

What Do Consumers Think about Food Safety in Nanjing, China

Aijun Liu, Yuehong Chen and Lang Xu
Nanjing Agricultural University
Nanjing
China

Peter. J. Batt
Curtin University
Perth
Western Australia

Abstract

With a growing urban population, greater affluence, changing lifestyles and the increasing global trade in food products, food safety is becoming more important for consumers. From 372 face-to-face interviews in Nanjing, China, over 60% of the respondents indicated that they were very concerned about food safety. Respondents were most concerned about the possibility of pesticide residues in vegetables, veterinary drugs residues in meat and the presence of illegal food additives. Those food products that they were most concerned about included baby food, cooked food and dairy food. In order to reduce the incidence of food poisoning, most respondents were choosing to eat more food at home. When making the decision to purchase food from a retail store, the key criteria respondents used was the label, the physical appearance of the product, price and past experience. Over 86% of respondents reported having been dissatisfied at some time in the past with the purchase of food from a retail store. The main reason for their dissatisfaction included concerns that the product had not met the prescribed health standards, counterfeit product, the product had passed its use-by-date or the product had simply failed to meet their expectations. Respondents perceived that supermarkets were the best place to buy safe food.

Keywords: consumer behaviour; consumer attitude; food safety

INTRODUCTION

With a highly fragmented production base, a rapid increase in the rate of urbanisation, changing lifestyles and the increasing trade in a more diverse range of food products, the incidence of food poisoning in China is increasing. Wang, Mao and Gale (2008) report that food poisoning affects an estimated 200,000 - 400,000 people per annum. While Bai et al. (2007) attribute the increasing incidence in food poisoning to improved reporting they recognise that food poisoning arises from contaminated raw materials, poor sanitation and the purposeful introduction of foreign materials and food ingredients. While pathogenic micro-organisms are the most frequent cause of food poisoning (58% of reported cases), Wang et al. (2009) recognise that the major threat arises from chemical contamination during food production and processing. At the farm level, contamination may arise from pesticide and antibiotic residues, growth hormones, heavy metals, water and air pollution. Zhou and Jin (2009) report how Chinese farmers are perhaps the world's greatest users of pesticides, with the rate of application increasing from 201,000 tonnes in 1985 to exceed 1,384,000 tonnes in 2006. However, much of the blame for the increasing incidence of food poisoning must be directed towards those food processors who choose to use inappropriate food additives as a way of reducing production costs, making the product more attractive or to increase shelf life (Bai et al. 2007). Wang et al. (2009) discuss the inappropriate

application of carcinogenic dyes such as Sudan Red to improve the appearance of food products, the use of acrylamide in fried food and formaldehyde in beer. But perhaps the most well known and most recent incident was the application of melamine to dairy products in 2008 (Zhang et al. 2010; Pei et al. 2011).

In an effort to restore consumer confidence, the Chinese government has recently introduced a raft of legislation including the Food Hygiene Law, the Product Quality Law, the Agricultural Product Quality Safety Law, the Consumer Rights Protection Law, the Special State Council Rules on Strengthening Supervision and Management of Food Safety and the National Plan for Major Food Safety Emergencies (Broughton and Walker 2010). Many government entities are involved in enforcing food safety regulations including the Ministry of Agriculture (MoA), the Administration of Quality Supervision, Inspection and Quarantine (AQSIQ), the Food and Drug Administration, the Ministry of Health (MoH), the Administration for Industry and Commerce, and the Standardization Administration. While some of China's food safety standards are mandatory, others are voluntary. At the retail level, food products are often differentiated on the basis of food safety (Wang, Mao and Gale 2008). Furthermore, to reduce the costs associated with monitoring these standards, any food company which passes a quality and safety inspection on three consecutive occasions may be exempt from further inspection (Zhang et al. 2010). However, brand piracy and the affixing of counterfeit quality assurance labels to food remains a common practice. With a highly fragmented food supply chain, composed of millions of small farmers, traders and retailers, most of which operate unsupervised, China will face an enormous challenge in implementing an effective domestic food safety system (Ortega et al. 2011).

While numerous studies have contributed to a greater understanding of food safety issues in China, there is need to understand how consumers search for safe food. In a recent opinion poll, Wang, Mao and Gale (2008) identified that food safety was among the top concerns for Chinese consumers. Ortega et al. (2011) note that there is a distinct gap in the literature that analyses consumers' attitudes and perceptions towards government food safety assurance systems. Bai et al. (2007) note that while consumers use extrinsic quality cues to determine whether a product is good quality and represents good value for value, they cannot judge whether it is safe or not. Zhang et al. (2010) demonstrate how the extrinsic quality indicators used by consumers were largely ineffective in identifying contaminated milk products.

This exploratory study, undertaken in Nanjing, China, seeks to provide a greater understanding of the perceived risks consumers face and the various strategies they employ to mitigate that risk.

FOOD SAFETY AND THE CONSUMER

Food safety is defined as the necessary conditions and measures during production, processing, storage, distribution and the preparation of food to ensure that it is safe, wholesome and fit for human consumption (WHO 1984). Food safety refers to all those hazards, whether chronic or acute, that may make food injurious to the health of the consumer.

In the Food Safety Law of the People's Republic of China (2009), food safety means an assurance that the food is nontoxic, harmless and compliant with reasonable nutritional requirements, and will not cause any acute, chronic and potential hazards to human health.

However, the overwhelming evidence today shows that the incidence of food borne illness is increasing in both the developed and developing world (Käferstein 2003). For a number of reasons including; (i) the increasing international trade in fresh and semi-processed food products; (ii) the increasing consumption of processed food and food away from the home; (iii) more intensive production systems and the increasing reliance on agricultural chemicals; and (iv) the increasing desire by more health conscious consumers to consume more raw food and to select processed food that does not contain preservatives, managing the microbiological safety of food has become increasingly important. Furthermore, consumers continue to be exposed to a range of issues relating to the addition of substances to food and to treatments applied to the food which may or may not have long-term health effects (Gerald and Perkin 2003). Events such as pesticide residues in fresh produce, mad cow disease, dioxins in animal feed stuffs and the presence of genetically modified organisms, have consumers questioning the ability of the modern food system to provide safe food.

Consumers are expected to purchase fresh produce primarily on the basis of quality and price (Henson and Reardon 2005; Eurobarometer 2006). Food safety is explicitly managed in most developed markets and implicitly managed in those that have no formalised approach. Irrespective, food safety is seldom an issue until such time as the consumers trust in the food system has been undermined by another food safety incident. Food safety issues are more acute in fresh products (Codron et al. 2005; Garcia and Poole 2004; Henson and Reardon 2005), for the product is often consumed without washing and or preparation. Furthermore, the product is often transported over considerable distances and with multiple handling it is more susceptible to contamination from biological and physical agents.

Quality is the key concept in building customer value and satisfaction. Described initially as a customer determination based upon the customers actual experience with the product as measured against the customer's requirements (Feigenbaum 1991), Peri (2006) defines quality as fitness for consumption. To some, quality means best, but to others, quality is something that cannot be analysed, but only recognised through experience (Oude Ophuis and van Tripp 1995). From the consumer perspective, Peri (2006) describes quality as being comprised of five integrated requirements: (1) the product requirements; (2) the psychological requirements; (3) guarantees and assurances; (4) packaging requirements; and (5) marketing requirements. Codron et al. (2005) describe quality in terms of four attributes: sensory, health, process and convenience. King and Venturini (2005) adopt a similar classification, but choose to identify food safety and product origin as separate variables.

The sensory attributes might be best described as experience attributes for many of these can only be evaluated after purchasing the product. Not unexpectedly, taste is the most important experience attribute for food (Oude Ophuis and van Tripp 1995). In most instances, the consumer's preference for fruit is derived from the interaction between taste, texture and flavour (Harker 2001). Texture relates to the mechanical properties of the flesh, mouth-feel and juiciness. However, Codron et al. (2005) consider that appearance should also be considered as a sensory attribute, for there is anecdotal evidence to suggest that most "consumers eat with their eyes". Peri (2006) further expands on the sensory attributes to include memory, culture, values and emotions, for these bring together the consumer's knowledge or memory of food and the consumer's sensory reactions to it.

Nutritional requirements are important because the main purpose of eating is to satisfy nutritional needs (Peri 2006). Most consumers and dieticians recognise the long term health benefits that arise from the regular consumption of fresh fruit and vegetables. However, few consumers expect the consumption of a particular product on a particular occasion to have a health benefit that they can experience (Codron et al. 2005). The recent interest in the health-giving properties of some foods is based on the assumption that their regular consumption will have some beneficial effect on health (Peri 2006). Foods which possess these properties are described as functional foods. These products include yogurts with probiotic ingredients, margarine enriched by cholesterol-reducing ingredients, milk and juices enriched with calcium and other healthy ingredients (Codron et al. 2005).

Just as consumers expect that the on-going consumption of functional foods will have a positive impact on health, the regular consumption of food that contains high levels of chemical residues can have negative implications. For fresh fruit and vegetables, there is evidence to suggest that the major concern for consumers is pesticide residues (Smith Dewaal 2003; Wilcock et al. 2004; Eurobarometer 2006). Not unexpectedly, many regulators, retailers and food manufacturers are now taking steps to reduce the level of pesticide residues and some are even going as far as to prescribe what chemicals may be applied (Farm Foundation 2004; Garcia and Poole 2004; Jaffee and Masakure 2005).

Labeling is also required to provide nutritional information and to identify what components have been added to the food. Peri (2006) discusses how the product packaging system must facilitate product recognition, marketing and use. The quality associated with packaging includes aesthetic requirements relating to product presentation and the information conveyed by the label. Various legal and regulatory standards must be met with regard to the description of the contents and the ingredients that have been used in manufacturing the product. In the past, consumers have made their decision to purchase largely on such attributes as the fat content and the quantity of salt, sugar and the use of preservatives and flavour enhancing compounds (FSA 2005). Presently, the emphasis is shifting towards the food energy content, the presence or absence of genetically modified organisms (GMO), antibiotics and vaccines, and for the growing proportion of the community with acute reactions, to the presence of potential allergens. Furthermore, the increasing concern for food safety is leading consumers to feel more reassured by familiar brand names, best-before dates and pre-packaged products (McCann-Hiltz 2004).

METHODOLOGY

Nanjing is the capital city of Jiangsu province. Located in the lower Yangtze River drainage basin and Yangtze River Delta economic zone, Nanjing has long been one of China's most important cities. In 2010, the GDP per capita was RMB 65,490. As income is increasing, consumers in Nanjing are becoming more and more concerned about food safety issues. In order to identify consumer behavior toward food safety, a project was funded by the Institute of China Rural Development (ICRD) and the Fundamental Research Funds for Central Universities (KYZ201009). A total number of 372 face-to-face interviews were collected by students of Nanjing Agricultural University in the street, shopping centres, parks and community centres in the Nanjing CBD during April to August 2010.

The questionnaire for the interview included three parts. The first part of the questionnaire included a number of warm-up questions about food consumption such as household food expenditure, where the respondents purchased food and the criteria utilised in making the decision to purchase food. In Part Two, respondents were asked to indicate their consideration of food safety, criteria respondents used in determining that food was safe, reasons why food was perceived to be unsafe, those food safety issues which were of greatest concern, the perceived quality of different food groups, measures to avoid food safety problems and how to improve consumer confidence. The last part obtained some demographic information from respondents.

The data preparation process included questionnaire checking, editing, coding, transcribing, adjusting the data and selecting a data analysis strategy. Coding the unstructured questions meant assigning each of the respondent's comments with a numerical code. This allowed for these questions to be statistically analysed. The data was loaded in SPSS 16.0 for analysis.

RESULTS

Respondents

A total number of 372 respondents responded to the survey instrument. Not unexpectedly, the majority of the respondents were female (57%). By age, most of the respondents were aged 35-44 years (28%), followed by respondents aged 45-54 years (26%), respondents aged 18-24 years (22%) and respondents aged 25-35 years (14%).

Most respondents (54%) lived in a household size with 3 people, followed by 15% with 4 people, 15% with 5 people and 12% with 2 people.

Some 32% of the respondents had a monthly income ranging from RMB 3000 to 5000, while 24% had a monthly income from RMB 1500 to 3000.

Food consumption

Most households participating in the survey (42%) spent between RMB 500-1000 per month on food (Table 1).

Table 1: Household food expenditure

RMB	N	%
100 - 300	13	3.6
301 - 500	99	27.5
501 - 1000	152	42.2
1001 - 1500	56	15.6
More than 1501	40	11.1
N	360	

For 80% of respondents, the primary place of purchase for food was the supermarket (Table 2).

Table 2: Place of purchase for food

	1	2	3
Supermarkets	300	37	21
Convenience stores	33	153	91
Free market	35	161	117
Morning/night markets	3	14	88
Other markets	1	2	20

However, it was also evident that consumers often visited both convenience stores and the free market to purchase food and on some occasions, the morning and/or night markets.

In making their decision to purchase food, price was the single most important consideration (Table 3).

Table 3: Criteria utilised in making the decision to purchase food

	1	2	3
Price	151	67	46
Production date/shelf life	99	110	100
Brand	83	85	46
Production factory	20	45	26
Color and appearance	8	13	39
Quality assurance certificate	4	22	65
Ease of cooking		1	5

Of some secondary importance was the production date/shelf life of the product and the brand. It was only then, at the third level, that the presence of a quality assurance certificate had any bearing on the respondents' decision to purchase.

Awareness about food safety

Over 60% of the respondents indicated that they paid considerable attention to food safety issues in making their decision to purchase food (Table 4). Only 5 respondents indicated that they were not concerned about food safety.

Table 4: Consideration given to food safety in the decision to purchase food

	N	%
Considerable	226	60.8
Generally	124	33.3
Slightly	17	4.6
Not at all	5	1.4
N	372	

In determining that the food was safe, most respondents relied upon the label (Table 5).

Table 5: Criteria respondents use in determining the food is safe

	1	2	3
Label	152	70	59
Products appear in TV ads	59	43	31
Price	59	51	19
Past experience	31	18	50
Physical appearance	15	65	43
Recommendations from friends	8	29	27

However, at a secondary level, it was also evident that the more attractive the product appeared the more likely respondents were to assume it was safe. Furthermore, the more prominent the product was in the market the more respondents trusted the product. Not unexpectedly, many respondents made a linkage between price and quality, assuming that the more expensive products were more likely to be safe. At a third level, respondents relied on their past experience. Nevertheless, some 86% of respondents indicated that at some time in the past they had purchased food that they believed to be unsafe. The main reason given was the perception that the food had not met national health standards (Table 6).

Table 6: Reasons why food was perceived to be unsafe

	1	2	3
Did not meet national health standards	153	47	45
Counterfeit product	99	112	43
Past use-by-date	70	105	66
Quality did not meet expectations	27	63	144
Presence of GM not identified	21	41	61

However, it was also evident that many respondents had inadvertently purchased counterfeit products and products which had passed their use-by-date. The other most frequently reported reason was the failure of the product to meet the respondents' expectations.

The issues that were of greatest concern to respondents were the possibility of high pesticide residues in vegetables and the high probability of food poisoning (Table 7).

Table 7: Food safety issues of greatest concern

	1	2	3
Pesticide residues in vegetables	148	86	68
Veterinary drug residues in meat	38	94	46
Illegal use of food additives	54	113	99
Use of non food materials	28	56	73
Food poisoning	102	21	74

Of secondary importance were considerations about the illegal use of food additives and the presence of veterinary drug residues in meat.

When respondents were specifically asked to think about individual food product groups, the three most problematic groups were baby food, cooked food and dairy products (Table 8).

Table 8: Perceived quality of different food groups

	1	2	3
Baby food	31	166	172
Cooked food	24	180	165
Dairy products	33	202	136
Aquaculture products	86	200	83
Alcohol	110	187	72
Vegetables	84	231	56
Eggs	95	231	46
Candy and cakes	106	220	44
Bean products	102	231	39
Fruit	128	206	38
Rice, flour and oil	194	168	9

where 1 is good
 2 is normal
 3 is poor

Somewhat surprisingly, alcohol was also perceived to be problematic. For whatever reason, respondents considered fresh vegetables to present a greater food safety risk than fresh fruit. Not unexpectedly, the staple foods: rice, flour and cooking oil, were perceived to present the least risk.

In order to reduce the risks associated with unsafe food, most respondents (39%) tried to consume more food at home (Table 9).

Table 9: Measures to avoid food safety problems

	N	%
Try to eat more at home	144	38.7
Buy food products from a few reliable food companies	81	21.8
Stop buying food in street markets and night markets	76	20.4
Choose ready to cook and packaged food	73	19.6
Pay more attention to media reports	64	17.2
N	372	

Others chose to buy more food products from reliable food companies (22%) and others to reduce the amount of food purchased from street markets and night markets. Indeed, some 79% of respondents believed that supermarkets were the best place to buy safe food. A further 36% of respondents believed that imported food presented less risk than the purchase and consumption of locally produced food.

In order to improve consumer confidence, most respondents believed that food companies should be certified (Table 10).

Table 10: How to improve consumer confidence

	1	2	3
Be certified by relevant agencies	184	65	39
Establish brand confidence	78	98	43
Improve food inspection and testing	61	88	136
Self regulate	35	97	75
Use anti-counterfeiting technology	12	20	71

Additional measures included improved food inspection and testing, presumably by government or some other independent third party, and self regulation, for some 68% of respondents believed that food processors should themselves take responsibility for food safety. As a final measure, to protect the integrity of their brand, food companies should invest in a number of alternative measures to reduce brand piracy.

DISCUSSION and CONCLUSION

As expected, the majority of respondents in Nanjing indicated that they paid considerable attention to food safety issues in making their decision to purchase food. Although price was the single most important variable influencing the respondent's decision to purchase food, the label was the most important variable utilised by respondents in determining that the food was safe to eat. Other variables included the production date/shelf life of the product, the brand and the presence of a quality assurance certificate.

In order to reduce the risks associated with unsafe food, respondents tried to consume more food at home and to buy more food products from reliable food companies. Due to poor hygienic conditions, street markets and night markets had become less popular. Most respondents believed that supermarkets were the best place to buy safe food, with more than one third of respondents believing that imported food presented less risk than the purchase and consumption of locally produced food.

Most respondents indicated that at some time in the past they had purchased food that they believed to be unsafe. The main reason given was the perception that the food had not met national health standards. The possibility of high pesticide residues in vegetables and the high probability of food poisoning were of greatest concern for respondents. For different food groups, the three most problematic groups were baby food, cooked food and dairy products.

Literature Cited:

- Bai, L., Ma, C., Gong, S. and Yang, Y. 2007. Food safety assurance systems in China. *Food Control*, 18: 480-484.
- Batt, P.J. 2004. Consumer sovereignty: exploring consumer needs. In Johnson, G.I and Hofman, P.J. (eds). *Agriproduct supply-chain management in developing countries. Proceedings of a workshop held in Bali, Indonesia 19–22 August 2003. ACIAR Proceedings No. 119. Canberra: 77-87.*
- Broughton, E.I. and Walker, D.G. 2010. Policies and practices for aquaculture food safety in China. *Food Policy*, 35: 471-478
- Beulens, A.J.M., Broens, D-F., Folstar, P. and Hofstede, G.J. 2005. Food safety and transparency in food chains and networks – Relationships and challenge. *Food Control*, 16: 481-486.
- Boehlje, M.D., Hofing, S.L. and Schroeder, R.C. 1999. *Farming in the 21st Century. Staff Paper # 99-9, Department of Agricultural Economics, Purdue University.*
- Codron, J-M., Grunert, K., Giraud-Heraud, E., Soler, L-G. and Regmi, A. 2005. Retail Sector Responses to Changing Consumer Preferences: The European Experience. In Regmi, A. and Gelhar, M. (ed), *New Directions in Global Food Markets. USDA. ERS: 32- 46.*
- Eurobarometer. 2006. Risk Issues. Eurobarometer 238. European Commission.
- Farm Foundation. 2004. Food Traceability and Assurance in the Global Food System. Food Foundation Traceability and Assurance Panels Final Report, July. Food Foundation. Oak Brook, Illinois. <http://farmfoundation.org>
- Feigenbaum, A.V. 1991. *Total Quality Control. Third Ed. McGraw Hill.*
- Food Standards Agency. 2005. Consumer attitudes to food standards wave 5. UK Report.
- Food Safety Law of the People's Republic of China, Retrieved by February, 2011, from http://www.procedurallaw.cn/english/law/200903/t20090320_196425.html
- Garcia, M. and N. Poole. 2004. The development of private fresh produce safety standards: implications for developing Mediterranean exporting countries. *Food Policy* 29: 229-255.
- Gerald, B.L and Perkin, J.E. 2003. Position of American Dietetic Association: Food and water safety. *Journal of the America Dietetic Association (ADA Reports)*, 103 (9): 1203-1218
- Harker, F.R. 2001. Consumer responses to apples. Proceedings of the Washington Tree Fruit Postharvest conference. Wenatchewa, U.S.A.

- Henson, S. and Reardon, T. 2005. Private agri-food standards: Implications for food policy and the agri-food system. *Food Policy*, 30(3): 241-253.
- Jaffee, S. and Masakure, O. 2005. Strategic use of private standards to enhance international competitiveness: Vegetable exports from Kenya and elsewhere. *Food Policy* 30: 316–333
- Käferstein, F.K. 2003. Actions to reverse the upward curve of food borne illness. *Food Control*, 14, 101-109.
- King, R.P and Venturini, L. 2005. Demand for Quality Drives Changes in Food Supply Chains. In Regmi, A. and Gehlbar, M. (eds). *Global markets for high-value food products*. USDA. ERS: 18-31.
- McCann-Hiltz, D. 2004. Consumer trends in food safety, *Consumer Food Trends*, Alberta Agriculture, Food and Rural Development. 1-8.
- Ortega, D.L., Wang, H.H., Wu, L. and Olynk, N.J. 2011. Modeling heterogeneity in consumer preferences for select food safety attributes in China. *Food Policy*, 36: 318–324
- Oude Ophuis, P.A.M. and van Trijp, H.C.M. 1995. Perceived quality: A market driven and consumer oriented approach. *Food Quality and Preference*, 6(3): 177-183.
- Pei, X., Tandon, A., Alldrick, A., Giorgi, L., Huang, W. and Yang, R. 2011. The China melamine milk scandal and its implications for food safety regulation. *Food Policy*, 36: 412–420.
- Peri, C. 2006. The universe of food quality. *Food Quality and Preference*, 17(1-2): 3-8.
- Smith de Waal, C. 2003. Safe food from a consumer perspective. *Food Control* 14: 75-79
- Verlegh, P.W.J., Steenkamp, J.B.E.M. and Meulenberg, M.T.G. 2005. Country-of-origin effects in consumer processing of advertising claims. *International Journal of Research in Marketing*, 22: 127-139.
- Wang, S., Zhu, H., Ge, Y. and Qiao, H. 2009. Current status and management of chemical residues in food and ingredients in China. *Trends in Food Science & Technology*, 20: 425-434.
- Wang, Z., Mao, Y. and Gale, F. 2008. Chinese consumer demand for food safety attributes in milk products. *Food Policy*. 33(1): 27-36.
- WHO. 1984. The role of food safety in health and development. Retrieved by February, 2011, from http://www.who.int/foodsafety/publications/capacity/en/Chinese_Guidelines_Food_control.pdf
- Wilcock, A. Pun, M., Khanonax, J. and Aung, M. 2004. Consumer attitudes, knowledge and behaviour: a review of food safety issues. *Trends in Food Science & Technology*. 15: 56–66

Zhang, C., Bai, J., Lohmar, B.T. and Huang, J. 2010. How do consumers determine the safety of milk in Beijing, China? *China Economic Review*, 21: S45–S54.

Zhou, J. and Jin, S. 2009. Safety of vegetables and the use of pesticides by farmers in China: Evidence from Zhejiang province. *Food Control*, 20: 1043–1048.