



Survey of domestic food purchases and related home handling practices in the Abruzzo region (central Italy): Data collection and analysis through a language-independent classification system



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ABSTRACT

A telephone survey was carried out on 13,486 randomly selected households located in the Abruzzo region (central Italy). Three questionnaires were specifically designed in relation to three different groups of foods (Meat and meat products, Fishery products, Fruit and vegetables). Questions were mainly focused on the amount and number of purchases, type of retailer, and home food handling practices with respect to the week prior to the interview. Data were classified according to a multilingual thesaurus system (LanguaL). Results allowed to estimate domestic purchases (in kg) per capita for different food categories. The category "Red meat/Cattle" accounted for a large part of purchases in the "meat and meat products" group (10.9 kg per capita/year; 32.2% of purchases in the group) while the category "Fish or related organism/Fish" was the most purchased in the "fishery products" group (6.9 kg per capita/year; 63.3%). The aggregation of more detailed characteristics enabled the identification of popular categories of foods, such as "Red meat/Cattle/Divided into pieces" (25% of the "meat and meat products" group). Significant differences ($p < 0.05$) were found between the four different provinces (L'Aquila, Chieti, Pescara and Teramo) with respect to "Poultry/Chicken" and "Red meat/Cattle" categories. Household members were also asked about post-purchase food handling practices that might be hazardous to food safety. More than 20% of those surveyed stated that they thawed frozen meat at room temperature. The degree of doneness after cooking of different food categories was generally high: over 90% of products purchased in the majority of meat and fish categories were properly cooked. However a noticeable proportion of householders (about 15%) reported medium or rare cooking of "Red meat/Cattle" and "Red meat/Swine". Differences ($p < 0.05$) were also found between consumers of different ages, with people over 65 years old being more prone to freeze meat and cook it thoroughly.

The survey was carried out in a specific geographic area and on a statistically significant sample of households, thus allowing a collection of data on domestic habits relating to food purchases and home food handling practices. This information should be included in the framework of quantitative microbial risk assessment (QMRA) models as a measure of the actual exposure of consumers to pathogenic microorganism. The LanguaL system also proved to be a practical language-independent method useful not only to identify and describe food items but also to classify them according to specific food safety characteristics.

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1. Introduction

Microbial risk assessment is an important tool to evaluate the probability of developing adverse human health effects following the exposure to pathogenic microorganisms and thus to set up food

safety strategies (Bahk & Todd, 2007; Barraj & Petersen, 2004). The exposure assessment is a crucial part of this process, although the lack of data regarding home food consumption and manipulation is a great limitation. Information on home domestic behaviours, in fact, is necessary to develop quantitative microbial risk assessment (QMRA) models and to plan food safety educational campaigns for consumers (Gilbert et al., 2007; Nesbitt et al., 2009). Food consumption patterns change over time and can differ significantly due to cultural, social and economic factors (Nesbitt et al., 2008).

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Several telephone surveys concerning the types and amounts of high-risk foods consumed by individuals have been performed in Northern America and Europe (Bahk & Todd, 2007; Barraij & Petersen, 2004; Bremer et al., 2005; Fein, Lando, Levy, Teisl, & Noblet, 2011; Nesbitt et al., 2008, 2009; Shiferaw et al., 2000). The results of these studies are difficult to compare since different terminologies were used to identify food items. A number of studies, held in different countries, underlined the importance of having more surveys on food consumption patterns with respect to food safety (Bahk & Todd, 2007; Barraij & Petersen, 2004; Nesbitt et al., 2009; Zorba & Kaptan, 2011). In addition, the production of new comparable data, classified according to a recognised food categorisation, would be highly desirable (EFSA, 2008, p. 159).

Factors other than consumption and domestic purchase patterns must be considered to assess the actual exposure of consumers to pathogenic microorganisms: different home practices (how food is stored, handled and cooked), could greatly influence the likelihood of cross-contamination or recontamination and, consequently, the level of risk associated with each type of food (Barraij & Petersen, 2004). Several studies have demonstrated that a significant proportion of foodborne diseases could be caused by unsafe food handling at home (Gilbert et al., 2007; Lake & Simmons, 2001; Redmond & Griffith, 2003; Shapiro, Porticella, Crystal Jiang, & Gravani, 2010; Zorba & Kaptan, 2011). Surveys in numerous countries have already provided data on this topic (Bremer et al., 2005; Gilbert et al., 2007; Redmond & Griffith, 2003; Zorba & Kaptan, 2011), but due to different habits and culture of the different regional contexts we have to focus on local food consumption patterns and home food manipulation behaviours to improve food safety strategies.

In Italy, data on food supply and consumption are available from different sources, but they are usually intended for marketing analysis (Assocarni, 2007; ISMEA, 2005, 2006) or nutritional studies (INRAN, 2008; Turrini, Saba, Perrone, Cialfa, & D'Amicis, 2001), and they are often not fully adequate for a food safety risk assessment.

Our study was carried out in the framework of a project funded by the Italian Ministry of Health (IZSAM, 2007), in order to gather data necessary to estimate exposure to pathogenic microorganisms inside QMRA models. In particular, this research aimed to collect data, via telephone interviews, on domestic food purchases and consumer behaviours in the Abruzzo region, using an internationally recognised, language-independent system in order to unambiguously identify and categorise food items.

2. Materials and methods

2.1. Location

The survey was performed interviewing a sample of people located in Abruzzo, a region in the eastern part of central Italy between the Apennines mountains and the Adriatic Sea (latitude: 41°40' to 42°53'N; longitude: 13°01' to 14°46'E). Although geographically placed in central Italy, this region has often been considered part of the south in statistical studies, for economical, historical and cultural reasons (ISTAT, 2008). The region is divided into 4 provinces: L'Aquila (AQ), Chieti (CH), Pescara (PE), and Teramo (TE). The total population is over 1,300,000, with relatively uniform ethno-cultural characteristics: the percentage of resident foreigners is below the national mean (4.5% versus a national mean of 5.8%). The ratio of males/females is 0.94. Life expectancy is 78.6 years for males and 83.9 years for females (ISTAT, 2008). The population is evenly distributed throughout the four provinces, but the geographic characteristics are quite different, with AQ province being larger but with a lower population density and a much more mountainous terrain than the other three provinces. In addition AQ is also the only one that does not border the sea. All four provinces are classified either as "predominantly rural" (AQ) or "significantly rural" (CH, PE, TE). There are no "predominantly urban" provinces on the Abruzzo region according to OCSE classification (MiPAAF, 2007, pp. 3–4).

2.2. People interviewed

13,486 households were interviewed by telephone call in order to estimate the amount of food purchased during the week before and the related post-purchase handling practices. As detailed in Table 1, 4568 households were interviewed regarding meat and meat products, 4471 for fishery products and 4447 for fruit and vegetables. The final sample size was calculated to have an error estimation of 1%, with a confidence level of 95%. The number of household to be interviewed was stratified across the four provinces according to their population, as calculated by the 2001 national census (ISTAT, 2008). Households were randomly selected from a list of residential telephone numbers (*Pagine Bianche* and *Pagine Gialle* – SEAT, STET division). Interviews were carried out in four 3-month cycles, from December 2007 to November 2008, evenly distributed during different seasons in order to cover the

Table 1
Percentage and number of households that purchased and that did not purchased in each macro-category, divided by sampling cycle (I: December–February, II: March–May; III: June–August; IV: September–November) and province (AQ: L'Aquila; CH: Chieti; PE: Pescara; TE: Teramo).

Macro-category	Cycle	Households that purchased (n)	Households that did NOT purchase (n)	Province	Households that purchased (n)	Households that did not purchase (n)
Meat and meat products	I	76.0% (867)	24.0% (275)	AQ	69.2% (709)	30.8% (316)
	II	68.6% (775)	31.4% (355)	CH	63.0% (901)	37.0% (529)
	III	56.9% (654)	43.1% (496)	PE	63.8% (718)	36.2% (407)
	IV	63.2% (724)	36.8% (422)	TE	70.0% (692)	30.0% (296)
	Total	66.1% (3020)	34.9% (1548)	Total	66.1% (3020)	33.9% (1548)
Fishery products	I	43.7% (481)	56.3% (619)	AQ	35.6% (368)	64.4% (666)
	II	36.8% (414)	63.2% (711)	CH	28.2% (386)	71.8% (982)
	III	30.4% (338)	69.6% (773)	PE	39.9% (417)	60.1% (629)
	IV	34.8% (395)	65.2% (740)	TE	44.7% (457)	55.3% (566)
	Total	36.4% (1628)	63.6% (2843)	Total	36.4% (1628)	63.6% (2843)
Fruit and vegetables	I	65.5% (721)	34.5% (380)	AQ	72.7% (732)	27.3% (275)
	II	65.6% (727)	34.4% (382)	CH	73.0% (984)	27.0% (364)
	III	82.9% (921)	17.1% (190)	PE	67.8% (716)	32.2% (340)
	IV	69.8% (786)	30.2% (340)	TE	69.8% (723)	30.2% (313)
	Total	70.9% (3155)	29.1% (1292)	Total	70.9% (3155)	29.1% (1292)

n = number of households.

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