



Food scandals, media exposure, and citizens' safety concerns: A multilevel analysis across Chinese cities



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ABSTRACT

It is both theoretically and socially imperative to understand what drives citizens' concerns over food safety, as outbreaks of food related health hazards have become increasingly rampant in developing countries like China. In this paper we combine recent national survey data and media reports to quantitatively examine the effects of food scandals and media exposure on food safety risk. We find that media reported food scandals are not significantly related to public concern about food safety risk, suggesting that food risk perceptions may be nationwide rather than region specific. We also find out that more educated citizens with more media exposure are more concerned about food safety risk, and the amplification effect of food scandals is more prominent among residents with higher levels of education. In contrast to our expectation, family income is not significantly related to food safety concern. We also find that females, the elderly, and urban dwellers perceive higher levels of food risk than males, youngsters, and rural residents. The government should pay more attention to public perceptions of food safety, and strengthen its risk communication capacity to mitigate media amplification effects of food safety concern. The regulatory authorities can work with other entities (e.g., food industry and NGOs) to advance food safety education to equip the public with essential knowledge to mitigate the framing and spillover effects of food scandals and rumors.

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1. Introduction

The issue of food safety has become an overwhelming challenge for both developed and developing countries over the past decade. The Foodborne Disease Burden Epidemiology Reference Group of the World Health Organization (WHO, 2015) estimates that there have been 582 million outbreaks of 22 different foodborne enteric diseases, which caused 351,000 deaths since 2010 in the world. As the largest developing country in the world, China's food safety problems are strategically important not only for those who live in the country, but also consumers of Chinese food exports worldwide. China has the world's largest size of food consumers, is undergoing rapid economic growth and urbanization, has a long history and regional diversity in dietary food, is characterized by scattered and medium-small scaled food industries, and is also a dispensable food exporter to other countries and regions. As a result, China's food safety plays an important role in ensuring food safety globally (Yasuda, 2015). Therefore, although food safety

issues are not unique to China, it is both theoretically and empirically meaningful to study food safety and its policy in the Chinese context.

The outbreak of rampant food safety scandals in China over the past decade, particularly the case of toxic Sanlu Milk Powder in 2008, has substantially undermined the credibility of food industry and severely damaged the public's confidence in food safety (Liu et al., 2013; Pei et al., 2011; Yan, 2012). The ordinary people are concerned about the safety of various food products they consume daily, although their knowledge of food safety is rather limited (Qiao et al., 2012; Wang et al., 2008).

The risk and citizens' perceptions of food safety, however, vary remarkably across regions in China (Holtkamp et al., 2014). It is interesting and meaningful to examine the driving forces for the regional disparity in food safety risk and citizen perceptions. So far, a few factors have been found responsible for the intractable food safety problem, which include but are not limited to rapid but asymmetrical industrialization and urbanization, defective government regulatory regime and policy, immoral market competition and poor corporate social responsibility, and complicated food industry scale and culture (Tam and Yang, 2005; Yasuda, 2015). However, few studies have attempted to connect

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consumers' subjective perceptions and limited knowledge to the country's food safety governance. In fact, risk communication on consumers' perceptions of food safety has already become an indispensable part in food safety governance, according to the guidelines proposed by the Food and Agricultural Organization (FAO) and WHO (FAO and WHO, 1998). But in the Chinese context, we still do not know much about the differences in people's attitudes towards food safety among different demographic groups (Ortega et al., 2011). Also, it is still unclear what factors shape people's food safety perceptions and what are the implications for food safety governance in China. Therefore, we aim to answer these research questions empirically in the current study. Specifically, the aim of this paper is to examine the effects of food scandals and individual demographics on the public's confidence in food safety in China.

This paper is structured as follows. The first part introduces the background on China's current food safety governance and consumers' concerns. Second, we review previous studies and derive our hypotheses from the theoretical perspective of the construction and amplification of social risk. Next, we present our data sources and analytic methods, followed by the key findings. In the fourth section, we offer a series of in-depth arguments to elaborate on the findings of our quantitative analysis. Finally, we discuss our research contribution and policy implications, and conclude with a comment on the limitations and directions for further research.

2. Background and context

2.1. The governance of food safety in China

Since the founding of the P. R. C. in 1949, the food safety governance regime in China has experienced a three-stage evolution: an old regime of command and control (1949–1977), an intermediate regime of mixed instruments (1978–1992), and a new regime of regulatory governance (1993–present) (Liu, 2010; Liu and McGuire, 2014). The current regulatory regime was established during the 2013 administrative restructuring and reconfirmed by the amended *Food Safety Law* in 2015.

Ministry of Agriculture (MoA) and China Food and Drug Administration (CFDA) are the two major food safety regulators, with the MoA being responsible for overseeing the safety of primary agricultural products and the CFDA in charge of food safety in the manufacturing, processing, distribution, and catering industries. In addition, the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) is a watchdog for the safety of exported and imported food, while the National Health and Family Planning Commission (NHFPC) frames national food safety standards.

Similar to the case of the U.S. and other major countries, China's food safety regulation is by and large fragmented due to the involvement and coordination of multiple agencies (Liu, 2010). The past two rounds of administrative reform in 2008 and 2013, themed super-ministry reform, aimed to consolidate interrelated agencies and to streamline interagency coordination processes. The consequences of the reforms, however, are not as optimistic as what the reformers expected. The chain of food production, transportation, and sales is still cut and intercepted by several agencies with inconsistent goals and interests, which hinders the establishment of an integrated and systematic food safety regulation regime.

2.2. Food safety risk and perceptions

As a rapidly-changing country with unprecedented pace of industrialization and urbanization in mankind's history since the

1980s, China has successfully achieved high economic growth and incredible poverty alleviation, but in the meantime has partially failed to meet the higher demands of its people to improve their life quality such as cleaner air and safer food. Historically, especially before the 2000s, China's national food market was less developed and the scale of cross-regional trade in foodstuff was relatively small due to local trade protectionism. However, since 2000 this has been dramatically changed and cross-regional food trade has boomed because of the effective cracking-down on local trade protectionism and the development of E-commerce. The increasing cross-regional flow of foods has drastically intensified consumers' anxieties on food safety risk.

Both food safety scandals and citizens' concerns have escalated exponentially over the past decade. Within a decade from 2003 to 2013, for instance, there have been a total of 9279 food poisoning accidents which affected more than 200 thousand people and killed 2.7 thousand.¹ According to the official inspection report, the major food risks in the contemporary Chinese society are food adulteration, pesticide residue, illegal usage and overdose of additives, and excessive heavy metal content. The categories of food mostly worried by Chinese consumers include cooking oil, meat products, fresh vegetables, seafood, and dairy products.

Although Beijing's official regulatory data shows that its food safety situation has improved since 2008, authoritative public opinion survey by the third party reveals that food safety has been ranked in the first place among Chinese people's concerns on various public safety issues since 2012.² Similarly, a survey completed by a research team affiliated with Tsinghua University, for instance, reveals that food safety has become the most worrying public safety issue by the public from 2012 to 2014 (He and Wang, 2014). Taking together, Chinese residents are very concerned about food safety risk, and it is meaningful to understand the key drivers and mechanisms for such concerns.

3. Theory and hypotheses

3.1. Media coverage and social amplification of food risk

Social risk is jointly shaped by individuals' personal propensity, information, knowledge, and experience. People who have personally encountered or heard about food safety accidents are more concerned than those who have not. While personal experiences of these accidents are rare, news and information on the accidents are ubiquitous in the media. In other words, citizens' concerns over food safety are primarily driven by food scandals in their vicinity, which are usually covered by local media. Customers rely on media reports to elicit information and may be affected by media coverage of food-related risks (McCluskey and Swinnen, 2011). If food scandals frequently occur in their regions and are widely covered by the media, citizens are more likely to perceive a high level of food risk.

People's perceptions of social risk are by and large determined by media coverage (Koné and Mullet, 1994), but it is not easy to disentangle the actual risk from media disclosure. An increase in the number of media reports on food safety might occur due to either an increasing number of food safety scandals or an increased media attention on food safety, or both. The steady growth of food safety scandals would escalate citizens' concerns, but media themselves may amplify the social risk perceived by the people with intensified attention and wide coverage (Kasperson et al., 1988).

¹ Data Source: China's National Health and Family Planning Commission, 2014.

² Data Source: Top 10 Issues concerned by public opinion in 2014: Food safety ranks top, available at <http://www.tech-food.com/news/2014-12-8/n1165317.htm>. While the survey is informative, it is a pity that no more detailed descriptions on different demographic groups have been exposed.

Holding the actual number of food scandals constant, food risk may be amplified by media exposure of food scares (Lofstedt, 2006). It is methodologically difficult to disentangle the actual number of food safety scandals from the media attention on them, which blurs the effects of media reports on food safety scandals on consumers' concerns.³ We acknowledge that both the actual number of food safety scandals and the level of media attention may contribute to citizens' concerns, and one should be cautious in interpret the results. We expect that citizens in provinces with rampant food scandals are more likely to perceive food risk. Thus, we hypothesize that:

H1. Citizens in regions with more reported food scandals are more concerned about food risk.

3.2. Media exposure and food safety concern

Apart from media reports on food scandals, several individual-level variables are found to be related to food safety concerns. In this paper we focus on individuals' media exposure, family income, education level, and the number of children, among others. Despite the fact that food safety concerns may be affected by various factors, these variables have been well documented in prior studies (Lee et al., 2012; Liu et al., 2013; Ovca et al., 2014; Parra et al., 2014; Zhllima et al., 2015), and we believe they are very relevant to this study. These variables may also moderate the relationship between media coverage of food scandals and citizens' concerns over food safety risk, which could be explored in later analyses. We include gender, age, and household registration type in the remaining analysis, but we do not propose specific hypotheses.

First, the media effect of food scandals are largely a function of information accessibility and media receptivity (Fleming et al., 2006), and citizens with richer information channels are more likely to be affected by media exposure (Wahlberg and Sjoberg, 2000). If citizens are isolated from media exposure, media reports on food safety scandals would not affect their level of concern as intended.

Apart from media exposure, the diversity of media channels also matters. With the aim of spreading ideological propaganda, official mass media such as newspapers, radio, and television are strictly controlled and censored by the authorities in China, and negative incidents is much less to be disclosed than positive ones. The wide circulation of food safety risk may elicit rumors, amplify social scare, and deteriorate social instability, and the government-controlled media are less likely to engage in the reporting of large-scale scandals. In spite of also being subject to official censorship, online media and social media are relatively free and more flexible in disclosing food safety risk (Peng et al., 2015). We expect that citizens with multiple and diverse information sources are more likely to be affected by media reports on food scandals. Thus, we hypothesize that:

H2. Citizens with more media exposure are more likely to be concerned about food risk.

3.3. Social status and food risk perceptions

Citizens with higher levels of education and income are relatively more exposed to the mass media and are more likely to be receptive to media exposure (Li et al., 2013; Liu et al., 2015). In other words, citizens who are highly educated and high income earners can afford and are capable of media consumption, and con-

sequently are more informed of food safety scandals covered by the media. Given the amplification effect of media reporting, we expect that higher levels of education and income are positively related to higher levels of food safety concerns.

Apart from media effects, income and education may affect food safety concerns in other ways. High-income citizens with higher social status are more concerned about life quality, for which food safety is a dispensable ingredient. Only with a decent income, can citizens consider a higher level of food safety. In contrast, low-income earners concern mostly about survival with sufficient amount of food, regardless of whether it is safe enough to avoid food-borne diseases or maintain personal health. We expect that higher-income citizens perceive higher levels of food risk.

Highly-educated people are usually more critical of the society and the government, which makes them relatively more concerned about social risk. Citizens with higher levels of education are often equipped with the essential skills and knowledge to receive external information on social risk. In the same way, highly-educated citizens with more knowledge and information about food safety are more likely to question the reliability of food safety regulation systems. We hypothesize that higher-educated citizens are more concerned about food scandals.

H3. Higher-income citizens are more likely to be concerned about food risk.

H4. Higher-educated citizens are more likely to be concerned about food risk.

3.4. Parental concerns over child safety

Families with juveniles, particularly infants and toddlers, are more concerned about food risk, as children are more vulnerable to food contaminations (Dosman et al., 2001). While adults are not free from food safety risks, children are much easier to be affected due to their immature digestive and immune systems. Children are also usually unaware of potential food safety threats, since they are not well trained and prepared in identifying and avoiding food contamination. In other words, citizens with young children are more likely to feel threatened by media reports on food scandals.

The concerns over food safety of children are particularly important and relevant in the context of China, in which the notorious family planning policy, or the one child policy, has been implemented nationally since the early 1980s. Nowadays most families have only one child, especially in the urban area where the one child policy is stringently implemented by state-owned institutions. The only child in a family is usually spoiled by his or her parents and grandparents as "little emperor" and "little princess". The family is very concerned about the health of the only child, and no one can afford taking food safety risks. We predict that, given the same amount of media reports on food safety scandals, families with children are more concerned than those without children. Thus, we hypothesize that:

H5. Citizens with children are more likely to be concerned about food risk.

4. Data and methods

4.1. Sample and data sources

The sample used for this study is composed of 30 major cities in Mainland China, including four municipalities (Beijing, Tianjin,

³ We thank one anonymous reviewer for reminding us to pay attention to this point.

Shanghai, and Chongqing), 22 provincial capital cities (e.g., Guangzhou), and capital cities of the four autonomous regions (e.g., Urumqi). Lhasa, the capital of the Tibet Autonomous Region has to be excluded from the sample because the survey data are unavailable. Usually being categorized as tier-one and tier-two cities in China, these cities are regional hubs with relatively vibrant economies and large populations. Since these big cities are the homes of a large number of food consumers, they are more likely to witness rampant food scandals, which makes the examination of the residents' concerns over food risk a meaningful exercise.

The data on food safety perceptions and other demographics are collected from face-to-face surveys of local residents in the 30 provincial capital cities in January 2013. Commissioned by Unirule Economics Institute in Beijing, the survey was implemented by HorizonKey Consultancy Group, a well-established survey company based in Beijing. The survey adopted a multi-stage stratified random sampling strategy to recruit respondents to participate in this survey. The quota sample size is 300, 250, 200, and 150 for cities with total population size above 10 million, from 5 to 10 million, from 2 to 5 million, and less than 2 million respectively. The survey first proportionally sampled the administrative districts in each city by the shares of total population. Each administrative district was then divided into five subdistricts, from which the families and specific persons to be interviewed were randomly selected by the KISH method. People aged between 18 and 60 and having resided at least one year in the sampled city were recruited. In sum, the survey data were collected from 6259 respondents, with a response rate of 8.85 percent.

We use archival and survey data from two sources to investigate the relationship between media reports on food scandals and food safety risk perceived by citizens. The data on food scandals are from Mr. Wu Heng's "Throw out the window" (*Zhichu Chuangwai* or ZCCW, <http://www.zccw.info/>), an independent and nonprofit website archiving and periodically updating online news reports on food safety in various Chinese provinces. To the best of our knowledge, ZCCW is one of the most relevant and completed dataset which has documented national and local news reports on food safety scandals since 2004. The reliability and validity of this dataset have been verified by Shanghai's FDA where it hosts and nominated internationally in the Global Media Forum in 9th Voice of Germany. Therefore, we draw on ZCCW to measure media coverage of food safety scandals in the sampled cities.

4.2. Public concern over food risk

We asked the respondents the extent to which they are usually concerned about food safety issues in their ordinary lives and measure the responses using a five-point Likert scale. The item ranges from 1 ("Never concerned") to 5 ("Very concerned"), with higher values indicating higher degrees of concern. Although citizens' concerns about various foods differ, we hope future research can dig into these possibilities.

4.3. Media coverage of food scandals

The data on food scandals are from "Throw out the window" (*Zhichu Chuangwai*), in which the incidents are uniquely identified rather than repeatedly recorded by media sources, and we can treat the data as media-based event counts of food scandals instead of media focus or media attention. Although there are other datasets archiving Chinese newspapers (e.g., CNKI), the specific locations of food scandals are usually unspecified or unstandardized. Furthermore, food scandals are often repeatedly reported by multiple sources, which may overestimate the actual amount of cases.

Media-based event count data may be biased due to political censorship, commercial competition, media coverage, and other contextual factors, but they can be used as reliable sources of data (Woolley, 2000). Food scandals are not as politically sensitive as critiques on other issues such as land compensation, demolition resistance, and official corruption accusation which can easily cause social unrest. Thus, news reports on food scandals are less likely to be censored by the authorities. The data on food safety incidents exposed by the media have been validated and are found to be highly related to the official reported incidents (Holtkamp et al., 2014). Although the actual number of food scandals is under-reported by the media, it is exactly the media reported cases that trigger and amplify public concerns over food risk.

The citizen survey was conducted in January 2013. In order to establish the time order for causal inference, we take media reported data in the previous years as our independent variable. To mitigate yearly volatility, we use the three-year moving average number of accidents from 2010 to 2012 to measure media reported food scandals in each province, with the highest weight on the latest year. The logarithm of the variable is used to ensure its normal distribution.

4.4. Individual-level independent variables

The respondents were asked to specify the channels by which they used to obtain domestic and international news by six three-point scale items. The available news channels asked in the survey include online news portals, online forums and blogs, micro blogs, newspapers and magazines, television, and chats with friends and colleagues. The first three news channels are online sources, and the last two belong to mass media forms. Residents can also access news on food scandals from their social networks, which is also exposed to mass and online media sources. The frequency at which these channels were used by the respondents includes "almost never," "occasionally," and "almost every day," which are in turn coded by 0, 1, and 2 respectively. We develop the media exposure measure by aggregating the six items above, which ranges from 0 to 12. We expect that respondents exposed to more and diverse news channels are more receptive to media coverage of food scandals.

We use total monthly household income to measure the affluence of the respondents. This ordinal variable is classified into 17 categories and ranges from 0 (without regular income) to 16 (more than RMB 40,000 Yuan). To identify the nuanced differences among income categories, we create a set of dummies with the group without regular income as the reference category.

The education level is measured by an ordinal scheme consisting of five categories in descending order: 4 (graduate), 3 (four-year university), 2 (three-year college), 1 (high school and equivalent educations), and 0 (middle school and below). In China's higher education system, three-year colleges are more vocation-based and less prestigious than four-year universities. In the same token, we create four dummies and use middle school and below as the reference category.

We asked whether the respondents have children aged from 6 to 16, and we create a dummy to denote the existence of underage children in the family. We expect that families with young children are more concerned about food safety risk, and we expect this measure is positively related to food safety perceptions. While children aged below 6 and those aged from 16 to 18 are excluded in this measure, the effect is actually underestimated in the analysis.

We also control other individual demographics that have been found to affect food risk perceptions (Dosman et al., 2001), such as gender, age, and household registration type (see Table 1 for more details).

Table 1
Descriptive statistics of key variables.

Variable	N	Mean	SD	Min	Max
<i>Individual level variable</i>					
Food safety concern	6248	4.255	0.956	1	5
Media exposure	6257	6.147	2.714	0	12
Income 0 (non-fixed income)	5869	0.001	0.032	0	1
Income 1 (<500 RMB)	5869	0.001	0.029	0	1
Income 2 (501–1000 RMB)	5869	0.004	0.065	0	1
Income 3 (1001–2000 RMB)	5869	0.039	0.193	0	1
Income 4 (2001–3000 RMB)	5869	0.105	0.307	0	1
Income 5 (3001–4000 RMB)	5869	0.141	0.348	0	1
Income 6 (4001–5000 RMB)	5869	0.178	0.383	0	1
Income 7 (5001–6000 RMB)	5869	0.166	0.372	0	1
Income 8 (6001–7000 RMB)	5869	0.110	0.313	0	1
Income 9 (7001–8000 RMB)	5869	0.082	0.274	0	1
Income 10 (8001–9000 RMB)	5869	0.067	0.251	0	1
Income 11 (9001–10,000 RMB)	5869	0.044	0.206	0	1
Income 12 (10,001–12,000 RMB)	5869	0.028	0.166	0	1
Income 13 (12,001–15,000 RMB)	5869	0.017	0.129	0	1
Income 14 (15,001–20,000 RMB)	5869	0.009	0.092	0	1
Income 15 (20,001–40,000 RMB)	5869	0.006	0.076	0	1
Income 16 (>40,000 RMB)	5869	0.001	0.032	0	1
Education 1 (middle school and below)	6231	0.029	0.169	0	1
Education 2 (high school)	6231	0.189	0.392	0	1
Education 3 (college)	6231	0.367	0.482	0	1
Education 4 (university)	6231	0.257	0.437	0	1
Education 5 (graduate)	6231	0.157	0.364	0	1
Children	6246	0.247	0.431	0	1
Gender (Male = 1)	6257	0.492	0.500	0	1
Age 1 (18–25)	6257	0.192	0.394	0	1
Age 2 (26–30)	6257	0.166	0.372	0	1
Age 3 (31–35)	6257	0.114	0.318	0	1
Age 4 (36–40)	6257	0.125	0.331	0	1
Age 5 (41–45)	6257	0.129	0.335	0	1
Age 6 (46–55)	6257	0.129	0.335	0	1
Age 7 (51–55)	6257	0.078	0.269	0	1
Age 8 (>55)	6257	0.066	0.249	0	1
Household 1 (Local urban)	6209	0.792	0.406	0	1
Household 2 (Local rural)	6209	0.049	0.216	0	1
Household 3 (Nonlocal urban)	6209	0.057	0.231	0	1
Household 4 (Nonlocal rural)	6209	0.102	0.302	0	1
<i>Provincial level variable</i>					
Media reported food scandals	30	13.911	16.567	0.667	72

4.5. Analytical methods

The data used in this study are of a typically nested structure, with individuals nested in cities. As a result, the individuals may not be independent from each other, which violates the ordinary least square (OLS) assumption of independence. In such cases, a multilevel model or hierarchical linear model is a more appropriate specification. Multilevel models have seldom been used in quantitative food risk studies (Poortinga, 2005), although they are advantageous in simultaneously estimating context- and individual-level effects (Hohl and Gaskell, 2008).

We use a multilevel model to estimate the effect of provincial level media reports of food scandals on individual-level citizen perceptions of food safety while simultaneously controlling for other individual-level demographic and socioeconomic variables. The dependent variable is an ordinal measure and therefore, the ordered logit model is more appropriate than the OLS model, which is suitable for interval variables. Citizen perceptions are referred to as Level 1 variables and provincial media reports are referred to as Level 2 variables. To estimate the effects of Level 1 and Level 2 independent variables on the dependent variable, we center the Level 1 independent variables by their mean within each city while center the Level 2 variable by its grand mean (Aguinis et al., 2013).

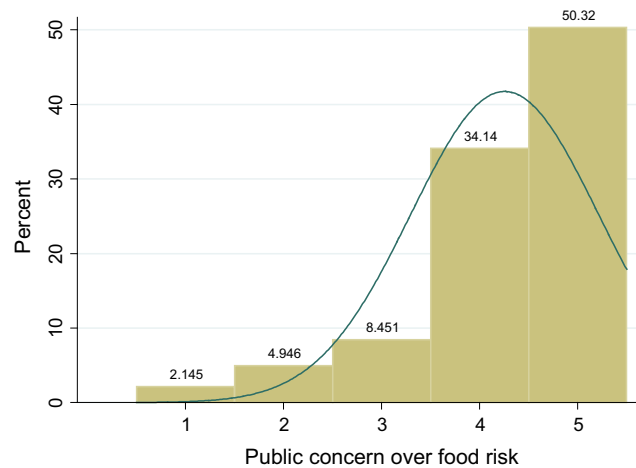


Fig. 1. Public concern over food risk. Note: N = 6248.

5. Results

5.1. Descriptive statistics

The descriptive statistics of the variables are reported in Table 1. The survey reveals the respondents' strong concerns over food risk (see Fig. 1). The data show that 34.14 and 50.32 percent of the respondents are "concerned" and "very concerned" about food safety respectively, totaling up to 84.46 percent. Only 2.14 and 4.95 percent of the respondents are "never concerned" and "seldom concerned" over food safety respectively, suggesting that only 7.09 percent of the respondents are confident in food safety. The results also show that 8.45 percent holds neutral attitudes towards food safety, and nine respondents (or 0.14 percent) are unsure about the issue.

We track the change of media reported food scandals in China from 2000 till 2015 in Fig. 2, as archived by the ZCCW website. The data reveal that there were few news reports on food scandals before 2005, but the situation changed remarkably from then on, with on average over 350 cases reported from 2005 to 2013 per year. The disproportional decrease of media coverage from 2014 may be partially attributed to the withdrawal of Mr. Wu from the operation of the ZCCW website in 2013. Although the website is still maintained by volunteers, the news reports are updated sparsely.

To preliminarily test the correlation between media coverage of food scandals and public perceptions of food risk, we first simply average the respondents' food safety concerns by city. The results suggest that the respondents in Nanjing (4.786), Guangzhou (4.735), Lanzhou (4.621), Harbin (4.587), and Taiyuan (4.551) are most concerned about food safety, while only those in Guiyang (2.951) are on average unconcerned about food risk. For the moving average of media reported food scandals from 2010 to 2012, Guangzhou (72), Ji'nan (58.5), Beijing (41.167), Nanjing (25.5) and Chongqing (20.83) are the top five cities, while Xining (0.667), Urumqi (1.667), and Yinchuan (2) are covered scarcely. The degree of citizens' concerns and the logged media reports at city level are weakly correlated, as suggested by Pearson's ($r = 0.235$, $p = 0.211$) and Spearman's correlation coefficients ($\rho = -0.0712$, $p = 0.7085$) (see Fig. 3).

5.2. Multilevel models

The result of the null model is reported in Model 1 of Table 2, from which we find that the intraclass correlation (ICC) is 0.1331,

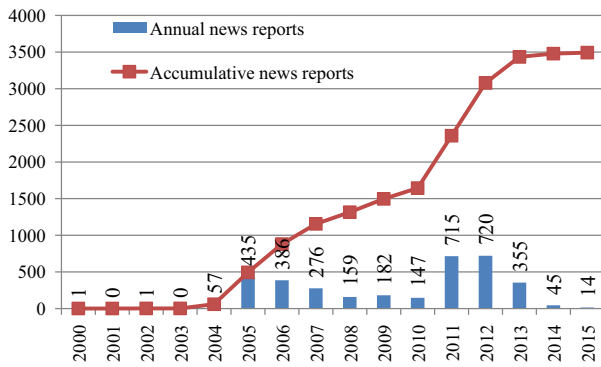


Fig. 2. Media reported food scandals in China (2000–2015). Note: The raw data are from ZCCW (<http://www.zccw.info/index>), last updated 2015-07-09.

suggesting that roughly 13.31 percent of the total variance in food risk perceptions can be attributed to Level 2 variables. Although the variance explained by city- or provincial level variables is not as large as individual-level variables, it is justified by the LR test ($\chi^2 = 589.74$, $p < 0.01$) to use multilevel model in the analysis. We then estimate random intercept and fixed slope model (RIFSM) and random intercept and random slope model (RIRSM) separately to examine direct and interaction effects respectively.

In Model 2, we include all the control variables at the individual level, and most of the signs of the estimated coefficients are in line with the findings of prior studies in China and other countries (Lee et al., 2012; Liu et al., 2013; Ovca et al., 2014; Parra et al., 2014; Zhilima et al., 2015). The results suggest that residents with more media exposure are more concerned about food risk, which supports our H2. As for H3, however, we find no evidence that residents with higher levels of family income are more concerned about food risk. The dummies of family income are not significantly related to food safety concerns, and H3 is not supported. The magnitudes of the regression coefficients for higher levels of family income are generally larger than those of lower levels, implying that richer respondents are less concerned about food risk. Consistent with H4, residents with higher education levels are more concerned about food risk. The difference in food safety concerns between respondents with completed high school education and those with middle school education and below are insignificant, but the differences between the other three categories are significant. Residents who have young children are more concerned about food risk, but the relationship is not significant. As mentioned earlier, this insignificant relationship is probably due to the exclusion of children aged below 6, which leads to the underestimation of their linkage. In other words, H5 is not supported by the results.

Our control variables are also found to be related to food safety concerns. Female respondents are more concerned than males over food risk. Elder residents are more concerned about food risk than young people. In terms of household, we find that urban residents, either local or nonlocal, are more concerned about food risk than floating families in rural regions, while the differences in food safety perceptions between local and nonlocal rural residents are insignificant. The results suggest there is a rural-urban divide in food safety concerns, with urban residents substantially more concerned than their rural counterparts.

In Model 3 we include all the Level 1 variables together with our key independent variable, media reported food scandals at Level 2. We find that H1 is not supported by the results. Although media reported food scandals are positively related to public concerns over food risk, the magnitude of the relationship is small and not statistically significant.

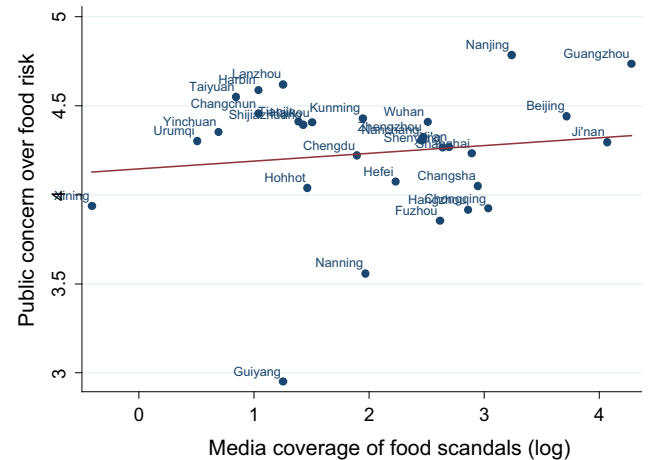


Fig. 3. Relationship between food scandals and food risk perceptions at city level.

Table 2

Multilevel ordered logit model estimates of food safety concern.

Level and variable	Model 1	Model 2	Model 3
Food scandals (log)			0.0890 (0.121)
Media exposure		0.0746*** (0.011)	0.0745*** (0.011)
Income 1		−1.675 (1.314)	−1.673 (1.314)
Income 2		−0.652 (1.124)	−0.656 (1.124)
Income 3		−0.695 (1.070)	−0.698 (1.070)
Income 4		−0.723 (1.065)	−0.726 (1.065)
Income 5		−0.668 (1.065)	−0.671 (1.065)
Income 6		−0.576 (1.065)	−0.580 (1.065)
Income 7		−0.644 (1.065)	−0.649 (1.065)
Income 8		−0.542 (1.066)	−0.547 (1.067)
Income 9		−0.665 (1.067)	−0.671 (1.068)
Income 10		−0.619 (1.068)	−0.625 (1.069)
Income 11		−0.560 (1.071)	−0.566 (1.071)
Income 12		−0.922 (1.074)	−0.928 (1.074)
Income 13		−1.257 (1.081)	−1.264 (1.082)
Income 14		−1.338 (1.098)	−1.343 (1.098)
Income 15		−1.511 (1.113)	−1.516 (1.113)
Income 16		−1.536 (1.328)	−1.538 (1.328)
Education 2		0.174 (0.163)	0.174 (0.163)
Education 3		0.321* (0.164)	0.320* (0.164)
Education 4		0.330* (0.174)	0.330* (0.174)
Education 5		0.371** (0.182)	0.372** (0.182)
Children		0.109 (0.074)	0.108 (0.074)
Gender		−0.215*** (0.052)	−0.215*** (0.052)
Age 2		0.122 (0.089)	0.121 (0.089)
Age 3		0.271*** (0.104)	0.270*** (0.104)
Age 4		0.319*** (0.113)	0.318*** (0.113)
Age 5		0.343*** (0.106)	0.342*** (0.106)
Age 6		0.418*** (0.105)	0.417*** (0.105)
Age 7		0.557*** (0.122)	0.556*** (0.122)
Age 8		0.778*** (0.131)	0.777*** (0.131)
Household 1		0.206** (0.095)	0.207** (0.095)
Household 2		0.174 (0.147)	0.176 (0.147)
Household 3		0.232* (0.139)	0.233* (0.139)
L2 Intercept	0.499*** (0.135)	0.487*** (0.133)	0.478*** (0.131)
variance			
Log likelihood	−6905.2825	−6302.193	−6301.924
L1 N	6248	5804	5804
L2 number of groups	30	30	30

Note: L1 = Level 1; L2 = Level 2. Values in parentheses are standard errors.

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

The effect of media coverage on citizens' perceptions of food safety may be heterogeneous among groups. It is also valuable to examine the moderating effects of individual-level demographic

variables, i.e., media exposure, family income, education level and number of children, on the relationship between food scandals and risk perceptions. We accordingly estimate cross-level interaction models, including various interaction terms to test the moderating effects of media exposure, household income, education level, and number of children. The moderating effects of Level 1 variables on the relationship between Level 2 food safety scandals and Level 1 food risk concerns are reported in Table 3.

The intercept-slope covariance is substantively and statistically significant, but the moderating effects of media exposure, household income, and the existence of children on the relationship between food safety scandals and food risk concerns are not supported by the results. We do find that the highest level of education positively moderates the cross-level relationship, and the amplification effect of food safety scandals on food risk concerns is stronger for higher-educated residents. In other words, the media effect is asymmetrical across education levels. Given the same amount of media-reported food safety scandals, citizens with higher levels of education are more concerned than those with lower level of education.

6. Discussions

We first discuss the key findings and the extent to which the hypotheses are supported by the results. We then discuss the contributions of this study and the policy implications of the findings. We finally present the limitations of this study and suggest future research avenues.

The results of the above quantitative analysis provide supporting evidence for hypotheses H2 and H4. We find that citizens with more media exposure and higher education are more concerned about food safety risks. These findings are consistent with most of the previous studies, which have put forward media exposure and education as crucial determinants of consumers' food safety perceptions. Nevertheless, the other three hypotheses H1, H3, and H5 are not supported by our analytical results. We also find that females, the elder, and urban residents perceive higher levels of food risks than males, youngsters, and rural dwellers. Further analysis reveals that education level positively moderates the scandal-risk relationship, whereas other Level 1 variables have no significant interaction effects.

One important finding of our research is that the higher-income population is not necessarily more concerned about food safety than the lower-income group. This finding is inconsistent with the common logic that the middle class is more concerned about life quality and would strive for it by promoting food safety regulations (Anguelovski, 2015; Ovca et al., 2014; Skuland, 2015). Although the high-income earners are not indifferent to food safety because they have higher expectations for the safety of food consumption, it does not mean that they would pay more attention to daily food scandals because most of those scandals reported by the mass media are in connection with common cheaper rather than expensive foods consumed by the rich. In recent years, Chinese food manufacturers and merchants have increasingly introduced a series of safe and green products such as pollution-free vegetable, green fruit and organic pork to cater to high-end consumers. Consumers can also purchase foods produced overseas by E-commerce, which are usually specifically labeled to meet higher standards of food safety. Since rich families are more capable to spend on food consumption, it is observed that some higher-income people are inclined to spend more on the consumption of more expensive but safer foods. Therefore, they can use their economic power to mitigate everyday food safety risks and are in no need to be concerned about regular food safety issues. Partially due to their higher level of purchasing power and the abil-

Table 3

The multilevel ordered logit model estimates of food safety concern.

Level and variable	Model 4	Model 5	Model 6	M7
#Media exposure	−0.0245 (0.023)			
#Income 1		−1.069 (3.463)		
#Income 2		−1.244 (1.670)		
#Income 3		−1.301 (1.645)		
#Income 4		−1.301 (1.642)		
#Income 5		−1.257 (1.643)		
#Income 6		−1.341 (1.645)		
#Income 7		−1.221 (1.648)		
#Income 8		−1.285 (1.651)		
#Income 9		−1.343 (1.654)		
#Income 10		−1.172 (1.658)		
#Income 11		−1.284 (1.663)		
#Income 12		−1.214 (1.672)		
#Income 13		−1.216 (1.679)		
#Income 14		−1.197 (1.703)		
#Income 15		−1.558 (1.708)		
#Income 16		−1.085 (1.812)		
#Education 2			0.345** (0.155)	
#Education 3			0.375** (0.166)	
#Education 4			0.410** (0.186)	
#Education 5			0.330 (0.206)	
#Children				−0.0258 (0.083)
L2 Intercept variance	0.674*** (0.212)	1.322*** (0.410)	0.827*** (0.255)	0.494*** (0.137)
Covariance	−0.0571** (0.026)	−0.130*** (0.046)	−0.119** (0.055)	−0.0405 (0.066)
Log likelihood	−6241.879	−6227.185	−6287.468	−6321.940
L1 N	5804	5804	5804	5818
L2 number of groups	30	30	30	30

Note: L1 = Level 1; L2 = Level 2. Values in parentheses are standard errors. The regression coefficients of the interaction terms between L1 variables and food scandals are reported in cells, while those of independent variables are suppressed to save space.

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

ity to afford healthier and more expensive foods, the high-income group shows less concern about food safety risks.

It is also possible that high-income citizens with strong food safety concerns turn to healthier and more expensive foods as a self-protection mechanism. In other words, we could use the demand for green and organic foods as a proxy of food safety concern, which can be examined in future studies. Another possible explanation is that the higher-income earners, being over-exposed to a plethora of food safety scandals, have become apathetic and numb to these risks. However, for the low-income

consumers, since they have less time and energy to focus on media reporting of food scandals, they are more surprised to see the emergence of food scandals and more concerned about how government responds to and handles them, which can partially explain why the low-income earners are not apathetic and numb to food risks.

For H1, we find that when food safety concern is regressed on food scandal report, the regression coefficient is positive albeit insignificant. It reveals that there is no clear regional disparity in consumers' food safety perceptions, which is inconsistent with our expectation of spatial differences across cities. This result indicates that media reports on food scandals can amplify people's food risk perceptions from regional to national scope. Due to the national wide flow of foods, no one in the country can be immune from food risks, if any. Although citizens are more concerned about food scandals occurring in their own and adjacent regions, the coverage of food scandals in other regions may also alert them to the possibility that they will be exposed to these accidents sooner or later. In other words, it is very easy for any consumers to connect food scandals in other cities with their own places, which leads to a remarkable spillover effect of negative food news across different cities. Admittedly, this argument of spillover effect is only one possible explanation of the regression result. Since all the accidents documented in the ZCCW dataset are local food scandals, and it may unavoidably attenuate the relationship between food scandals and residents' perceptions. We encourage future studies to use the data on national food scandals to directly test whether the "spillover" effect amplifies citizen concern.

We find that residents with children are more concerned about food risk, but the relationship is not significant. The results can be partially attributed to the limitation of our measure. Children are one potential source of food safety concerns, but unfortunately the cut-off used in the survey instrument is age 6–16. While children aged below 6 and those aged from 16 to 18 are excluded in this measure, the effect of children is actually underestimated in this analysis, which may void the impact of parental role on food safety perceptions.

Many previous empirical studies have shown and explained the regional disparity in consumers' judgments on food safety in other countries and regions (Ko, 2015; Lee et al., 2012; Parra et al., 2014; Zhilima et al., 2015). However, why do Chinese consumers' perceptions not exhibit a similar pattern? We can think of four explanations to account for this interesting finding in the context of China's current food safety governance.

First, the prevalence of new online media has made food safety news and information more widely circulated and accessible. In the era dominated by the classical forms of mass media, especially given that China's media are state-controlled, any impact of negative news can be easily contained within its original jurisdiction, and food risk perceptions would be more localized. However, the rapid outspread of online media makes food safety information more easily and conveniently accessible, which has strengthened the spillover effect of food safety information across different cities (Yang, 2013). Most food scandals documented in ZCCW were firstly reported by traditional mass media and then disseminated rapidly by online media nationwide. As any food scandals reported locally can be promptly heard by a nationwide audience, the embedded risks get easily amplified in the process. While this phenomenon may be found in other countries and regions, China's large scale and highly-developed cyberspace make it more explicit and prominent.

Second, most food safety news reports are relatively homogeneous and concentrated, which make the audience subjectively expand the scope of food scandals. If we look into the food scandals dataset of ZCCW, we can find that over 70 percent of those news reports are concentrated on a handful of issues such as expired

foods, illegal cooking oil, poisonous pork with lean meat powder, and the use of unhealthy food additives. Psychologically, those highly-homogenous news reports can deliver homogenous mental images of food risks to consumers in different regions. In addition, most food scandals are not limited to one region but cross-regional and even international, which elicit similar imaginations of food risks from consumers nationwide.

Third, most local governments are yet to establish effective and timely risk communication regimes and have failed to avoid risk amplification outside their jurisdictions. Due to the persistent communist tradition of political propaganda and media censorship, most Chinese officials are adept at controlling official media to convey positive information to consumers, but they have insufficient experiences in policy persuasion and bilateral exchange of information with the public. Media censorship may restrict the release of undesirable information on the mass media, but cannot prevent rumors from spreading. Previous empirical studies show that local officials tend to lumber in their responses to emergencies, and in doing so fail to clarify unnecessary misunderstandings and rumors to the concerned residents (Feng et al., 2014; Ma, 2012; Schwartz, 2012). For food safety scandals, poor risk communication done by local authorities not only fails to restrict risk perceptions to their own regions, but also expedite the spread of similar sentiments to other regions. Apparently it has contributed significantly to the spillover effect of food risk across cities. In recent years, Chinese government has paid more attention to the development of a more skillful risk communication regime, so that it can handle the outspread of food risk information more successfully.

Finally, Chinese consumers in general do not possess adequate scientific knowledge to properly understand food safety risks. Essentially food safety risk is a science-based issue and its understanding requires not only scientists' professional studies but also consumers' basic scientific knowledge. As a developing country struck by famine, China was more concerned about food security and its supply rather than safety and quality before the 1980s. After its economic reform, China's grain production has increased remarkably and the economy has successfully secured the supply of food. As the problem of food shortage has been solved, food safety and quality have received more attention in recent years. However, most Chinese consumers are not well equipped with scientific knowledge on food safety, as evidenced by several recent surveys (Ho et al., 2006; Liu et al., 2015). For instance, the 2011 incident of "panic shopping salt" reveals that lots of Chinese consumers have a false belief that iodized salt can guard against exposure to radiation caused by the East Japan Earthquake. A 2008 survey shows that less than one fifth Beijing consumers knew food safety labels (Wang et al., 2008). A recent experiment reveals a larger framing effect of food events among consumers with less prior knowledge about food safety (Jin and Han, 2014). Ignorance leads to blind behaviors, and the knowledge deficiency of the consumers partially contributes to the amplification of food risk perceptions and unreasonable exaggerations of the risks across the country. The root of the problem can be traced to the lack of provision of food safety education by the state. Easily accessible, user-friendly, and understandable food safety education should be delivered by regulators and grassroots neighborhoods to the citizens in the near future.

6.1. Limitations and future research directions

The limitations of this study are threefold. First, our food scandal data comes from the ZCCW dataset and scholars may want to construct a first-hand dataset for future research. It is also meaningful to use social media data to replicate our study, due to their ubiquitous usage and ample effects in information dissemination

(Peng et al., 2015). Second, we may have omitted some variables such as local food safety regulatory capacity, local mass media coverage which are likely to explain food safety perceptions in different localities. In our further research, we will pay more attention to these variables and endeavor to better explain the spillover effect of media reports. Finally, the data used in this study are purely cross-sectional and cannot capture changes within a city over time. We encourage future studies to use panel data or employ experimental design to identify the causal mechanisms among these variables.

6.2. Contributions and policy implications

The current study uses data obtained from citizen surveys in 30 Chinese cities and the ZCCW dataset to quantitatively investigate the determinants of citizens' perceptions of food safety risks in China. We find that media exposure and education affect consumers' food safety perceptions. Specifically, citizens with greater media exposure and higher levels of education are more concerned about food safety risks. However, it is surprising that the frequency of local food scandals does not effectively shape consumers' judgments on local food safety situations. It is evident from the data that media reports on food scandals amplify consumers' perceptions and create a strong spillover effect on food safety perceptions across different regions. This interesting finding can be explained by the expansion of online media, the homogeneity and convergence of food scandals reports, the absence of effective governmental risk communication and the lack of scientific knowledge on food safety on the part of the consumers. In addition, it is found that higher-income earners are more apathetic about food safety risks possibly due to their wider food selection scope and disappointment with the current situation.

This current research speaks to the literature on consumers' food safety perceptions. A key novelty is the discovery of a spillover effect of citizens' food safety perceptions from local to national level. We propose four possible explanations for this finding, which help to understand risk amplification effect of the mass media in developing countries, but have seldom been explored in previous studies. In addition, our research challenges the conventional argument that the middleclass is an active pusher for food safety improvement. In the Chinese context, the willingness of the middle-class citizens to push for safer food has been weakened by the existence of alternative supply channels of safer food and the apathetic attitudes towards persistent food scandals. For the current food policy debate, on one hand this article recognizes the imperative to strengthen its traditional regulatory policy which overwhelmingly focuses on improving objective outputs instead of citizen perceptions of food safety. On the other hand, it sheds light on the importance of employing the risk communication strategy which aims at fostering subjective consensus to reduce the spillover and amplification effect of food safety risks. Furthermore, this article also reminds policy-makers to manage and guide consumers' perceptions of food safety risks on the national level rather than limit in local scope.

The policy implications of these research findings are explicit and profound. In developed countries, reports on food scandals can effectively draw the attention of local consumers and trigger immediate responses from local authorities due to professional media reporting and timely risk communications. Consequently food safety risks can be effectively controlled and prevented from escalation. However, in a developing country such as China, mass media reporting of local food scandals can easily amplify risk perceptions and bring local concerns to the national level. To minimize this spillover effect on food risk perceptions, there should be more professional trainings for media reporters, more efforts to improve the official risk communication channels, and more

scientific education targeted at the consumers. All these endeavors are ultimately aimed to forge a risk consensus among different stakeholders of the food safety issue. Particularly, online media should be more often and better used to send out more timely responses to food scandals so that the spread of irrational risk sentiments can be tamed effectively. Furthermore, the government can implement various measures to address the food safety knowledge gap among consumers. For instance, it could be made compulsory for the food suppliers to be more transparent in labeling the information on ingredients and nutrition, which may help consumers better understand food safety risks.

In addition, our evidence warns against being overly optimistic about the role of the rising Chinese middle class in pushing for safer foods and ameliorating the current food safety condition. Instead, groups such as women, the highly educated and parents with kids who are more concerned about food safety are more likely to be the driving force for safer food consumption in China. While our research takes citizens' food safety perceptions as a whole, future research may attempt to disaggregate this concept into safety perceptions of specific foods and attributes. We hope this different conceptualization returns new and more nuanced findings that enhance our understanding of the issue.

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References

- Aguinis, H., Gottfredson, R.K., Culpepper, S.A., 2013. Best-practice recommendations for estimating cross-level interaction effects using multilevel modeling. *J. Manage.* 39 (6), 1490–1528.
- Anguelovski, I., 2015. Alternative food provision conflicts in cities: contesting food privilege, injustice, and whiteness in Jamaica plain, Boston. *Geoforum* 58, 184–194.
- Dosman, D.M., Adamowicz, W.L., Hrucey, S.E., 2001. Socioeconomic determinants of health- and food safety-related risk perceptions. *Risk Anal.* 21 (2), 307–318.
- FAO, WHO, 1998. The application of risk communication to food standards and safety matters. Rome: FAO Food and Nutrition Paper 70.
- Feng, T., Keller, L.R., Wu, P., Xu, Y., 2014. An empirical study of the toxic capsule crisis in China: risk perceptions and behavioral responses. *Risk Anal.* 34 (4), 698–710.
- Fleming, K., Thorson, E., Zhang, Y., 2006. Going beyond exposure to local news media: an information-processing examination of public perceptions of food safety. *J. Health Commun.* 11 (8), 789–806.
- He, D., Wang, H.Y., 2014. Dissatisfaction With Food Safety Pervasive, Survey Finds. *China Daily*, 2014, 07–25.
- Ho, P., Vermeer, E.B., Zhao, J.H., 2006. Biotechnology and food safety in China: consumers' acceptance or resistance? *Develop. Change* 37 (1), 227–254.
- Hohl, K., Gaskell, G., 2008. European public perceptions of food risk: cross-national and methodological comparisons. *Risk Anal.* 28 (2), 311–324.
- Holtkamp, N., Liu, P., McGuire, W., 2014. Regional patterns of food safety in China: what can we learn from media data? *China Econ. Rev.* 30, 459–468.
- Jin, H.J., Han, D.H., 2014. Interaction between message framing and consumers' prior subjective knowledge regarding food safety issues. *Food Policy* 44, 95–102.
- Kasperson, R.E., Renn, O., Slovic, P., 1988. The social amplification of risk: a conceptual framework. *Risk Anal.* 8 (2), 177–187.
- Ko, W.-H., 2015. Food suppliers' perceptions and practical implementation of food safety regulations in Taiwan. *J. Food Drug Anal.* <http://dx.doi.org/10.1016/j.jfda.2015.05.006>.
- Koné, D., Mullet, E., 1994. Societal risk perception and media coverage. *Risk Anal.* 14 (1), 21–24.
- Lee, L.E., Niode, O., Simonne, A.H., Bruhn, C.M., 2012. Consumer perceptions on food safety in Asian and Mexican restaurants. *Food Control* 26 (2), 531–538.
- Li, D., Chen, T., Zhou, H., Nanseki, T., 2013. Consumer perceptions on food safety and demographic determinants. In: Nanseki, T., Song, M. (Eds.), *Food Safety and Agro-Environment in China: Perceptions and Behaviors of Farmers and Consumers*. InTech, Croatia, pp. 105–120.

- Liu, P., 2010. Tracing and periodizing China's food safety regulation: a study on china's food safety regime change. *Regul. Gover.* 4 (2), 244–260.
- Liu, P., McGuire, W., 2014. One regulatory state, two regulatory regimes: Understanding dual regimes in China's regulatory state building through food safety. *J. Contemp. China* 24 (91), 119–136.
- Liu, R., Pieniak, Z., Verbeke, W., 2013. Consumers' attitudes and behaviour towards safe food in China: a review. *Food Control* 33 (1), 93–104.
- Liu, S., Liu, Z., Zhang, H., Lu, L., Liang, J., Huang, Q., 2015. Knowledge, attitude and practices of food safety amongst food handlers in the coastal resort of Guangdong, China. *Food Control* 47, 457–461.
- Lofstedt, R.E., 2006. How can we make food risk communication better: where are we and where are we going? *J. Risk Res.* 9 (8), 869–890.
- Ma, C.-C., 2012. Responding in crises: a comparative analysis of disaster responses between Mainland China and Taiwan. *J. Homel. Secur. Emerg. Manage.* 9 (1). <http://dx.doi.org/10.1515/1547-7355.1993>.
- McCluskey, J., Swinnen, J., 2011. The media and food-risk perceptions. *EMBO Rep.* 12 (7), 624–629.
- Ortega, D.L., Wang, H.H., Wu, L., Olynk, N.J., 2011. Modeling heterogeneity in consumer preferences for select food safety attributes in China. *Food Policy* 36 (2), 318–324.
- Ovca, A., Jevšnik, M., Raspor, P., 2014. Food safety awareness, knowledge and practices among students in Slovenia. *Food Control* 42, 144–151.
- Parra, P.A., Kim, H., Shapiro, M.A., Gravani, R.B., Bradley, S.D., 2014. Home food safety knowledge, risk perception, and practices among Mexican-Americans. *Food Control* 37, 115–125.
- Pei, X., Tandon, A., Alldrick, A., Giorgi, L., Huang, W., Yang, R., 2011. The China melamine milk scandal and its implications for food safety regulation. *Food Policy* 36 (3), 412–420.
- Peng, Y., Li, J., Xia, H., Qi, S., Li, J., 2015. The effects of food safety issues released by we media on consumers' awareness and purchasing behavior: a case study in China. *Food Policy* 51, 44–52.
- Poortinga, W., 2005. The use of multi-level modelling in risk research. A secondary analysis of a study of public perceptions of genetically modified food. *J. Risk Res.* 8 (7–8), 583–597.
- Qiao, G., Guo, T., Klein, K.K., 2012. Melamine and other food safety and health scares in China: comparing households with and without young children. *Food Control* 26 (2), 378–386.
- Schwartz, J., 2012. Compensating for the 'authoritarian advantage' in crisis response: a comparative case study of sars pandemic responses in China and Taiwan. *J. Chin. Polit. Sci.* 17 (3), 313–331.
- Skuland, S.E., 2015. Healthy eating and barriers related to social class. The case of vegetable and fish consumption in Norway. *Appetite* 92, 217–226.
- Tam, W., Yang, D., 2005. Food safety and the development of regulatory institutions in China. *Asian Perspect.* 29 (4), 5–36.
- Wahlberg, A.A.F., Sjöberg, L., 2000. Risk perception and the media. *J. Risk Res.* 3 (1), 31–50.
- Wang, Z., Mao, Y., Gale, F., 2008. Chinese consumer demand for food safety attributes in milk products. *Food Policy* 33 (1), 27–36.
- WHO, 2015. World Health Day 2015: From Farm to Plate, Make Food Safe. World Health Organization, Geneva.
- Woolley, J.T., 2000. Using media-based data in studies of politics. *Am. J. Polit. Sci.* 44 (1), 156–173.
- Yan, Y., 2012. Food safety and social risk in contemporary China. *J. Asian Stud.* 71 (03), 705–729.
- Yang, G., 2013. Contesting food safety in the Chinese media: between hegemony and counter-hegemony. *China Quart.* 214, 337–355.
- Yasuda, J.K., 2015. Why food safety fails in China: the politics of scale. *China Quart.*, FirstView, 1–25.
- Zhllima, E., Imami, D., Canavari, M., 2015. Consumer perceptions of food safety risk: evidence from a segmentation study in Albania. *J. Integr. Agric.* 14 (6), 1142–1152.