DRAFT FOR COMMENT

Preliminary Research Report on the Assessment of Intra-household Wastage of Food

Prepared for ESSB, ESDG and ESNA
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1.0 SUMMARY

1.1. Project Proposal

The FAO methodology of estimating undernourishment is based upon food availability (the average dietary energy supply (DES) derived from the national supply/utilization accounts (SUA) and a minimum energy requirement (the cut-off point) expressed in terms of actual food intake. The underlying assumption is that available energy "is a close approximation of [actual] energy consumption, at least for developing countries." In reality, the SUA data provide an estimate of food available at the retail (and food service) level but ignore wastage and losses that occur at or after the retail level (marketing or household level losses, pet food, spoilage, etc.), and therefore overestimate actual intake of dietary energy.

1.1.1. Preliminary Research

In coordination with ESSB and ESNA, ESDG contracted F. Martinez Nocito to prepare a preliminary research report on the assessment of intra-household (i.e. both household and non-household sectors) wastage of food. The ultimate goal of this project is to determine an estimate of (commodity-specific and country-specific) post-retail losses. The consultant was asked to address the following:

1. Make an inventory of existing literature and analyses, summarize the results and make an overview of the approaches followed;
2. Identify sources of information to base further work on. Create an inventory of Household Expenditure surveys available;
3. To the extent possible (considering the constraints on time, the complexity of the issue and the volume of literature), provide estimates for ranges of food wastage within each geographical region, ideally as it relates to income groups.

1.2. History of Food Wastage Research

The need to establish an estimate for waste predates the Food Balance Sheets (FBS) and was identified as early as 1939 (Chatfield 1956). It may be due to the depth and complexity of the subject that it has historically not been allocated adequate research time or funding. The wide range of estimates found throughout the literature can be explained by the differences in the way that food wastage or loss is defined, as well as varying study methodologies, sample sizes, geographical location and household characteristics (Kantor 1998). Historically it has been very difficult to obtain accurate estimates of normal food wastage in the household (Harrison, Rathje & Hughes 1975, Jones et al 2003). This has been attributed, at least in part, to behavioural influences or household bias (Wenlock & Buss 1977). As early as 1952 FAO observed that differences in food supplies and actual food intake have long occurred in most developed countries. Losses and wastage at the household level may be considered a major source of discrepancy in final estimates (FAO Statistics Division 1983). Little is known about the quantity of each food commodity that is lost at each stage of processing and distribution, in food establishments or in the home (Wenlock et al 1980). For the purposes this report and based upon its use in the literature, the term, food wastage refers to *all edible food waste that is discarded throughout the entire food distribution system, most notably at the intra-household level, which is considered appropriate for human consumption but which is not consumed. This includes plate waste, foods that are spoiled, fed to pets, composted, put in garbage disposals or lost in preparation.*

1.3. Need for Estimates on Food Wastage

Food wastage is a significant factor in considering resource utilization and actual food consumption. It has been documented throughout the literature that there is a need for reliable data on household food wastage, but these estimates have typically been difficult to

obtain (Chatfield 1956, Harrison, Rathje & Hughes 1975, Fung & Rathje 1982, FAO Statistics Division 1983, Naska 2001). Since the 1960s, FAO has called for special studies to be made in different countries on the wastage of edible foods (Mercado-Villavieja 1976). While losses of potentially edible food may be inevitable during storage, distribution, processing and at the intra-household level, it is vital to capture this wastage in an effort to calculate accurate caloric and nutrient intake, for the losses incurred between production and consumption cannot be overemphasized and will even occur when food supplies are short (Harrison, Rathje & Hughes 1975, Mercado-Villavieja 1976). Additionally, the relationship between demographic factors and food wastage must be examined, in order to gain a more accurate interpretation of food consumption at the household level (VanDeReit 1985).

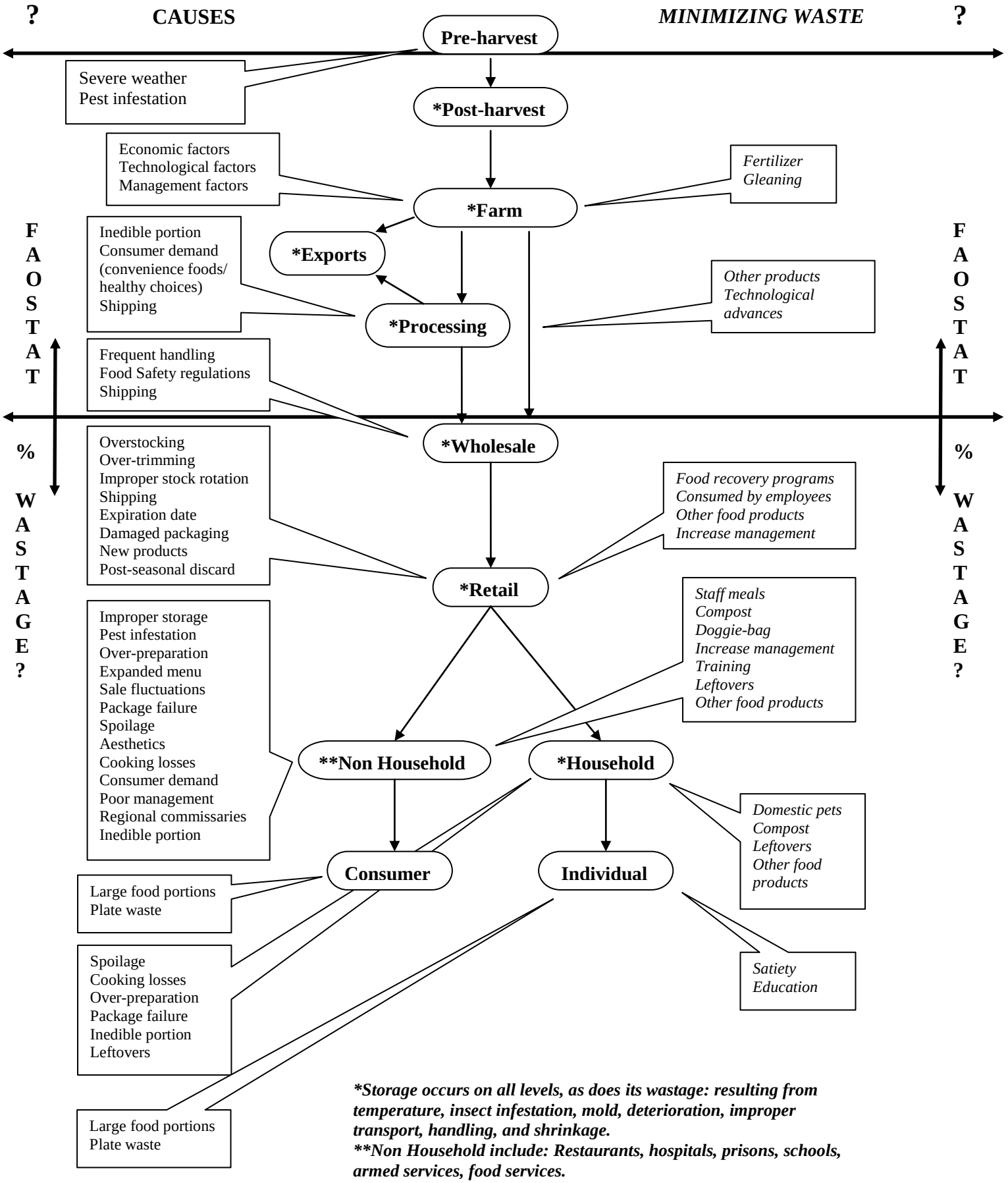
2.0 OBSERVATIONS

2.1. Clarifying Terminology

One of the frequent concerns that arose when discussing the topic of food wastage with FAO staff and outside contacts and have been mentioned in the literature was the discrepancies in terminology. The following definitions are gleaned from the literature and related discussions. They are not necessarily reflective of information held within FAOSTAT.

- **Food Balance Sheets (FBS):** present a comprehensive view of a country's food supply during a specific reference period. Shows the sources of supply and use of each food item available for human consumption.
- **Food loss:** the average reduction in weight that occurs to an agricultural commodity as that commodity leaves the farm, is processed into final food products, and purchased for consumption at the retail and non-household level.
- **Food wastage or Edible food waste:** all edible food waste that is discarded throughout the entire food distribution system, most notably at the intra-household level, which is considered appropriate for human consumption but which is not consumed. This includes plate waste, foods that are spoiled, fed to pets, composted, put in garbage disposals or lost in preparation.
- **Household or Private household:** a household includes all the persons who occupy a housing unit. The occupants may be a single family, one person living alone, two or more families living together, or any other group of related or unrelated persons who share living arrangements.
- **Household Income/Expenditure/Budget Surveys:** provide detailed data on household income and expenditure for investigating the economic behaviours of consumers. They refer to the flow of foods into the household independent of its consumptive use and without taking into account food wastage and the specific foods eaten outside of the household.
- **Individual Food Consumption/Intake Surveys:** provides detailed data on all foods consumed by the individual at home and also food consumed away from home (i.e. any foods, beverages, and snacks eaten outside of the home). This information is obtained by weighing and measuring food items, and through the use of recorded dietary measurements.
- **Intra-household:** refers to both the (private) household and non-household sectors.
- **Non-edible (inedible) waste or Refuse:** the remains of food commodities not fit for human consumption that is discarded. This includes bones, peels, rinds, skin, etc. (In the literature the term ***household refuse*** is used to describe ALL garbage disposed of by a household, including non-edible and edible wastage.)
- **Non-household or Public household:** sector of the food distribution system that includes all restaurants, hospitals, prisons, schools, and food service establishments; i.e. all areas outside of the private household, where food may be consumed.

2.2. Flowchart- Examining the levels of Food Wastage



***Storage occurs on all levels, as does its wastage: resulting from temperature, insect infestation, mold, deterioration, improper transport, handling, and shrinkage.**

****Non Household include: Restaurants, hospitals, prisons, schools, armed services, food services.**

2.3. The concept of food wastage

2.3.1. Analysing the concept

The discarding of food should be viewed as an aspect of human behaviour, open to many different constraints, which are often quite different from those guiding food choices or those that might be expected from subjective experiences. Furthermore, distinctions should be made between the methods of measurement of waste and the methods of measurement of food intake (Dowler 1977).

2.3.2. Nutrient Losses

It should be made very clear in the FBS data, or anywhere that food availability figures are presented, that the corresponding nutrient values are a maximum and do not include wastage from food preparation and meals. As noted in a 1977 USDA report, an unforeseen "food waste" was the decline in nutrient values of food through certain vitamins being destroyed by heat, or diminished by washing and peeling, loss of moisture content, or storage. An important area of research would be to determine the extent of these nutrient losses, as they are of great concern (Mercado-Villavieja 1976), especially in developing countries. The implication for less-then-currently-estimated macronutrient and micronutrient intakes could potentially be significant because of an unreliable estimate of food wastage, effecting nutrition policies and programs.

2.4. Research Contacts

Over 60 individuals were contacted in an effort to collect research on the subject of intra-household food wastage. This included individuals from a number of Government Ministries, Agencies, Research Organizations, Academic Institutions, and staff members from the UN Agencies, including the FAO.

2.5. Limitations of Report

As of the date of this preliminary report, and to the extent possible, this document represents a fairly comprehensive compilation of information on the topic of intra-household food wastage, specifically at the household level. Considering the constraints on time, the complexity of the issue, the access to and volume of literature that has been researched, it represents a starting point for further discussion on the topic of food wastage.

2.6. Trends in the Literature

2.6.1. Figures are underestimated

One of the most prominent trends in the literature is that regardless of the methodology undertaken in the individual studies, many researchers believe that the estimates derived are low (Adelson, Asp & Noble 1961, Adelson et al 1963, Dowler 1977, Wenlock & Buss 1977, Wenlock et al 1980, Fung & Rathje 1982, Rathje 1984, VanDeReit 1985, Kantor et al 1997, Jones et al 2003).

2.6.2. Income correlations

Discrepancies due to sample size and other factors are rampant. Some studies have found that lower-income households have a smaller food loss rate then higher-income households (Fung & Rathje 1982, Chun 1986, Jones 2003). However, while Wenlock et al (1980) had similar results during the summer season, this relationship did not reach formal significance after effects due to household size and region had been removed. In a small study, Dowler (1977) found no correlation to income and food waste. Supporting this, VanDeReit concluded that household income was not linearly related to food waste (1985). Additionally, it has been noted that households with adequate storage facilities (i.e. refrigeration and enclosed cabinets), resources that are often linked with higher income, had

greater edible food wastage (Mercado-Villavieja 1976). Income could be viewed as a motivational factor in food efficiency, rather a deciding factor (Fung & Rathje 1982).

2.6.3. Household size

Some studies found a tendency for larger families to waste more food then smaller ones (Dowler 1977, Wenlock & Buss 1977, Wenlock et al 1980), while others contended that for larger families, and for those with small children, food wastage was a smaller concern (Fung & Rathje 1982).

2.6.4. Household knowledge

The strongest correlation between any household characteristic and overall quantity of food wastage was with the respondents' knowledge of food safety and quality (Harrison, Rathje & Hughes 1975, Fung & Rathje 1982). Those households with a greater knowledge wasted less. This was particularly marked during the summer, when less knowledgeable households tended to increase their waste due to confusion regarding food safety.

2.6.5. Research methodologies

The methodologies employed by researchers throughout the studies varied considerably, from weighing edible food waste to using 7-day diaries completed by household members to calculating caloric content of food to physically sorting garbage, among others. In some cases estimates were derived from loss coefficients based upon existing research. Because of this lack of standardization, it is difficult to identify any one methodology as the most effective or accurate. Also, it should be noted that most existing estimates on food wastage that rely on coefficients are generated from studies that were conducted during or prior to the 1970s. Marketing systems have changed dramatically in the last three-plus decades, putting this data in need of review and probable updates (Kantor 1998, Naska 2001). Note: for more specific details on individual food wastage studies, please refer to the Research Summary Table found in the appendix.

2.6.5.1. Sample Size

Some of the studies reviewed for this report used very small sample sizes (at times only friends and colleagues) while other studies encompassed larger numbers of study subjects (on regional or national levels). Ideally the sample size must be large for any reliable estimates of food wastage to be made, as factors such as the amount of disposable income, food prices and quality, the season of the year, foods given to domestic pets, the number of people in the household and the number of meals eaten at home versus outside of the home all impact the results (Wenlock & Buss 1977).

2.6.5.2. Archaeology and ethnographic accounts

Archaeological analyses of "artifacts" in a behavioural context are beginning to provide a unique new perspective on the structure and content of modern society. Physically sorting garbage, as an archaeological method, provides a unique view of nutrition and health, resource management, consumer behaviour, social inequality, waste management, and in determining the truth in reported actions, as well as producing higher quality data (Rathje 1984, DEFRA Food Wastage Pilot Survey 1998-99, Jones et al 2003). It can be used as an invaluable adjunct to other methods in an effort to determine methods of household wastage. Measuring waste through archaeological methods along with using information from household expenditure surveys may offer a more cost efficient means to bypass consumption survey methodology. It can also serve to avoid the complexities and bias of food consumption data collection when human responses and limitations are considered (i.e. consumers not able to accurately recall food intake through food diaries, 24 hour recalls, etc, or wastage), though this is more a limitation of the methodology itself (Harrison, Rathje & Hughes 1975). This is also less threatening and more acceptable to household members involved since direct participation is not necessary, thereby providing a non-reactive approach to counter behavioural biases (Jones et al 2003). The anthropological tool of

ethnographic accounts compliments this method by utilizing interviews, personal accounts, and observations in gathering qualitative data on specific areas of research.

2.6.6. Domestic Animals/Pets and Garbage disposals

In many of the studies reviewed domestic animals and garbage disposals were not accounted for in estimating household wastage, further contributing to inaccurate estimates (Harrison, Rathje & Hughes 1975, Wenlock & Buss 1977, Jones 2003). Families that fed edible waste to pets were allowed to continue in the studies by Wenlock and Buss (1977) and Wenlock et al (1980) but were asked to record the type and quantity of these foods. Overall, pets had an important influence on the amount of food entering the household and the magnitude of the household's food wastage, in some cases between 20-30% of the total (Wenlock et al 1980, Mercado-Villavieja 1976).

2.6.7. Issue of away-from-home food consumption and resulting wastage

Data from the USDA's food consumption surveys shows that food eaten outside of the home provided 32% of total energy consumption during 1994-1996. In 2001, nearly half of all money spent on food (calculated from food expenditure surveys) went towards away-from-home meals and snacks (USDA 2003). This illustrates the important point that wastage outside the household must be accurately accounted for in an effort to arrive at a reliable estimate of total food wastage. Currently, no reliable information exists for away-from-home food wastage (UK Food Standards Agency 2003). While some food consumption surveys attempt to collect information on foods that are obtained outside of the household this information can only be regarded as a rough estimate at best, due to participant biases (FAO Statistics Division 1983). New methods of data collection should be developed, or improvements should be made to the current methods of data collection and this information included, giving a more total account of actual food intake at the household level (FAO Statistics Division 1983).

2.6.8. Behaviours affect the measurements of household wastage

Understanding food wastage behaviours is extremely important and useful. In times of shortage, normal behaviour patterns appear to result in greater waste (Harrison, Rathje, & Hughes 1975, Fung & Rathje 1982, Rathje 1984). For example, if there is an increase in demand for a specific commodity (e.g. meat) the research shows that individuals will tend to over-purchase large quantities when it is available, and in some cases will buy food of a lesser quality, in an effort to obtain it. As a result a good deal of this commodity will be wasted in the end due to spoilage, etc. (Fung & Rathje 1982). In general, the purchase of low-quality or unfamiliar products may also contribute to this phenomenon. Notable behavioural reasons that effect the measurements of household waste estimates include negative implications on the part of the researchers in regards to household waste, thus causing a reduction in its accurate collection by household members; if the household member primarily responsible for food preparation is made aware of the amount of waste generated in his/her household that individual may change their practices; and difficulties inherent in measuring certain types of waste, i.e. liquid and scraps given to pets, particularly if the participant is busy (Dowler 1977, Wenlock & Buss 1977, Wenlock et al 1980, VanDeReit 1985, Jones et al 2003). By strictly using quantitative data, researchers may overlook the reasons for the behaviours that effect wastage, and therefore be unable to measure it.

2.6.8.1. Underreporting/Bias

Throughout the research some of the primary underlying reasons for bias of quantifying food wastage in the household were noted as both the impact on the consciences' of consumers who found they were wasting, and the time required to weigh and record data and the discrepancy in classifying items as edible or non-edible by consumers. Many studies have suggested that food intake surveys, which collect food consumption data through food

recalls, food records and food diaries over short periods of time, are subject to underreporting of consumption, especially when measured in terms of energy intake (Dowler 1977, VanDeReit 1985, Kantor 1998, Jones et al 2003). Some researchers have recognized and made adjustments in their studies to account for bias (Dowler 1977, Wenlock et al 1980, Rathje 1984). By reducing the amount of involvement from individual household members in estimating waste, a certain amount of reporting bias can be avoided, as has been observed through the use of archaeological methods. There are inherent moral implications to the action and reporting of food wastage (Harrison, Rathje & Hughes 1975, Fung & Rathje 1982), as well as human limitations such as poor recall, self-consciousness, or consumer privacy issues (FAO Statistics Division 1983, Naska 2001). Understanding behaviours will also aid in understanding food wastage trends (Harrison, Rathje & Hughes 1975, VanDeReit 1985).

2.6.9. Use of Qualitative Data

Qualitative data may assist in filling in some of the gaps between household expenditure survey data and food consumption data, possibly giving explanation as to the differences in research results and providing potential solutions to pressing issues. Another use of qualitative data is exploring post-retail wastage in developing countries, where waste could be higher due to lack of infrastructure, cold chains, household storage, etc, but could also be lower, as food accounts for a larger share of total incomes and subsistence farming is more important.

2.6.10. Household Wastage in Developing Countries

Though it is clearly important and desirable to establish an estimate of food wastage, identifying the factors of loss may prove to be equally as important as determining the actual percentage of loss itself. If these factors are known, steps can be taken to reduce the overall extent of food wastage even without a specific percentage having been identified (Kapsiotis 1977). The accuracy of national estimates of production and stock data seems to be the most questionable in developing countries when an appreciable part of its total production is subsistence-based. In countries such as the Philippines, where the typical diet is already relatively low in calories, any further reduction in calories due to waste must be taken seriously (Mercado-Villavieja 1976).

2.6.11. Household Wastage in Developed Countries

2.6.11.1. The US Model

The USDA has estimated food loss by applying existing loss coefficients gathered from published studies and through discussions with commodity experts regarding the amount of edible food available for human consumption. Using this method, the American estimate for caloric wastage at the combined wholesale, retail and non-household levels is 28.9%. One can extrapolate three possibilities from this percentage: (1) the number is inaccurate; (2) the US wastes considerable food, or (3) even with the high standards and efficiency in food services and technology present in the US this high number *is* accurate. This third possibility could mean that wastage may be even higher in countries whose food services and technology are of lower quality and efficiency. Certainly this is good reason for further examination and research. The US can be used as a model of how, with comprehensive availability data complimented by consumption data, actual intake can potentially be determined while simultaneously addressing the obvious issues of food wastage.

2.6.11.2. The UK Model

The Food Standards Agency (FSA) in the UK primarily bases its estimate on published studies (e.g. Dowler 1977, Wenlock and Buss 1977, Wenlock et al. 1980). FSA asserts that in each type of household 10% of all foods, and therefore of all nutrients available for consumption, are lost to wastage or spoilage in the kitchen or on the plate, or are fed to domestic pets and livestock.

2.7. Concerns

2.7.1. Double counting

It should be noted that the subject of double counting is in need of further examination. If you are using the terms refuse and food wastage (please refer to section 2.1) interchangeably, there is a potential risk for double counting when factoring in the deduction of non-edible waste.

2.8. Different uses of food wastage estimates within FAO

It should be acknowledged that each division approaches the topic of food wastage from the unique perspective of their specialty, reflecting the professional needs and uses of such data in their field. For example, ESSB is interested in obtaining an estimate of the total correct food wastage from Post Harvest to the Consumer (*availability* to *human consumption*), ultimately providing a range of food wastage within each geographical region, ideally as it relates to income groups. ESDG is interested in overall calorie intake and in commodity specific estimates. ESNA is concerned with the accuracy of the overall nutrient intake by including the estimate of food wastage.

2.8.1. Using FAOSTAT data

2.8.1.1. Understanding Food Wastage

A clear understanding of the percentage of food wastage at each step of the entire food distribution system is necessary to reach an accurate (without overlap, etc.) estimate of household food wastage. This is also vital in being able to compare data between sources (e.g. food that is given to subsistence animals is not considered waste since eventually it is consumed by the household, though food given to domestic pets would be considered waste). Ideally the final estimate for food wastage would provide a clear breakdown of percentage wastage at intermediate levels, along with an identification of which areas were not able to be measured.

2.8.1.2. Food balance sheets

"Between household consumption surveys and food balance sheets there lie discrepancies in waste from cooking, waste from spoilage, plate waste, meals not eaten at home (which are not included in some surveys), home production, in-kind payments, and food that does not reach the household from retail markets" (Jacobs & Sumner 2002). In an attempt to address the gap between these factors, studies that look at waste and spoilage, home production information, and increased data on meals eaten away from home must be performed. The projections made by the food balance sheet data on availability can differ considerably from consumption due to losses on the household and non-household level from storage, preparation and cooking, plate-waste, and food fed to domestic animals or thrown away. Improved food and agricultural analysis would include quality data addressing availability, consumption, prices, and the discrepancies between available food and consumed food, including losses incurred once in the hands of the consumer (FAO Statistics Division 1983, Jacobs & Sumner 2002).

3.0 SUMMARY OF FINDINGS

3.1. Results

While the majority of studies included in this report are from the UK and the US, a few are also from developing countries. The research literature has shown a 0% - 29% range of edible food wastage of calories per capita and total food supply by weight, with most figures falling within a more narrow range between 10% - 15%. Of these studies, most take into account household food wastage with few representing the retail and non-household levels. Most commodities fall between 0 - 32% of food wastage. You can see differences between and a 3% - 32% range of food wastage on specific selected commodities as well. In regards

to the relationship between food wastage and income, where information was available, five studies found a positive correlation and six found no correlation. It appears that the studies from developing countries, which also tend to have larger sample sizes, have lower percentages of food wastage then the developed countries included in this report. It seems that in the US, higher percentages of food wastage have been recorded but it should be noted that in some cases wastage was accounted for on multiple levels beyond the household. While much can be interpreted from the above studies, one must proceed with caution when interpreting such information because of the numerous differences in definitions, methodologies, sample size or type, portion sizes, cultural differences, and demographics. Please refer to sections 3.2 and 3.3 for more details.

3.2. Research Summary Table

Article	Location	% Wastage	Methodology	Income	Basis for Research
Adelson, S. Asp, E. and Noble, I. 1961. Household Records of Foods Used and Discarded. *Journal of American Dietetic Association*. 39: 578-584.	US	7-10% total calories of HH	Household food waste was weighed and recorded by the respondents over a 7-day period. Goal of study was to determine the caloric value of various categories of food that were discarded at the HH level. Volunteer respondents from a small non-representative sample; noted that behaviours were changed through participation in study.	Lower income HH discarded more meat.	USDA Food Consumption Surveys
Adelson, S., Delaney, I., Miller, D., & Noble, I. 1963. Discard of edible food in households. *Journal of Home Economics*. 55, 633-638.	US	7-10% total calories of HH	Household food waste was weighed and recorded by the respondents over a 7-day period. Goal of study was to determine the caloric value of various categories of food that were discarded at the HH level. Volunteer respondents from a small non-representative sample; noted that behaviours were changed through participation in study.	Lower income HH discarded more meat.	USDA Food Consumption Surveys
Chun, S., Lee, D., Chang, H., Chun, H. and Jung, S. 1986. Food handling practices and processing at village and household levels in Republic of Korea. Rural Nutrition Institute, Rural Development Admin. Food and Agriculture Organization of the U.N.	Korea	4-25% Vegetable 0-14% Meats <5% Pulses/sea weed 3.4% & 4.1% Rice (/per day)	Random sampling of 603 *rural farm* households. Conducted 4 times a year by questionnaire interview and practical measurement (1984-86). Ratio of losses and discards of food, analysis of factors affecting the waste of food, waste rate and related matters to waste of rice. Food weights were measured from production and purchase to preparation for a meal; waste and loss percentage of individual foods were investigated.	A correlation between rural household income and the waste rate of rice.	*Prepared for FAO.
Chatfield, C. 1956. Expert Committee on Calorie Requirements. Allowance for Waste. For the Food and Agriculture Organization of the United Nations. Working Paper No. 4. Rome.	UK US Tunisia Paraguay Latin America	10% Developing <2800 Kcal 10-15% Developed >2800 Kcal (/per day)	Research review based upon edible waste measured in homes (3), institutions (1), in homes as inferred from high recorded consumption (5).	A correlation between wealthier HH wasted more than poorer HH. More food was wasted by rural than urban communities.	*Prepared for FAO.

Article	Location	% Wastage	Methodology	Income	Basis for Research
Dowler, E. 1977. A pilot survey of domestic food wastage. *Journal of Human Nutrition*, 31: 171-180.	UK	0-12% total edible food weight (per HH/day)	Obtained data on leftover food over 7 consecutive days from 25 HH. Weighed inventory of prepared food for consumption. Collected and weighed all edible waste, including preparation and plate waste to determine its energy, protein and fat content by analysis. Scales and measuring jugs for weighing, a record book and written instructions provided.	Social class and socioeconomic groups were not related to percentage of available food and nutrients remaining (waste).	HH food records converted-Food Conversion Tables
Food and Nutrition Research Institute. 1993. National Nutrition Survey: Food Consumption Survey. Dept. of Science and Technology. Tables A.8.1-A.8.3. Philippines.	Philippines	3.7% Kcal (per person/ day) 5% Rice (per person/day)	Unpublished tables provided by Nutritional Assessment and Monitoring Division, Food and Nutrition Research Institute. Methodology for study not available.	No Information	DOST Fourth National Nutrition Survey
Fung, E., & Rathje, W. 1982. How we waste $31 billion in food a year (pp. 352-357). In J. Hayes (Ed.). The 1982 Yearbook of Agriculture. Washington, DC: US Government Printing Office.	US	10% total edible food weight (6-25%) per year	Nine years worth of data. Involves sorting refuse to calculate quantity of foods purchased (Net weights and fluid volumes), the quantity of foods wasted by summing the actual weights of discarded foods. Absolute weight of once-edible foods found in residential refuse represents the minimum level of HH food waste. Interviews and Panel discussions.	Low-income populations tend to discard less edible food overall as well as a lower proportion of single identifiable items.	HH Food Consumption Surveys
Harrison, G., Rathje, W. and Hughes, W. 1975. Food Waste Behaviour in an Urban Population. *Journal of Nutrition Education*. 7, 13-16.	US	8.9-9.7% total edible food weight (21.3% of HH had garbage disposals; not accounted) per year	Randomly selected 222 HH (1973) and 350 (1974) from 66 urban census tracts. Sanitation Dept. made one-time collections of all HH refuse over a 4-month period. Pooled all data collected, thus data analysis is based on the census tract as the unit sampled. Items were sorted in 133 categories; 52 categories referred to food items. Waste was defined as once edible foods except for meat fat. Further separated in straight waste and plate scrapings and weighed. Didn't include beverage waste.	No Information	1970 US Federal Census Data

Article	Location	% Wastage	Methodology	Income	Basis for Research
Jones, T., Bockhorst, A., McKee, B. and Ndiaye, A. 2003. Percentage of Food Loss in the Household. Unpublished paper. Bureau of Applied Research in Anthropology. Tucson: US.	US	14% total edible food weight HH/ day (Veg. 32%, fruits 27%, grains 20%, meat 15%, fats/oils 8%, liquid 2 %.)	All households in each of 4 areas for each study were sampled and efforts were made to ensure comparable analytical categories. Data on food purchased and brought into the household was collected using food purchasing receipts (including grocery, convenience stores and restaurants) for a 2 week period on 17 HH. Interviews were conducted regarding HH composition, socioeconomic status, food storage and waste disposal facilities and food consumption and disposal habits.	No Information	HH Food Loss Refuse Data. Methods ensured data collected was comparable with previous HH refuse data and household interview data.
Jones, T. 2003. Using Contemporary Archaeology and Anthropology to Understand Food Loss in the American Food System. Unpublished paper. Bureau of Applied Research in Anthropology. Tucson: US.	US	14% total edible food weight per HH/year 4-10% (avg.) Restaurants 6% Transport per year	The project documented and quantified food loss throughout the production and marketing system using a combination of primary data collection, interviews with commodity/industry experts, site visits, and secondary data sources. Food losses were measured in weight, value and as a percentage of available food supplies. HH losses did not include garbage disposal, compost piles and domestic pets.	Lower income HH have lower food loss rates than higher income HH.	Retail, household and foodservice losses are estimated using hand-sorted refuse data.
Kantor, L. 1998. A Dietary Assessment of the U.S. Food Supply: Comparing per capita food consumption with Food Guide Pyramid serving recommendations. Food and Rural Economics Division, Economic Research Service. USDA. Report No. 772.	US	27% total edible and non-edible food weight per year (retail, foodservice, consumer)	The percentage calculated included retail, foodservice and consumer losses, changes in weight due to cooking (where appropriate), and the discard of non-edible food parts. Food loss was defined as the average reduction in weight occurring to an agricultural commodity leaving the farm, as it is processed into final food products, and purchased for consumption in supermarkets and eating places. It is estimated by applying existing loss coefficients, gathered from published literature and commodity experts, to the amount of food available from 1970-96. This does not include HH food wastage.	No Information	USDA Food Supply Data. USDA Nutrient Database for Standard Reference

Article	Location	% Wastage	Methodology	Income	Basis for Research
Kantor, L., Lipton, K., Manchester, A. and Oliveira, V. 1997. Estimating and Addressing America's Food Losses. *Food Review*.	US	26% (Intra HH) <2% Retail per year	Food loss was estimated by applying loss factors, gleaned from published studies and discussions with commodity experts. Included total edible and non-edible food waste.	No Information	National Food Supply and Utilization Data (USDA ERS)
Mercado-Villavieja, G. 1976. A Study of Household Edible Food Wastage in Four Regions of the Philippines. *Philippine Journal of Nutrition*. January-June: 45-61.	Philippines	2.44%-6.25% calories/day (68-96% of total HH had rice wastage) 3-8% rice weight per day	Four out of ten regions selected. 4 non-consecutive years covering a total of 1228 sample households using the multi-stage sampling technique. Data on edible food wastage in HH using a 3-day weighing technique. Included all edible food wastes, even those fed to subsistence animals.	Food expense/ capita/day bear a direct relationship to the amount edible food waste. Increase in edible wastage with food expense increase.	Food and Nutrition Research Centre (FNRC) Dietary Surveys
Naska, A., Paterakis, S., Eckman, H., Remaut, A. and Trygg, K. 2001. Methodology for rendering household budget and individual nutrition surveys comparable, at the level of the dietary information collected. *European Journal of Public Health Nutrition*. 4 (5):1153-58.	Europe	10% wastage factor to allow for wastage of edible food	In the analysis, a factor of 10% for household wastage was applied to all food items recorded in all Household Budget Surveys. This figure is based upon the 10% figure accounting for the wastage of edible food which is utilized by the British Ministry of Agriculture Fisheries and Food (MAFF), the organization responsible for the longest run series of household budget surveys.	No information	Household Budget Surveys
Rathje W. 1984. The Garbage Decade. *American Behavioural Scientist*. 28:9-29.	US	10-15% (300 g/ HH/day) of edible food purchased (includes GD factor)	The Garbage Project began its study of waste by recording the weight of all food items in refuse that was considered edible or once-edible. Inedible portion was not included. The proportion of food losses ground in Garbage Disposals (GD), which varies by food group, was about 50%. This wastage figure represents the minimum of loss, only that which was weighed.	Notes strongest correlation between HH characteristic and overall quantity of wastage is not with income but with respondent's food knowledge.	Based upon 10 years of consistent records from refuse collection.

Article	Location	% Wastage	Methodology	Income	Basis for Research
USDA. 2003. *Agriculture Factbook 2001-2002.* Chapter 2. United States Department of Agriculture, Office of Communications. Washington: USA.	US	28.9% of total available calories lost to edible food wastage	The USDA Agriculture Fact Book 2001-2002 provides information on the broader trends in American agriculture, as well as on USDA programmes, food consumption and the agricultural sector. Based upon data from the NHANES and CSFII information.	No Information	USDA's Centre for Nutrition Policy and Promotion, USDA's Economic Research Service (ERS)
VanDeReit, S. 1985. Food Discards: Nature, Reasons for Discard, and Relationship to Household Variables. A Thesis Submitted to Oregon State University in partial fulfilment of the requirements for the degree of Doctor of Philosophy. Oregon State University, Corvallis: US.	US	6% total edible food waste (1631 g per week/7 days per week/4 people per household = 58 g discarded daily)	243 households participated in personal interviews and a 7 day record of discarded foods, the approximate amount, the reason for discard, and if the discarded food was given to a domestic or wild animal; 2 interviewer telephone calls were made. The discarded foods listed were placed into eight categories of reason for discard. The discarded foods were placed in bags by respondents and weighed. Foods that were judged unsafe to eat were collected over a 3 day period for a sub-sample of 50 households.	Gross 1983 incomes were not linearly related to amounts of discard. Trends seen in food discard interpretations re: food safety and food quality.	Food Composition Tables
Wenlock, R., and Buss, D. 1977. Wastage of edible food in the home: a preliminary study. *Journal of Human Nutrition.* 31: 405-411.	UK	6% total edible food weight per HH/ day	Involved 52 families of the Ministry Food Science and Food Standards Divisions. Survey conducted to estimate the total amount of food cooked or served during 1 week collecting all uneaten potentially edible food. All foods were weighed and recorded in logbooks. No account for foods eaten outside of HH. Only edible waste was measured. Food given to pets was measured. All wastage was analyzed for water, protein, fat, and ash along with a resulting energy content calculation.	No Information	National Food Survey records

Article	Location	% Wastage	Methodology	Income	Basis for Research
Wenlock, R., Buss, D., Derry, B. and Dixon, E. 1980. Household food wastage in Britain. *British Journal of Nutrition.* 43: 53-70.	UK	Total edible food weight 6.5% summer and 5.4% in winter (difference significant at P<0.05) per HH/week	334-338 HH took part in the study. Retention of all edible food wastage for 1 week was collected as well as the keeping of a diary of the main foods eaten by the household. Wastage did not include some beverages, confectionaries or those meals eaten outside the home except for meals that originated in the home. Containers (6 categories) were provided for daily collection. Age and sex of each HH member, and the income group of the head of HH was also recorded. Conformed to National Food Survey (NFS) methodology. Foods given to pets were recorded and included, though not collected. Energy contents were measured using a ballistic bomb calorimeter.	The relationships between income and wastage did not reach formal significance after effects due to differences in household size and region had been removed using standard regression techniques.	National Food Survey records

3.3. Food Wastage Summary Charts

3.3.1. Table 1- KCAL Intra-household Food Wastage Percentages

Criteria	Range (per/day)	Method	Sample type	Sample Size	Type of wastage	Relation to Income	Country	Reference
KCAL (>2800)	10-15%	*Research Review*	Household Institution	Varied	Edible waste	Positive correlation	Tunisia UK US	Chatfield, C. 1956
	28.9% (of available calories)	Expenditure & Consumption Surveys	Intra HH Retail	Varied	Edible waste	No information	US	USDA 2003
	7-10% total calories of HH	Food Weight and Records	Household	Volunteers	Edible waste	No correlation	US	Adelson, S. Asp, E. and Noble, I. 1961
	7-10% total calories of HH	Food Weight and Records	Household	Volunteers	Edible waste	No correlation	US	Adelson, S. et al. 1963
KCAL (<2800)	10%	*Research Review*	Household	Varied	Edible waste	Positive correlation	Guatemala Honduras Costa Rica Cuba El Salvador Panama Peru	Chatfield, C. 1956
	10%	*Research Review*	Household	Varied	Edible waste	Positive correlation	Paraguay	Chatfield, C. 1956
	2.44-6.25%	*Food Weight* Dietary Surveys	Household	1228 HH	Edible waste	Positive correlation	Philippines	Mercado-Villavieja, G. 1976
	3.7%	Food Consumption Surveys	Household	Varied	Edible waste	No information	Philippines	Food and Nutrition Research Institute 1993

3.3.2. Table 2- FOOD SUPPLY WEIGHT Intra-household Food Wastage Percentages

Criteria	Range (per/day)	Method	Sample type	Sample Size	Type of wastage	Relation to Income	Country	Reference
FOOD SUPPLY	4-25%	*Food Weight* Questionnaire	Rural Farm Household	603 HH	Non-edible & Edible waste	Positive correlation	Korea	Chun, S. K. et al. 1986
(WEIGHT)	0-12%	*Food Weight* HH Food records	Household	25 HH	Edible waste	No correlation	UK	Dowler, E. 1977
	6-25%	*Sorting refuse* Food Weight	Household	Varied	Edible waste	Positive correlation	US	Fung, E. and Rathje, W. 1982
	14%	*HH food receipts* HH F. Loss Refuse Data	Household	17 HH	Edible waste	No information	US	Jones, T. et al. 2003
	14%	*Food Weight* HH F. Loss Refuse Data	Household	Varied	Edible waste	Positive correlation	US	Jones, T. 2003
	4-10%	*Food Weight* F. Loss Refuse Data	Restaurant	Varied	Edible waste	Positive correlation	US	Jones, T. 2003
	27%	Application of known food loss factors	Intra HH Retail	Varied	Edible waste	No information	US	Kantor, L. et al. 1997
	10-15%	*Food Weight* Refuse sorting	Household	Varied	Edible waste	No correlation	US	Rathje W. 1984
	6%	*Food Weight* 7-day record	Household	243 HH	Edible waste	No correlation	US	VanDeReit, S. 1985
	6% (per week)	*Food weight* Logbooks	Household	52 HH	Edible waste	No information	UK	Wenlock, R. and Buss, D. 1977
	5.4-6.5% (per week)	*Food weight* 1 Week food diary	Household	672 HH	Edible waste	No correlation	UK	Wenlock, R. et al. 1980
	8.9-9.7% (per year)	*Food Weight* Garbage sorting	Household	572 HH	Edible waste	No information	US	Harrison, G., Rathje, W. and Hughes, W. 1975
	27%	Application of known food loss factors	Up to HH	Varied	Edible waste	No information	US	Kantor, L. 1998
	10%	Wastage factor to allow for wastage of edible food (based on MAFF)	Household	Varied	Edible waste	No information	Europe	Naska, A. et al. 2001

3.3.3. Table 3- COMMODITY CATEGORY Intra-household Food Wastage Percentages

Criteria	Range (per/day)	Method	Sample type	Sample Size	Type of wastage	Relation to Income	Country	Reference
COMMODITY CATEGORY								
Vegetables	0-14%	*Food Weight* Questionnaire	Rural Farm Household	603 HH	Non-edible & Edible waste	Positive correlation	Korea	Chun, S. K. et al. 1986
	32%	*HH food receipts* HH Food Loss Refuse Data	Household	17 HH	Edible waste	No information	US	Jones, T., et al. 2003
	32%	Application of known food loss factors	Retail Foodservice Consumer	Varied	Edible waste	No information	US	Kantor, L. 1998
Fruits	27%	*HH food receipts* HH Food Loss Refuse Data	Household	17 HH	Edible waste	No information	US	Jones, T., et al. 2003
	32%	Application of known food loss factors	Retail Foodservice Consumer	Varied	Edible waste	No information	US	Kantor, L. 1998
Meats	<5%	*Food Weight* Questionnaire	Rural Farm Household	603 HH	Non-edible & Edible waste	Positive correlation	Korea	Chun, S. K. et al. 1986
	15%	*HH food receipts* HH Food Loss Refuse Data	Household	17 HH	Edible waste	No information	US	Jones, T., et al. 2003
	16-32%	Application of known food loss factors	Retail Foodservice Consumer	Varied	Edible waste	No information	US	Kantor, L. 1998
Grains	20%	*HH food receipts* HH Food Loss Refuse Data	Household	17 HH	Edible waste	No information	US	Jones, T., et al. 2003

Criteria	Range (per/day)	Method	Sample type	Sample Size	Type of wastage	Relation to Income	Country	Reference
Dairy	32%	Application of known food loss factors	Retail Foodservice Consumer	Varied	Edible waste	No information	US	Kantor, L. 1998
	22%	Application of known food loss factors	Retail Foodservice Consumer	Varied	Edible waste	No information	US	Kantor, L. 1998
Fats/oils	8%	*HH food receipts* HH Food Loss Refuse Data	Household	17 HH	Edible waste	No information	US	Jones, T., et al. 2003
	21-51%	Application of known food loss factors	Retail Foodservice Consumer	Varied	Edible waste	No information	US	Kantor, L. 1998
Liquid	2%	*HH food receipts* HH Food Loss Refuse Data	Household	17 HH	Edible waste	No information	US	Jones, T., et al. 2003

3.3.4. Table 4- COMMODITY SPECIFIC Intra-household Food Wastage Percentages

Criteria	Range (per/day)	Method	Sample type	Sample Size	Type of wastage	Relation to Income	Country	Reference
COMMODITY SPECIFIC								
Almonds	16%	Application of known food loss factors	Retail Foodservice Consumer	Varied	Edible waste	No information	US	Kantor, L. 1998
Apples	32%	Application of known food loss factors	Retail Foodservice Consumer	Varied	Edible waste	No information	US	Kantor, L. 1998
Corn	32%	Application of known food loss factors	Retail Foodservice Consumer	Varied	Edible waste	No information	US	Kantor, L. 1998
Lamb	17%	Application of known food loss factors	Retail Foodservice Consumer	Varied	Edible waste	No information	US	Kantor, L. 1998
Rice	4.1%	*Food Weight* Questionnaire	Rural Farm Household	603 HH	Edible and Non-edible waste	Positive correlation	Korea	Chun, S. K. et al. 1986
	3-8%	*Food Weight* Dietary Surveys	Household	1228 HH	Edible waste	Positive correlation	Philippines	Mercado-Villavieja, G. 1976
	22%	Application of known food loss factors	Retail Foodservice Consumer	Varied	Edible waste	No information	US	Kantor, L. 1998
Sea weeds/pulses	3.4%	*Food Weight* Questionnaire	Rural Farm Household	603 HH	Edible and Non-edible waste	Positive correlation	Korea	Chun, S. K. et al. 1986
Yogurt	32%	Application of known food loss factors	Retail Foodservice Consumer	Varied	Edible waste	No information	US	Kantor, L. 1998

4.0 RECOMMENDATIONS

4.1. Areas for further research

4.1.1. Further non-household research

Additional research should be conducted in the area of retail and non-household sectors, i.e. restaurants, schools, hospitals, and food service establishments. While a relatively large body of literature exists the full extent of it was unable to be included in this report, primarily due to time constraints and access to resources.

4.1.2. In-depth analysis

Ideally a few countries could be identified, one per region, for an in-depth analysis. Food consumption surveys and household expenditure surveys should be utilized, among other tools. The resulting data would provide a starting point for determining percentage wastage estimates, since these figures will be inherently reflective of the individual cultures and countries that are being examined. The level of wastage estimated will reflect the diverse commodities consumed and the existing cultural habits (i.e. usage) for each region. As regional and global averages may mask considerable differences between countries, it would be therefore advisable to include and examine country-specific data.

4.1.3. Empirical work

Further work should be conducted in the following areas, among others: (1) comparing national representative food expenditure surveys with food consumption surveys broken down by commodity; (2) comparing nationally representative food expenditure surveys with the DES by commodity; (3) gathering information about actual waste at each step of the entire food distribution system and confirming existing estimates (including processing and the marketing chain); and (4) comparing waste estimates in the research with implicit waste in commonly used databases.

4.1.4. Household Surveys

The inventory of household expenditure and consumption surveys provided in this report should be expanded upon to include additional country-specific information outlining the name and year of each survey, population covered, sample size, dietary method and full reference. This information could aid in determining the usefulness of country-specific data in regards to future research on food wastage, as well as enabling this tool to be used for comparison purposes between studies. The inventory should provide, where possible, references for the most recent surveys that have been conducted.

4.1.5. Garbage data

An area in need of further examination regarding its relevance towards deriving an estimate of food wastage is that of garbage, or HH refuse, data. In addition to the work conducted at the University of Arizona, a number of national government ministries' waste management divisions have begun collecting data on overall household wastage. As has been noted, existing household biases may be reduced through the use of garbage collection. Using Income/Expenditure/Budget survey information along with HH refuse data may offer one of the most economical, expedient and accurate modes of estimating waste since it minimizes the role of the household members. The figures derived by this method would give an estimation of actual intake, which could then be compared to FBS data in order to identify discrepancies between the two sets of data.

4.2. Collaborative efforts

4.2.1. Opportunities for Partnerships

It is not necessary for FAO to undertake this effort alone. As a result of the research for this report a number of individuals at Academic Institutions, Research Organizations and Government Ministries have been identified as potential collaborators. These individuals possess expertise on the topic as well a keen interest to aid efforts to further the work so that

a more reliable estimate of food wastage may be determined. Also, professional staff from the Regional and Sub-regional Offices could be involved in gathering necessary data, potentially in partnership with pertinent local organizations.

4.2.2. Roundtable Discussion

Consideration should be given to organize a Roundtable Discussion with experts presently doing research on the topic of intra-household food wastage. The resulting output could be outlined as informal recommendations of how to proceed in obtaining a more reliable estimate of food wastage or to evaluate and discuss eventual determined estimates. Ideally, this would lead to further research being done with agreed-upon and consistent methodology so that results can be better compiled and utilized.

5.0 CONCLUSIONS

5.1. Estimate of Food Wastage

The purpose of this report is to provide the reader with an extensive review of the existing and available literature and research studies on the topic of intra-household wastage of food. Though larger than previously imagined the body of literature pertaining to this subject is still relatively small. Given the many issues involved with the diverse studies that have been conducted, not the least of which was the different methodologies that have been used, it would be premature to simply use the existing studies to base any reliably accurate estimates of food wastage at the intra-household level. Much more work is needed before determining any single figure or range of figures if an accurate and reliable estimate is a desirable outcome. If taken into consideration, any allowance for food wastage will cause a decrease in food availability and an increase in food requirement goals. Existing research supports the fact that food wastage at the household level cannot be considered insignificant, and calls for an increase in further studies and public awareness of this issue. Researchers and academics alike must bear in mind that error is inherent when using estimated figures, that availability is not the same as intake, and that even small amounts of waste throughout the food distribution system can be significant. As stated by the FAO Statistics Division in 1983, there is no replacement for accurate food consumption data when estimating food wastage and the number of undernourished in any given country.

6.0 BIBLIOGRAPHY

Adelson, S., Asp, E. and Noble, I. 1961. Household Records of Foods Used and Discarded. *Journal of American Dietetic Association*. 39: 578-584.

Adelson, S., Delaney, I., Miller, C. and Noble, I. 1963. Discard of edible food in households. *Journal of Home Economics*. 55: 633-638.

Bouis, H. and Haddad, L. 1992. Are Estimates of Calorie-Income Elasticities too High? *Journal of Development Economics*. 39: 333-364.

Chatfield, C. 1956. Expert Committee on Calorie Requirements. Allowance for Waste. For the Food and Agriculture Organization of the United Nations. Working Paper No. 4. Rome: 15-22 May.

Chun, S., Lee, D., Chang, H., Chun, H. and Jung, S. 1986. Food handling practices and processing at village and household levels in Republic of Korea. Rural Nutrition Institute, Rural Development Administration. For the Food and Agriculture Organization of the United Nations.

Cutler, D., Glaeser, E. and Shapiro, J. 2003. Why have Americans become more Obese? National Bureau of Economic Research. Working Paper Series No. 9446. Cambridge: USA.

Dowler, E. 1977. A pilot survey of domestic food wastage. *Journal of Human Nutrition*. 31: 171-180.

FAO. 1983. *A comparative study of food composition data from Food Balance Sheets and household surveys.* FAO Economic and Social Development Paper, Statistics Division, No. 34. Rome: Food and Agriculture Organization of the United Nations.

FAO. 1988. *Review of food consumption surveys: 1988.* FAO Economic and Social Development Paper, No. 44. Food Policy and Nutrition Division. Rome: Food and Agriculture Organization of the United Nations.

FAO. 1993. *Compendium of food composition statistics from household surveys in developing countries.* FAO Economic and Social Development Paper, No. 116/1 Asia. Rome: Food and Agriculture Organization of the United Nations.

FAO. 1994. *Compendium of food composition statistics from household surveys in developing countries.* FAO Economic and Social Development Paper, No. 116/2 Africa, Latin America and Oceania. Rome: Food and Agriculture Organization of the United Nations.

FAO. 2003. FAO estimates of food deprivation—methodology. FAO Statistics Division, June 2003, Rome.

UK National Statistics. 2000. Food Wastage Pilot Survey: Part of the National Food Survey (NFS). Department of Environment, Food and Rural Affairs (DEFRA). United Kingdom.

Fung, E. and Rathje, W. 1982. How we waste $31 billion in food a year. The 1982 yearbook of agriculture. J. Hayes (Ed.): 352-357. US Government Printing Office.
Washington, DC: USA.

Guerron-Montero, C. and Moreno-Black, G. 2001. Household Structure and Dietary Patterns in the Afro-Ecuadorian Highlands. *Food and Nutrition Bulletin*. 22(1): 23-30.

Harrison, G., Rathje, W., and Hughes, W. 1975. Food Waste Behaviour in an Urban Population. *Journal of Nutrition Education*. 7: 13-16.

Jerome, N. 1981. The U.S. Dietary Pattern from an Anthropological Perspective. *Food Technology*. 35(2): 37-42.

Jones, T., Bockhorst, A., McKee, B. and Ndiaye, A. 2003. Household food loss perceptions: Results of the household interviews. Unpublished paper. Bureau of Applied Research in Anthropology. University of Arizona. Tucson: USA.

Jones, T. 1999-2000. USDA Commercial Food Establishment Food Loss Annual Report. University of Arizona. Tucson: USA.

Jones, T., Bockhorst, A., McKee, B. and Ndiaye, A. 2003. Percentage of Food Loss in the Household. Unpublished paper. Bureau of Applied Research in Anthropology. University of Arizona. Tucson: US.

Jones, T. 2003. Using Contemporary Archaeology and Anthropology to Understand Food Loss in the American Food System. Unpublished paper. Bureau of Applied Research in Anthropology. University of Arizona. Tucson: USA.

Kantor, L. 1998. *A Dietary Assessment of the U.S. Food Supply: Comparing per capita food consumption with Food Guide Pyramid serving recommendations.* Food and Rural Economics Division, Economic Research Service. USDA. Report No. 772.

Kantor, L., Lipton, K., Manchester, A. and Oliveira, V. 1997. Estimating and Addressing America's Food Losses. *Food Review*.

Kapsiotis, G. 1977. *Food Losses and waste in the rural household.* Study Commissioned for World Conference on Agrarian Reform and Rural Development. Home Economics and Social Programmes Service, Human Resources Institutions and Agrarian Reform Division.

Lester, I. 1994. Food and Nutrient Intakes. Australia's Food and Nutrition. Australian Institute of Health & Welfare. Australian Government Publishing.
Mathews, R. 1994. Is the Damage Done? *Progressive Grocer*. June: 35-38.

Mercado-Villavieja, G. 1976. A Study of Household Edible Food Wastage in Four Regions of the Philippines. *Philippine Journal of Nutrition*. January-June: 45-61.

Naska, A., Paterakis, S., Eckman, H., Remaut, A. and Trygg, K. 2001. Methodology for rendering household budget and individual nutrition surveys comparable, at the level of the dietary information collected. *European Journal of Public Health Nutrition.* Vol. 4, No. 5(B): 1153-58.

Naska, A., Vasdekis, V. and Trichopoulou, A. 2001. A preliminary assessment of the use of household budget survey data for prediction of individual food consumption. *European Journal of Public Health Nutrition.* Vol. 4, No. 5(B): 1159-65.

Putnam, J., Kantor, L. and Allshouse, J. 2000. U.S. Per Capita Food Supply Trends: Progress Toward Dietary Guidelines. *Food Review*.

Rathje, W. 1984. The Garbage Decade. *American Behavioural Scientist*. 28:9-29.

Schmidhuber, J. 2003. Long-term changes in food consumption patterns: Emerging concerns and policy options. Prepared for the FAO Scientific Workshop on Globalization of the Food System. Unpublished paper. Rome: Italy.

Smith, L. 1998. Can FAO's Measure of chronic undernourishment be strengthened? IFPRI Discussion Paper Briefs. No. 44.

Smith, L. 2002. Keynote Paper: The use of household expenditure surveys for the assessment of food insecurity. Proceedings: Measurement and Assessment of Food Deprivation and Undernutrition. FIVIMS. Food and Agriculture Organization of the United Nations. Rome: Italy.

Subramanian, S. and Deaton, A. 1996. The Demand for Food and Calories. *Journal of Political Economy*. 104(1): 133-162.

Trant, M. 1994. Introduction to Food Balance Sheets. FAO QBS. 7: 2/3/4.

Trichopoulou, A. and Naska, A. 2003. European food availability databank based on household budget surveys. *European Journal of Public Health*. 13(1): 24-28.

USDA. 1977. General Accounting Office. Food Waste: An Opportunity to Improve Resource Use. Report to Congress by the Comptroller General of the United States. Washington, DC: USA.

USDA. 1996. Food Recovery and Gleaning Initiative. A Citizen's Guide to Food Recovery. Washington, DC: USA.

USDA. 2003. *Agriculture Factbook 2001-2002.* Chapter 2. United States Department of Agriculture, Office of Communications. Washington, DC: USA.

VanDeReit, S. 1985. *Food Discards: Nature, Reasons for Discard, and Relationship to Household Variables.* A Thesis Submitted to Oregon State University in partial fulfilment of the requirements for the degree of Doctor of Philosophy. Oregon State University. Corvallis: USA.

Verger, P., Ireland, J., Moller, A., Abravicius, J., De Henauw, S., and Naska, A. For the EFCOSUM Group. 2002. Improvement of comparability of dietary intake assessment using currently available individual food consumption surveys. *European Journal of Clinical Nutrition.* 56 (Supplement 2): S18-S24.

Wenlock, R. and Buss, D. 1977. Wastage of edible food in the home: a preliminary study. *Journal of Human Nutrition.* 31: 405-411.

Wenlock, R., Buss, D., Derry, B. and Dixon, E. 1980. Household food wastage in Britain. *British Journal of Nutrition.* 43: 53-70.

7.0 APPENDICES

7.1. Appendix I: Bibliography of Additional Relevant Sources

The following sources have been identified as potential resources in furthering the research on the topic of intra-household food wastage. Due to constraints on time and access to information, they were unable to be retrieved for use in the preliminary research report.

Almdal, T. et al. 2003. Food production and wastage in relation to nutritional intake in a general district hospital: Wastage is not reduced by training the staff. *Clinical Nutrition.* 22(1): 47-51.

Arnell, G. and Badham, D. 1949. The losses of edible food due to plate waste in army dining halls. *British Journal of Nutrition.* 2: 310-13.

Audit Scotland. 2003. Catering for Patients. Key findings/ Prepared for the Auditor General for Scotland. November.

Banks, G. and Collinson, R. 1981. Food wastage in catering. *Proceedings of the Institute of Food Science and Technology.* 14 (4): 181-89.

Barton, A. et al. 2000. High food wastage and low nutritional intakes in hospital patients. *Clinical Nutrition.* 19(6): 445-449.

Becker, W. 2001. Comparability of household and individual food consumption data- evidence from Sweden. *Public Health Nutrition.* 4(5B): 1177-1182.

Bender, W. 1994. An end use analysis of global food requirements. *Food Policy.* 19 (4): 381-395.

Bouis, H. 1994. The Effect of Income on Demand for Food in Poor Countries: Are our Food Consumption Databases Giving us Reliable Estimates? *Journal of Development Economics.* 44: 199-226.

Bull, N. and Wheeler, E. 1986. A study of different dietary survey methods among 30 civil servants. *Human Nutrition and Applied Nutrition.* 40 (1): 60-66.

Buss, D. 1991. Food patterns in the British Isles. *Annals of Nutrition Metabolism.* 35 (Supplement 1): 12-21.

Comstock, E., St Pierre, R. and Mackierman, Y. 1981. Measuring individual plate waste in school lunches. *Journal of the American Dietetic Association.* 79: 290-96.

Dowler, E. and Ok Seo, Y. 1985. Assessment of energy intake: Estimates of Food Supply versus measurement of food consumption. *Food Policy.* 10 (3): 278-288.

Edwards, J. and Nash, A. 1999. The nutritional implications of food wastage in hospital food service management. *Nutrition and Food Science.* March/April. 2: 89-98.

Fenton, J. et al. 1995. The nutritional implications of food wastage in continuing care wards for elderly patients with mental health problems. *Journal of Human Nutrition and Dietetics.* 8: 239-48.

Gallo, Anthony E. 1980. Consumer Food Waste in the United States. *National Food Review*. Fall: 13-16.

Gittelsohn, J. 1991. Opening the Box: Intra-household Food Allocation in Rural Nepal. *Social Science and Medicine*. 33: 1141-54.

Grivetti, L. and Pangborn R. 1973. Food Habit Research: A Review of Approaches and Methods. *Journal of Nutritional Education*. 5(3): 204-7.

Gryboski, K. 1995. The Importance of Qualitative Methods for Field-based Nutritional Research. *American Journal of Clinical Nutrition*. 62(1): 153-4.

Haddad, L. 1994. Strengthening food policy through intra-household analysis. *Food Policy.* 19 (4): 347-356.

Harrison, G. 1976. Socio-cultural correlates of food utilization and waste in a sample of urban households. Unpublished doctoral dissertation, University of Arizona, Tucson.

Harrison, G., et al. 1983. The food loss project: methodologies for estimating household food losses. USDA Report No. 59-32U4-05. Washington, D.C.

Himmelgreen, D. 2002. You Are What You Eat and You Eat What You Are: the Role of Nutritional Anthropology in Public Health Nutrition and Nutrition Education. *Nutritional Anthropology*. 25(1): 2-12.

Iwaoka, F. et al. 2001. A validation study on a method to estimate nutrient intake by family members through a household-based food-weighing survey. *Journal of Nutrition Science Vitaminol.* 47(3): 222-227.

Kaiser, L. 1991. Household Economic Strategies, Food Resource Allocation, and Intra-household Patterns of Dietary Intake in Rural Mexico. *Ecology of Food and Nutrition.* 27: 123-145.

Kirk, D. and Osner, R. 1981. Collection of data on food waste from catering outlets in a University and Polytechnic. *Proceedings of the Institute of Food Science and Technology*. 14 (4): 190-94.

Klesges, R., Eck, L. and Ray, J. 1995. Who underreports dietary intake in a dietary recall? Evidence from the Second National Health and Nutrition Examination Survey. *Journal of Consulting and Clinical Psychology*. 63(3): 438-444.

Mertz, W. 1992. Food intake measurements: is there a "gold standard"? *Journal of the American Dietetic Association.* 92(12): 1463-1465.

Mertz, W., Tsui, J., Judd, J., Reiser, S., Hallfrisch, J., Morris, E., Steele, P. and Lashley, E. 1991. What are people really eating? The relation between energy intake derived from estimated diet records and intake determined to maintain body weight. *American Journal of Clinical Nutrition.* 54(2): 291-295.

Morgan, K. et al. 1987. Collection of food intake data: an evaluation of methods. *Journal of the American Dietetic Association.* 87(7): 888-896.

Nelson, M., Dyson, P. and Paul, A. 1985. Family food purchases and home food consumption: comparisons of nutrient contents. *British Journal of Nutrition.* 54 (2): 373-387.

Nettleton, P., Day, K. and Nelson, M. 1980. Dietary survey methods. A comparison of nutrient intakes within families assessed by household measures and the semi-weighed method. *Journal of Human Nutrition.* 34(5): 349-354.

Rathje, W. 1978. "Food Utilization and Discard at the Household Level- A view from the Garbage Can." Key Issues in Population and Food Policy. Roman and Littlefield.

Rathje, W. et al. 1976. Food Loss at the Household Level: A Perspective from Household Residuals Analysis. Le Project Du Garbage, University of Arizona.

Rathje, W. and Ritenbaugh, C. 1984. Household Refuse Analysis: Theory, Methods, and Applications in Social Science. *Sage*.

Roy, R. 1976. Wastage in the UK food system. Earth Resources Research Publications.

Singer, D. 1979. Food losses in the UK. *Proceedings of the Nutrition Society.* 38(1): 181-186.

Stuff, J. et al. 1983. A comparison of dietary methods in nutritional studies. *American Journal of Clinical Nutrition*. 37(2): 300-306.

Thøgersen, John. 1996. Wasteful food consumption: Trends in food and packaging waste. *Scandinavian Journal of Management*. Vol. 12 (3): 291-304.

Todd, K., Hudes, M., and Calloway, D. 1983. Food intake measurement: problems and approaches. *American Journal of Clinical Nutrition*. 37: 139-146.

Van Garde, S. and Woodburn, M. 1987. Food Discard practices of householders. *Journal of the American Dietetic Association.* 87(3): 322-329.

Wu, M., Whittemore, A. and Jung, D. 1986. Errors in reported dietary intakes. Short-term recall. *American Journal of Epidemiology*. 124 (5): 826-35.

7.2. Appendix II: Inventory of Household Surveys

Listed alphabetically, the following is a fairly extensive listing of household surveys providing national level expenditure and/or consumption information representing 156/193 recognized countries. Note that all Household Surveys and Living Standards Measurement Study (LSMS) surveys include, at least in part, expenditure information. Where possible, the most recent surveys available are listed.

A

- Albania: Living Standards Measurement Survey (LSMS) 2002
- Albania: Household Budget Survey 2000
- Albania: Tirana Household Expenditure Survey 1994
- Algeria: Household Consumption Survey (Enquête sur les Dépenses de Consommation des Ménages) 1988
- Algeria: Household Expenditure Survey 1988
- Angola: The Luanda Household Budget and Nutrition Survey 1990
- Angola: Inquerito Prioritario Sobre as Condicoes de Vida dos Domicilios 1995
- Argentina: Rural Living Standard Survey 1996
- Armenia: Armenia Living Standards Survey 1996
- Armenia: Armenian Integrated Living Conditions Survey 2001
- Austria: Austrian Study on Nutritional Status (ASNS) 1991-94
- Austria: Austrian Study on Nutritional Status (ASNS) 1993-97
- Austria: Austrian Study on Nutritional Status (ASNS) 1995, 1998
- Azerbaijan: Azerbaijan Household Budget Survey 2001

B

- Bahamas: Household Expenditure Survey 1973
- Bangladesh: Household Expenditure Survey 1995
- Belarus: Income and Expenditure Survey 2002
- Belgium: Belgian Interuniversity Research on Nutrition and Health (BIRNH) 1980-85
- Belize: Survey of Living Conditions 1996
- Benin: Enquête sur les dépenses des ménages de Cotonou (UEMOA) 1996
- Bosnia and Herzegovina: Bosnia and Herzegovina Living Standards Measurement Survey 2001
- Botswana: Household Income and Expenditure Survey 1985
- Brazil: The Estudo Nacional da Despesa Familiar (ENDEF) 1974-75
- Brazil: Pesquisa Nacional por Amostra de Domicílios (PNAD) since 1976
- Bulgaria: Bulgarian Integrated Household Survey (BIHS) 2001
- Burkina Faso: Enquête sur les dépenses des ménages de Ouagadougou (UEMOA) 1996
- Burundi: Enquête sur les Dépenses de Consommation des Ménages de Bujumbura (EDCM) 1991

C

- Cambodia: Socio-Economic Survey 1999
- Canada: Family Food Expenditure Survey 2001
- Cape Verde: Inquerito as Despesas e Receitas Familiares 1999
- Central African Republic: Enquete Entegrale Budget/Consommation 1995
- Chad: Enquête sur la Consommation des Ménages et le Secteur Informel au Tchad (ECOSIT) 1995
- Chile: Caracterización Socioeconómica Nacional (CASEN) 1998
- China: China Rural/Urban Household Survey 1999

- China: National Survey of Income and Expenditure of Rural and Urban Households 1990
- Columbia: Caracterización Socioeconómica Nacional 1993
- Comoros: Enquête exploratoire budget-consommation 1995
- Congo (Brazzaville): Enquete sur les depenses de menage urbain 1989
- Congo, the Democratic Republic of: Enquête permanente auprès des ménages en milieu rural 1991
- Costa Rica: Household Income and Expenditure Survey 1987-88
- Côte d'Ivoire: The Côte d'Ivoire Living Standards Study (CILSS) 1986
- Côte d'Ivoire: Enquête sur les dépenses des ménages d'Abidjan (UEMOA) 1996
- Croatia: Household Budget Survey 1998
- Cyprus: Household Income and Expenditure Survey 1996-97
- Czech Republic: Czech Microcensus 1996

D

- The Data Food Networking Initiative (DAFNE) (based upon European Household Budget Surveys) 2003
- Denmark: National Dietary Survey 1995
- Denmark: National Continuous Dietary Survey 2000-02
- Djibouti: Enquête Budget-Consommation à Djibouti ville 1986
- Dominican Republic: Income-Expenditure Survey 1992
- Dominican Republic: Household Income and Expenditure Survey 1997

E

- Ecuador: Encuesta de Condiciones de Vida (ECV) 1998-99
- El Salvador: Encuesta de Ingresos y Gastos Familiares 1969
- Egypt: Egypt Integrated Household Survey (EIHS) 1997
- Egypt: Household Expenditure and Consumption Survey (HECS) 1999
- Eritrea: Household Health status, utilization and expenditure survey 1997
- Estonia: Household Budget Survey 2000
- Ethiopia: Household Expenditure Survey 1992
- Ethiopia: Welfare Monitoring /Income, Consumption and Expenditure Survey 1999/2000
- Europe: Household Budget Surveys in the European Union, Eurostat

F

- Fiji: Household Income and Expenditure Survey 1977
- Finland: Dietary Survey of Finnish Adults (FINDIET) 1997
- France: Individual National Food Consumption Survey (INCA) 1998-99
- French Guiana: Household Budget Survey 1984-85

G

- Gabon: Enquete Budget et Consommation (EBC) 1994
- Gambia, the: Household Economic Survey 1992
- Gambia, the: National Household Poverty Survey 1998
- Georgia: Survey of Georgian Households 2002
- Georgia: National Survey of Households 2002
- Germany: German Nutrition Survey 1998
- Ghana: Ghana Living Standards Survey IV 1998
- Greece: Household Expenditure Survey 1981-82
- Guatemala: Encuesta Nacional de Ingresos y Gastos Familiares 1998
- Guatemala: Guatemala Encuesta Nacional Sobre Condiciones De Vida (ENCOVI) 2000
- Guinea: Enquête Intégrale sur les Conditions de vie des Ménages (avec module budget et consommation) 1994

- Guinea-Bissau: Inquerito ao Consumo e Orcamentos Familiares 1993
- Guyana: LSMS 1998

H

- Haiti: Household Expenditure and Consumption Survey 1986-87
- Honduras: Income and Expenditure Survey 1978
- Hong Kong: Household Expenditure Survey 1994
- Hungary: Hungarian Randomized Nutrition Survey 1992-94
- Hungary: Household Budget Survey 2001

I

- Iceland: Icelandic National Nutrition Survey 2001
- India: National Sample Survey (NSS) 1951-97
- India: UP-BIHAR Survey of Living Conditions 1997
- Indonesia: SUSENAS- Indonesia's Socio-Economic Survey 2002 (Periodic)
- Iran: Household Income and Expenditure Survey (Urban and rural) 1994
- Iraq: Household Budget and Living Condition Survey 1971-72
- Ireland: North-South Food Consumption Survey 1998
- Israel: Family Expenditure Survey 1979-80
- Italy: INN-CA 1994-96

J

- Jamaica: Survey of Living Conditions (JSLC) 2001
- Japan: National Survey of Family Income and Expenditure (NSFIE) 1995
- Japan: Family Income and Expenditure Survey (FIES)1997
- Jordan: Household Expenditure and Income Survey 1997

K

- Kazakhstan: Kazakhstan Living Standards Survey 1996
- Kazakhstan: Kazakhstan Household Budget Survey 2001
- Kazakhstan: Family Budget Survey 1950-2003 (Periodic)
- Kenya: Rural Household Budget Survey 1981-81
- Kenya: Urban Household Budget Survey 1982-83
- Kenya: Welfare Monitoring Survey III 1997
- Korea: Korean National Statistical Office Household Income and Expenditure Survey 2002 (Monthly)
- Korea: National Survey of Household Income and Expenditures 1996
- Kosovo: Kosovo Living Standards Measurement Study Survey 2000
- Kuwait: Family Budget Survey 1986-87
- Kuwait: Household Income and Expenditure Survey 1999
- Kyrgyz Republic: Household Budget Survey 2002

L

- Laos: Laos Expenditure and Consumption Survey 1 (LECS 1) 1992
- Laos: Lao Expenditure and Consumption Survey II (LECS II) 1997-98
- Latvia: Household Budget Survey 1999
- Lebanon: Conditions de Vie des Menages 1997 (Living Conditions) 1997
- Lesotho: Household Survey 1993
- Lesotho: National Household Expenditure and Consumption Survey (HECS) 1995, Maseru
- Lithuania: Household Budget Survey 2000
- Libya: Report on the Second Phase of the Household Sample Survey- Household Expenditure 1969

M

- Macedonia, FYR: Household Budget Survey (HBS) 2000
- Madagascar: Enquête permanente auprès des ménages 1993
- Madagascar: Enquête prioritaire aupres de ménages 1999
- Malawi: Integrated Household Survey 1997-98
- Malaysia: Household Income/Basic Amenities Survey 1999
- Maldives: Vulnerability and Poverty Survey 1997
- Mali: Enquête sur les dépenses des ménages de Bamako (UEMOA) 1996
- Mauritania: Enquête Permanente sur les conditions de vie des ménages 2000
- Mauritius: Household Budget Survey 1991
- Mexico: Encuesta nacional de Ingreso-Gasto de los Hogares (ENIGH) 1996
- Mexico: Encuesta Nacional de Empleo urbano (ENEU) 1997
- Moldova: Moldova Household Budget Survey 2002
- Mongolia: National Monthly Income-Expenditure Survey 1995
- Mongolia: Household Survey 1999
- Morocco: Enquête sur la consommation et les dépenses des ménages 1984
- Morocco: Enquête nationale sur les niveaux de vie des ménages 1998
- Mozambique: National Household Survey 1996-97
- Myanmar: Household Income and Expenditure Survey 1997

N

- Namibia: National Household Income and Expenditure Survey (NHIES) 1993
- Nicaragua: Encuesta Nacional de Hogares sobre Medición de Niveles de Vida 2001
- Nepal: Nepal Living Standards Survey II 2003
- The Netherlands: Dutch National Food Consumption Survey 1997-98
- New Zealand: Household Expenditure and Income Survey 1985-86
- Niger: Enquête budget et consommation des ménages (ENBC) "Phase rurale" 1992
- Nigeria: General Household Survey 1996
- Nigeria: National Consumer Survey 1996
- Norway: National Dietary Survey among Adults (Norkost) 1997
- Norway: National Dietary Survey 1999

O

- Oman: Pilot Household Expenditure Survey 1977

P

- Pakistan: Household Integrated Economic Survey (HIES) 1996
- Panama: Encuesta de Niveles de Vida (ENV) 1997
- Papua New Guinea: Household Survey 1996
- Paraguay: Encuesta Integrada de Hogares(EIH) 1999
- Peru: Encuesta Nacional de Hogares (ENAHO) 1999
- Philippines: Family Income and Expenditure Survey (FIES) 2000
- Poland: Household Budget Survey 1980-2003 (Quarterly)
- Poland: Household Food Consumption and Anthropometric Survey 2000
- Portugal: National Dietary Survey 1980
- Portugal: Household Income and Expenditure Survey 1980-81

R

- Rwanda: Enquete intégrale sur les conditions de vie des ménages 1998
- Romania: Family Budget Survey 2002
- Russian Federation: Household Budget Survey 2000

- Russian Federation: Russian Longitudinal Monitoring Survey, Round 10 2001

S

- Samoa: Survey of Household Living Conditions 1971-72
- Senegal: Enquête sur la consommation des ménages de la capitale (UEMOA) 1996
- Serbia and Montenegro: Household Survey, Round 6 2002
- Serbia and Montenegro: Household Budget Survey 2003
- Seychelles: Household Expenditure Survey 1991
- Sierra Leone: Household Expenditure and Economic Activities Survey 1989
- Sierra Leone: LSMS Survey 1994
- Singapore: Household Expenditure Survey 1992
- Slovak Republic: Household Budget Survey 1998
- Slovak Republic: Assessment of food habits and nutritional Status 1991-99
- Slovenia: Household Budget Survey 2000
- Somalia: Household Budget Survey 1985-86, (outside Mogadishu)
- South Africa: KwaZulu-Natal Income Dynamics Study (KIDS) 1998
- South Africa: October Household Survey /Income and Expenditure 1999-2000
- Sri Lanka: Household Income and Expenditure Survey 1990-91
- St. Lucia: Living Standards Measurement Survey 1995
- Sudan: Sudan Household Economic Survey 1988-89
- Swaziland: National Income and Expenditure Survey 1985
- Swaziland: Household Income and Expenditure Survey (SHIES) 1994
- Swaziland: Swaziland Household Income and Expenditure Survey 1995
- Sweden: HULK 1989
- Sweden: Riksmaten 1997-98
- Switzerland: Swiss Health Survey 1992-93

T

- Taiwan: Survey of Family Income and Expenditure Survey 1975-76
- Tajikistan: Tajikistan Living Standards Survey 1999
- Tanzania: Human Resources and Development Survey 1993
- Tanzania: Household Budget Survey 2000-01
- Thailand: Thailand Household Socio-Economic Survey (SES) 1998
- Togo: Enquête sur les dépenses des ménages de Lomé (UEMOA) 1996
- Trinidad and Tobago: Survey of Living Conditions 1998
- Tunisia: Household Budget and Consumption Survey 1990
- Tunisia: Household Consumption Survey 1995
- Tunisia: Living Standards Survey 1995
- Turkey: Household Income and Consumption Expenditure Survey 1994
- Turkmenistan: Living Standards Measurement Survey 1998

U

- Uganda: National Integrated Household Survey II 1996
- Uganda: National Household Survey 2002
- Ukraine: Household Budget Survey (Living Conditions Survey) 2001
- United Kingdom: National Diet and Nutrition Survey (NDNS) Children 1992-93
- United Kingdom: National Diet and Nutrition Survey (NDNS) Young Adults 1997
- United Kingdom: National Diet and Nutrition Survey (NDNS) Adults 2000-01
- United Kingdom: Expenditure and Food Survey (EFS) 2001

- United States: The Continuing Survey of Food Intakes by Individuals (CSFII) and the Diet and Health Knowledge Survey (DHKS) 1989-91
- United States: The National Health and Nutrition Examination Survey (NHANES) III 1988-94 and 1999-Current
- Uruguay: Household Income and Expenditure Survey 1982-83
- Uzbekistan: Family Budget Survey 1950-2003

V

- Venezuela: Encuesta de Ingresos y Gastos Financieros 1975
- Vietnam: The Vietnam Living Standards Survey (VNLSS) 1992-1993
- Vietnam: Household Living Standards Survey (merges MPHS with VLSS) 2001

W

- West Bank and Gaza: The Palestinian Expenditure and Consumption Survey 1997

Y

- Yemen: Household Budget Survey 1998

Z

- Zambia: Household Budget Survey 1993
- Zambia: Living Conditions Monitoring Survey II 1998
- Zimbabwe: Income, Consumption and Expenditure Survey 1995-96

7.3. Appendix III: List of Research Contacts

The following individuals were contacted in an effort to collect research on the subject of intra-household food wastage. Those names appearing in italics indicate those individuals with whom follow-up is necessary.

1. Alison Tedstone: Food Standards Agency/UK (National Diet & Food Survey)
2. Androniki (Ada) Naska: DAFNE
3. Antonia Polychronopoulou-Trichopoulou: DAFNE
4. Beatrice Lourdes Rogers: Tufts University
5. Carol Shanklin: Chair of ADA Research Committee, Kansas State University
6. Claudio Martinez: Instituto Nacional de Estatistica
7. *Dave Weatherspoon: Michigan State University*
8. David Neven: Michigan State University
9. *Dr. Bill Rathje: University of Arizona*
10. *Dr. Catherine Dolan: Kenya*
11. *Dr. Esther Myers: Director of Scientific Affairs at ADA*
12. Dr. Fred Sorbello: CDC, Maryland USA
13. Dr. Jean Buzby: USDA
14. Dr. Joanne Guthrie: ERS/USDA
15. Dr. Maarten Nubé: Centre for World Food Studies
16. *Dr. Martine Padilla: CIHEAM*
17. Dr. Peter Pellett: University of Massachusetts
18. Dr. Rachel Johnson: Dean of Ag School at UVM
19. Dr. Robert Dirks: University of Illinois
20. *Dr. Roy Ackmann: University of Giessen*
21. *Dr. Thomas Reardon: Michigan State*
22. Dr. Tim Jones: University of Arizona
23. *Elizabeth Byron: IFAD*
24. Elvira Johnson: American Dietetic Association
25. Francois Sizaret: Retired FAO
26. Ken Simler: IFPRI
27. *Lesley Bourne: South Africa/Dietary Intake in an Urban African Population*
28. *Linda Scott Kantor: USDA*
29. Lisa Smith: IFAD
30. *Margrit Kroeger: Small Business, Germany*
31. Maria Regina Pedro: Philippine Nutrition Study
32. Marie Ruel: IFPRI
33. Marjorie VanWyk: Household Income Expenditure Surveys, Namibia
34. *Marianne Turow: CIA*
35. *Michael Doctor: Massachusetts Food Bank Farm*
36. Nancy Cohen: University of Massachusetts
37. *Patricia Hoyles: Zimbabwe/WHO*
38. Patrick Webb: WFP
39. *R. Brooke Thomas: University of Massachusetts*
40. *Shobhita Rajgopal/ Dr. M. Velayutham: Swaminathan Research Foundation*
41. *Stephen Bailey: Tufts University*
42. Tamara Beckett: Food Standards Agency/UK (National Diet & Food Survey)
43. Adele Crispoldi (FIDI)
44. Barbara Burlingame (ESNA)
45. *Doyle Baker (AGSF)*

46. Franco Galantino (GILB)
47. Francois Mazaud (AGST)
48. Frank Schmitt (ESSB)
49. Garry Hopwood (ESSB)
50. Gina Kennedy (ESNA)
51. Gladys Moreno Garcia (ESSB)
52. John Dixon (AGSF)
53. Jorge Mernies (ESSA)
54. Josef Schmidhuber (ESDG)
55. Louise Fresco (AGD)
56. Luz Diaz Rios (ESNP)
57. Mariana Campeanu (ESSB)
58. Marie Claude Dop (ESNA)
59. Orietta Conti (ESSB)
60. Patricia Merrikin (GILB)
61. Peter Glasauer (ESNP)
62. Ricardo Sibrian (ESSA)
63. Richard Grainger (FIDI)
64. Ruth Charrondiere (ESNA)
65. Sumiter Broca (ESAE)
66. Vincent Ngendakumana (ESSB)
67. Wilfried Thiele (FIIT)