell's Human Participant Research Program. Please download the latest forms from the IRB website www.irb.cornell.edu/forms/ for each submission.

APPENDIX L – Conceptual networks elaborated for each American family studied (Interpretative analysis based on interviews, observations and analysis of photos / Atlas.ti software output)

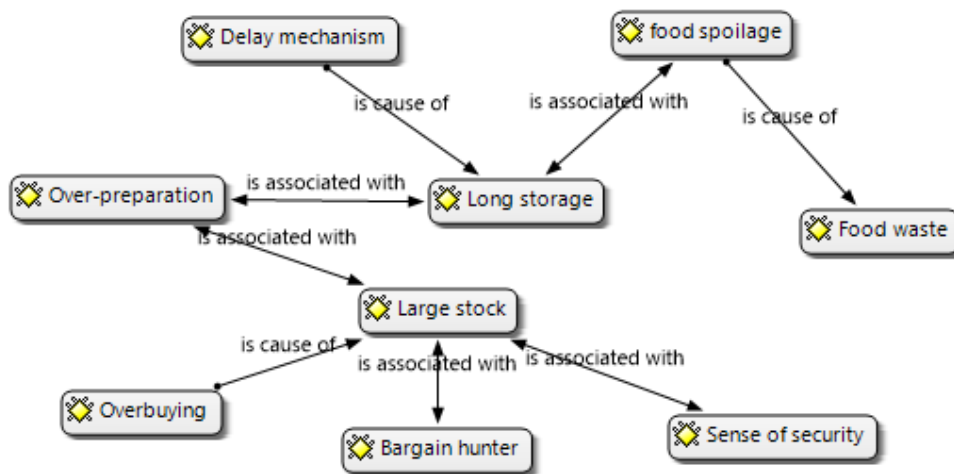
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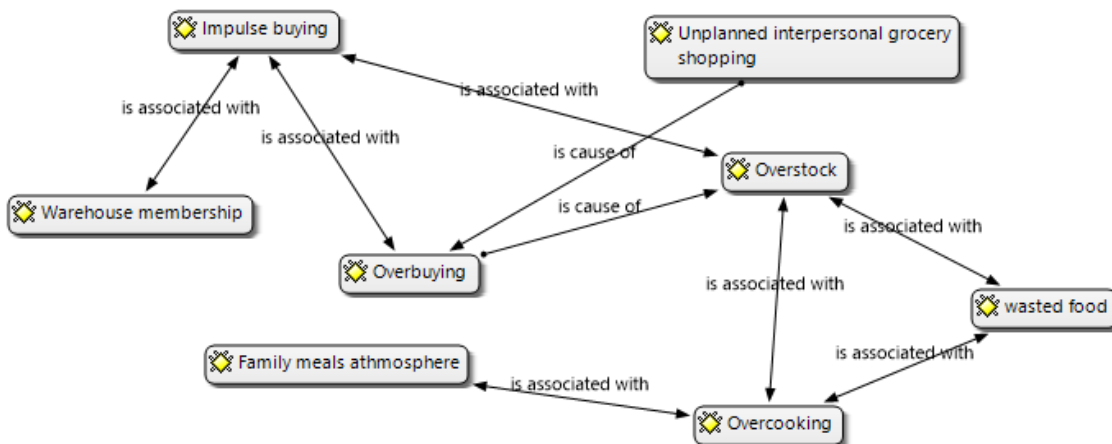
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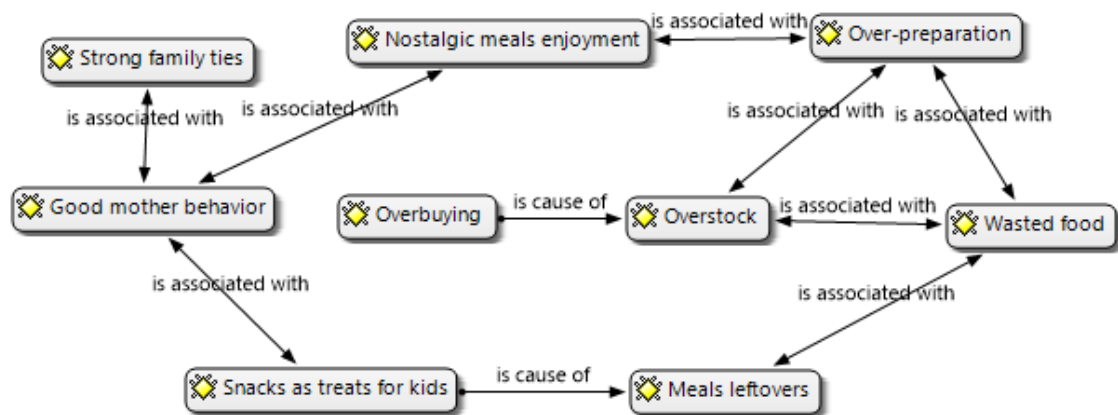
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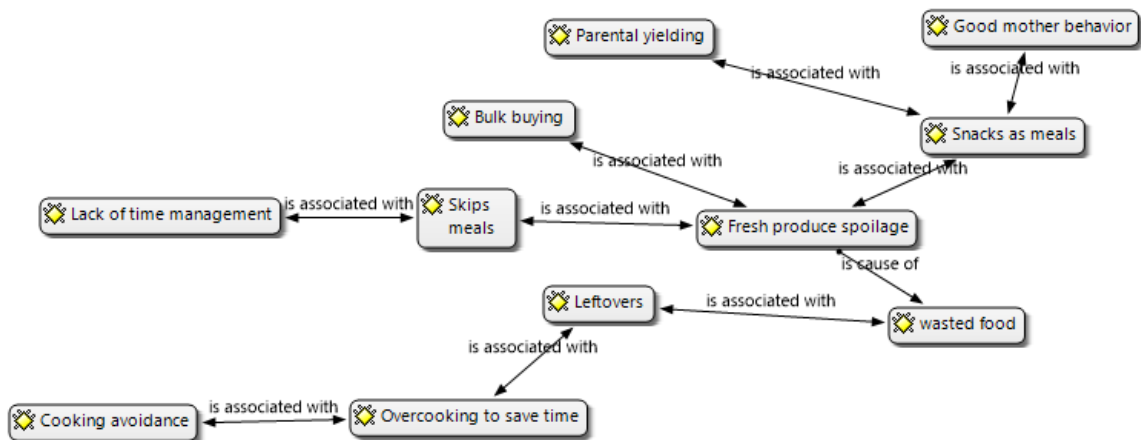
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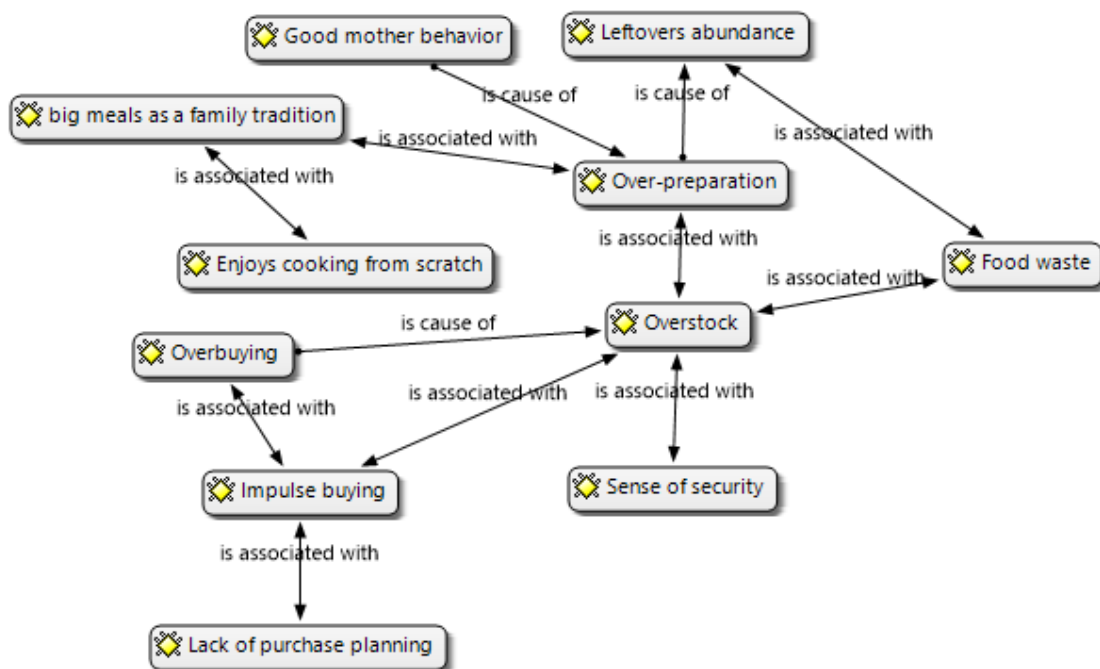
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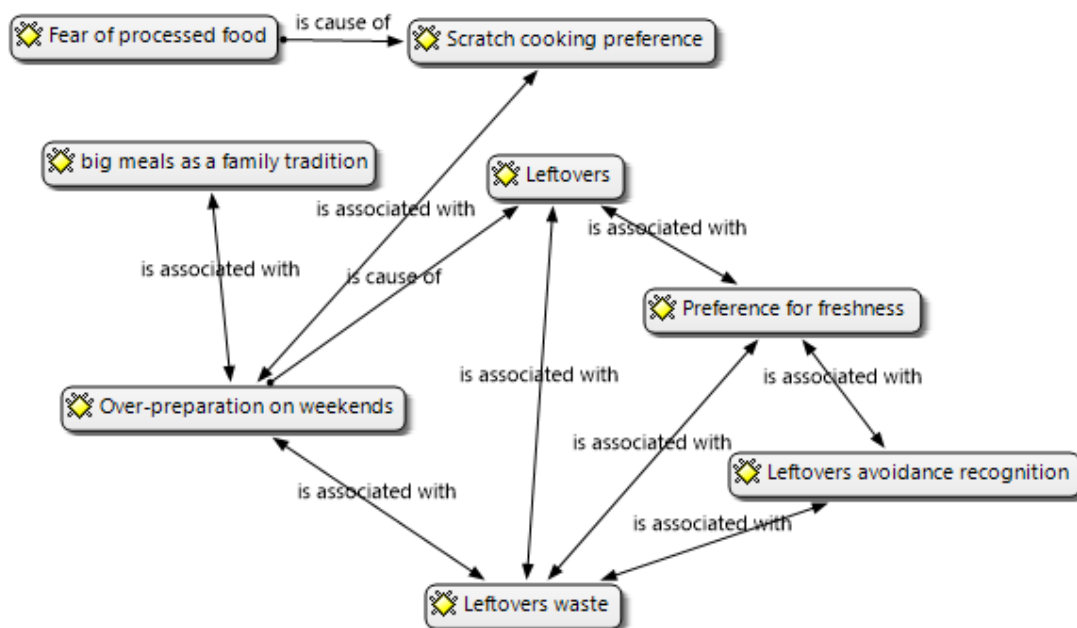
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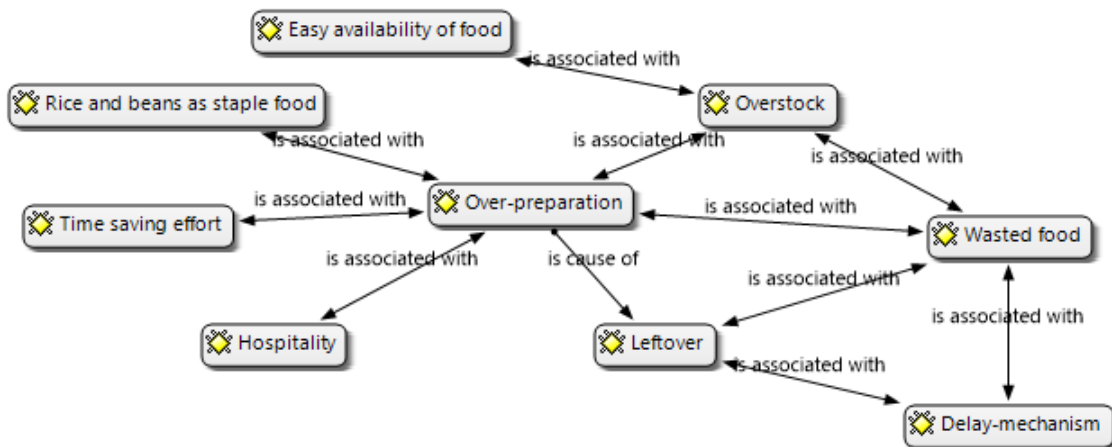
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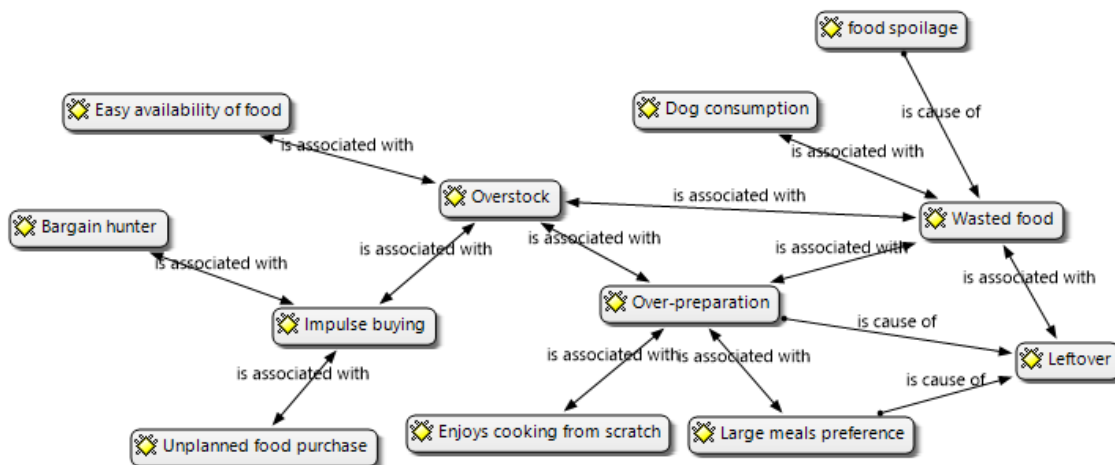
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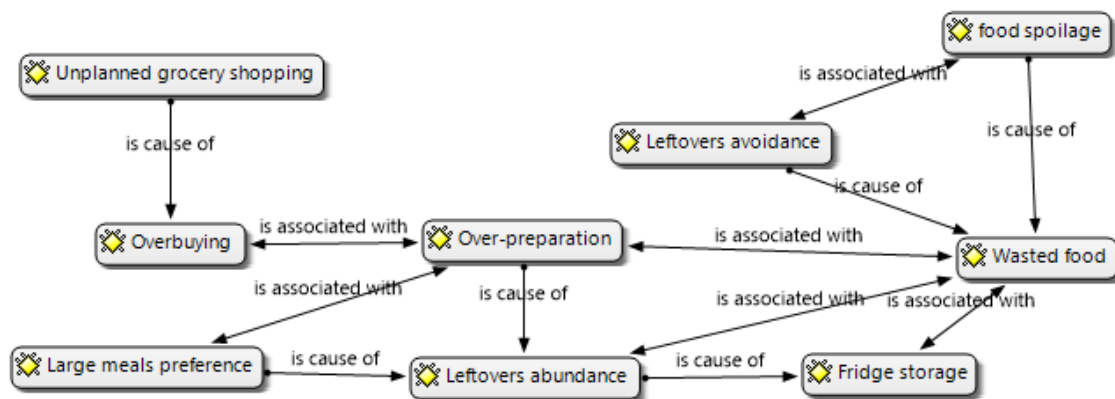
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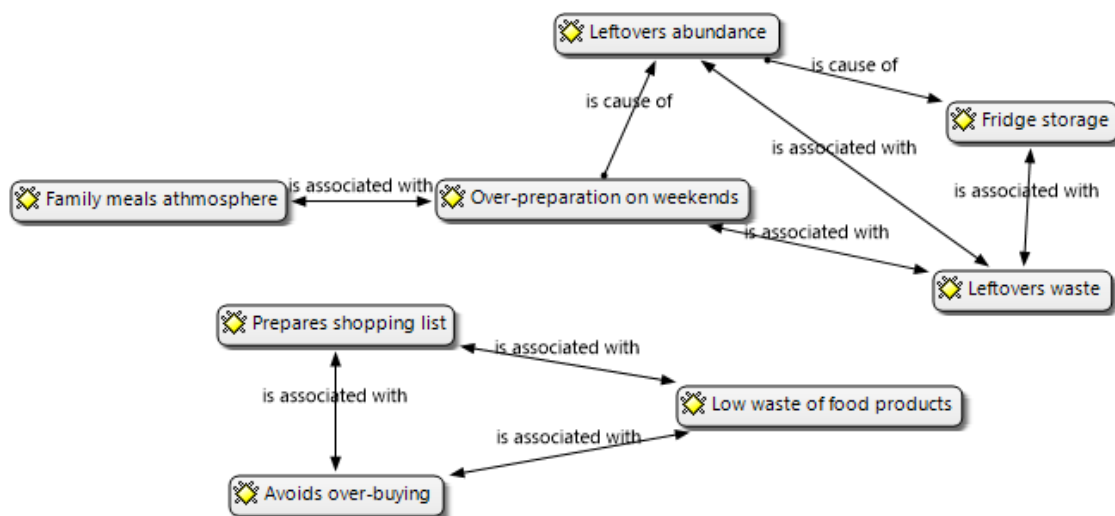
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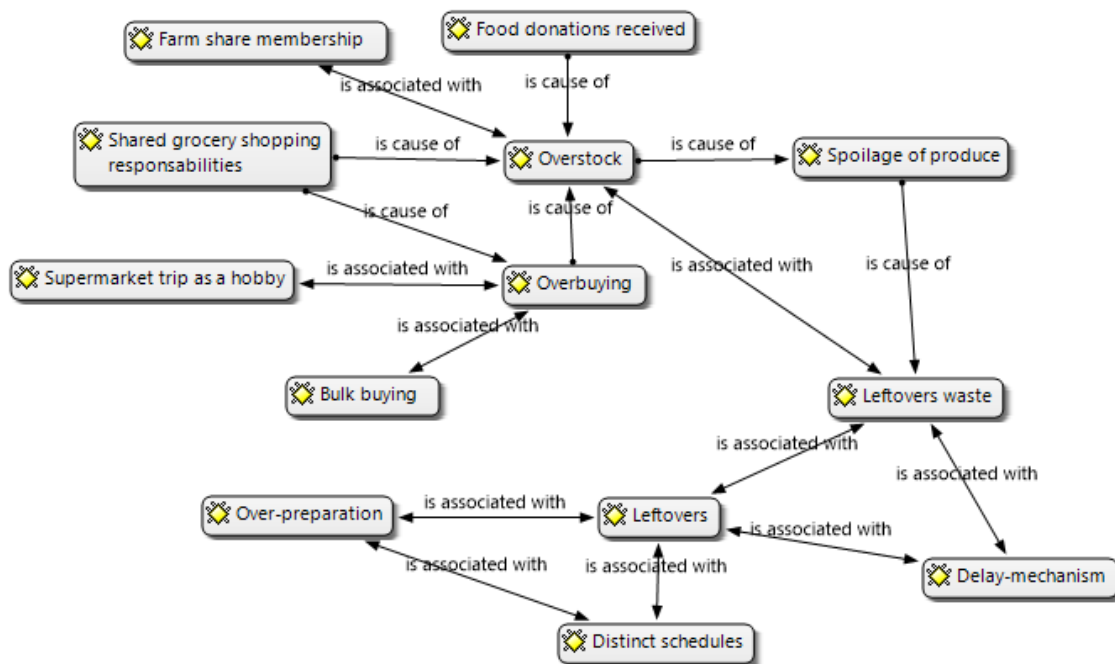
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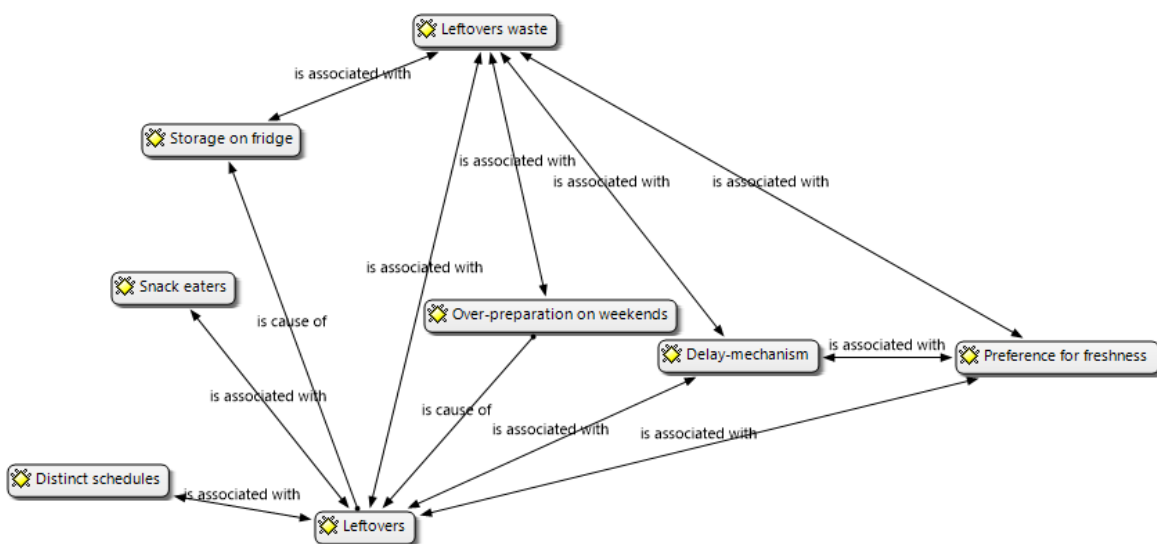
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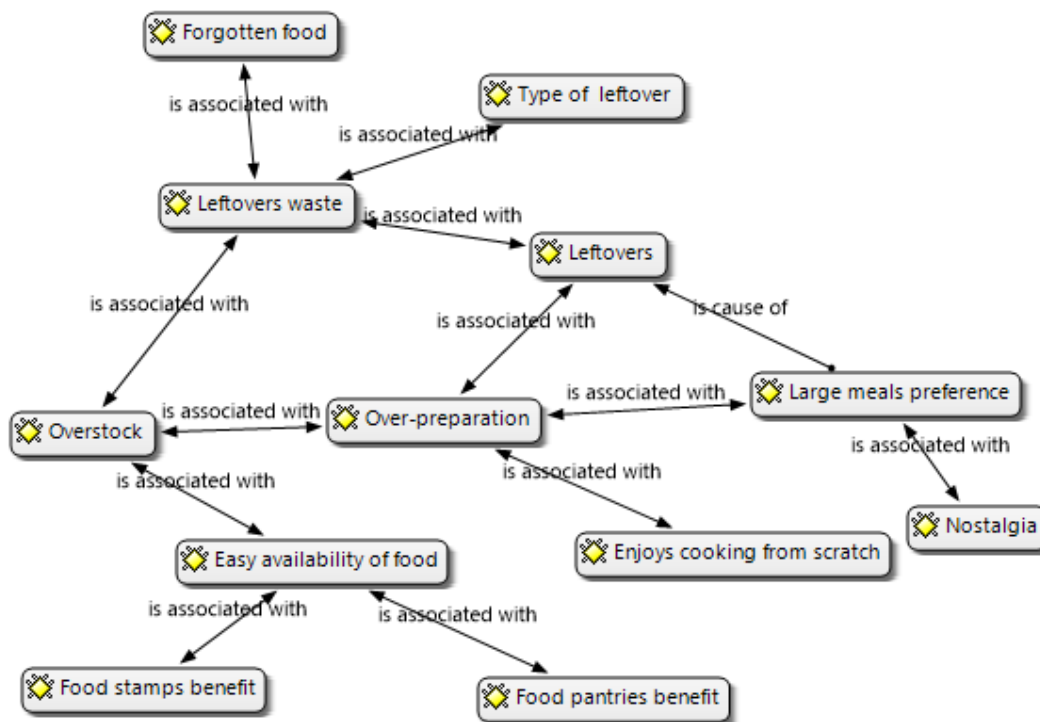
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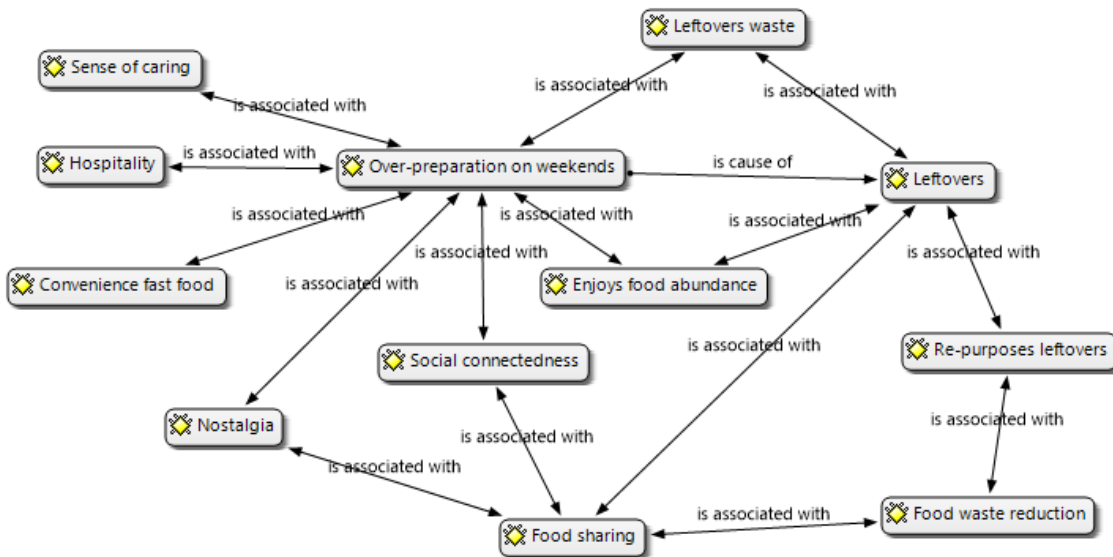
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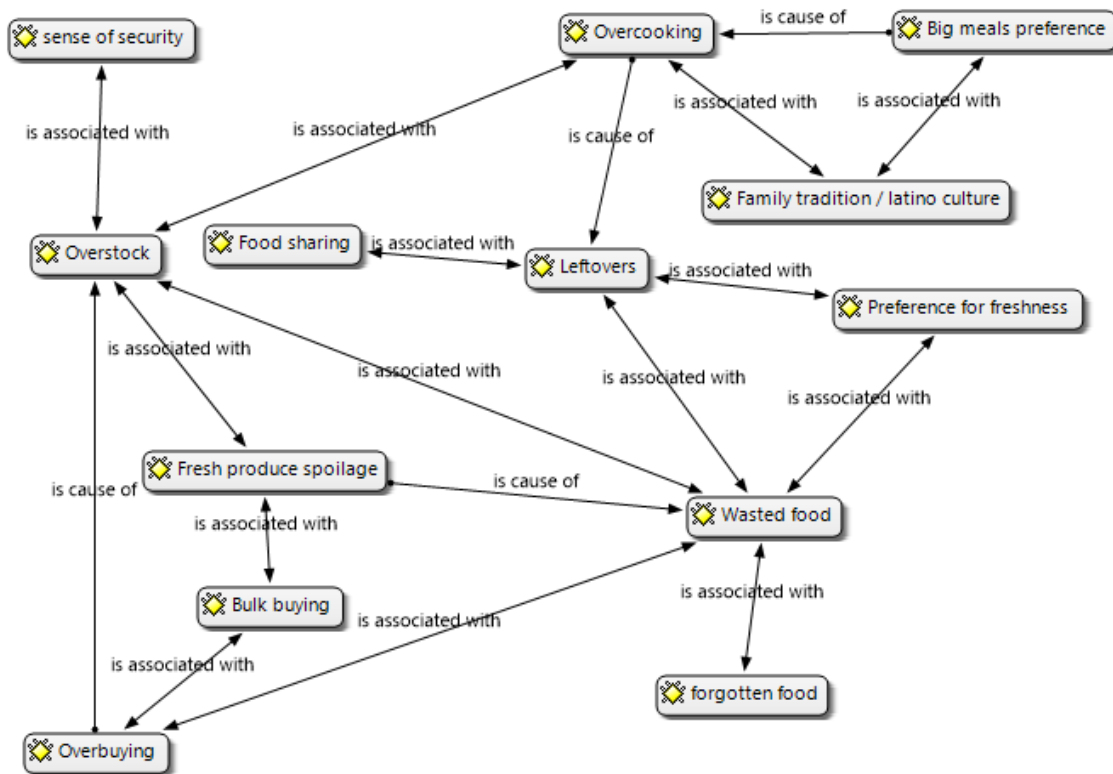
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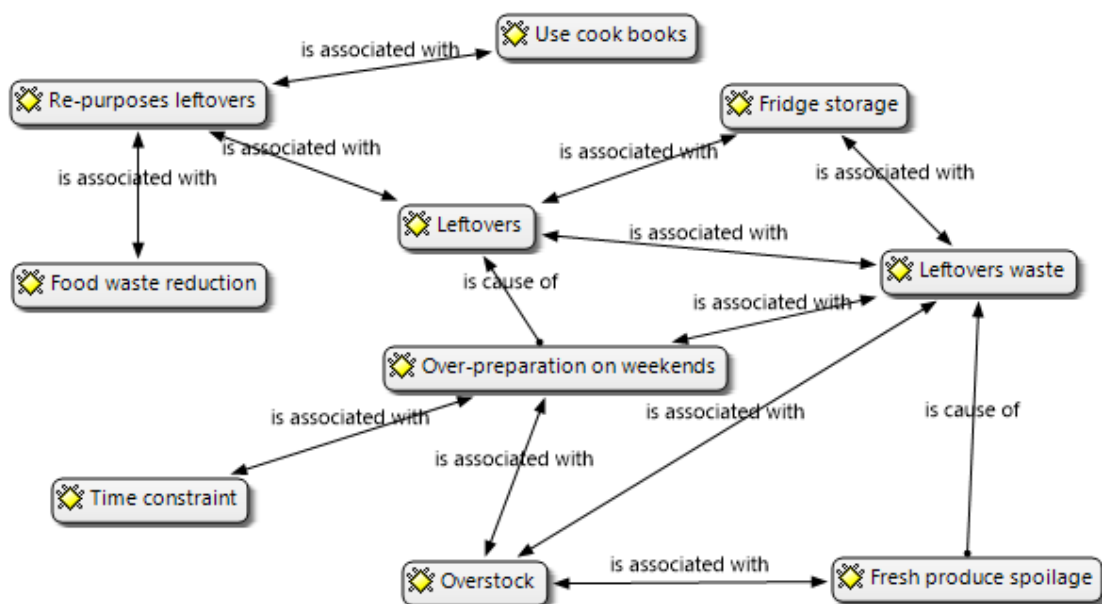
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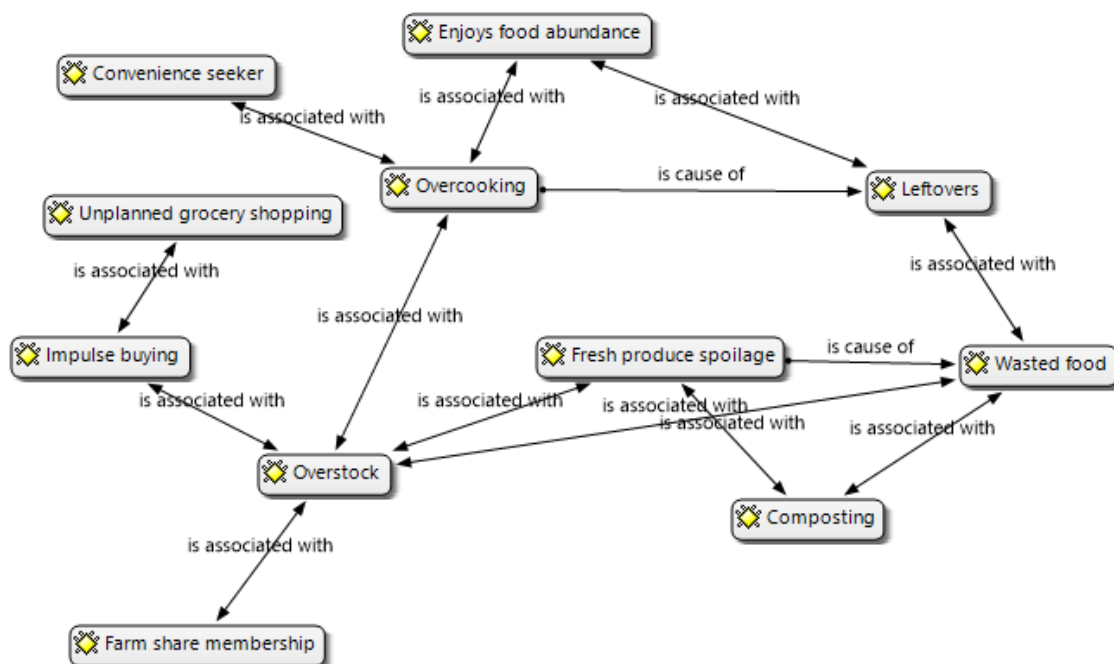
Informant 17 (Table 5)



Informant 18 (Table 5)



Informant 19 (Table 5)



Informant 20 (Table 5)

