



How consumer confidence in food safety practices along the food supply chain determines food handling practices: Evidence from Ghana

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ABSTRACT

The relationship between consumer confidence in food safety measures for vegetables sold in open markets and their use of safe food handling practices in the domestic environment was investigated for a set of 332 randomly sampled vegetable consumers within the suburbs of Accra, Ghana. More specifically, the confidence of consumers in twelve food safety measures employed by farmers, middlemen and traders was assessed, together with the frequency of treatment of vegetables with salt or vinegar and whether or not vegetables were stored in a hygienic and ventilated place. The results suggest that the level of consumer confidence in food safety measures along the value chain of vegetable production influences their food safety actions. Principal component analysis identified two factors determining confidence: (a) cleanliness and contact exposure, and (b) safe practices related to water, pesticides and fertilisers in production and general hygiene at the selling point. Structural equation modelling showed that confidence was significantly related to the cleanliness and contact exposure component (path coefficient = 0.41, $p = 0.002$), but only indirectly to the safe production practices and hygiene component ($r = 0.71$). Moreover, confidence then directed storage (path coefficient = 0.54, $p < 0.001$), but impaired use of salt or vinegar (path coefficient = -0.29 , $p = 0.0015$). Furthermore, multinomial logit modelling revealed a significant association between delayed vegetable consumption and frequency of treatment of vegetables with salt or vinegar before cooking or eating ($\chi^2 = 13.2$, $p < 0.05$). It also showed that the marginal effects of changes in the two principal components of confidence operated differently for groups of consumers who differed in their combined use of storage and treatment. These findings have implications for food risk communication and actions to improve local conditions under which food is sold.

1. Introduction

Food safety is a major concern in many developing countries, with food-related hazards arising along the chain from production to consumption (e.g. Ababio & Lovatt, 2015; Lagerkvist, Okello and Karanja, 2013; Omari, Frempong, & Arthur, 2018). In Ghana, vegetable production takes place throughout the country, mainly depending on weather patterns and market conditions. A common practice in peri-urban and urban vegetable production is the use of untreated wastewater for irrigation and crude farming practices (Amoah, Drechsel, Abaidoo, & Henseler, 2007). Furthermore, it has been shown that leafy vegetables grown and sold in Accra metropolis have high microbial counts and that market vegetables have higher microbial counts than farm vegetables (Quansah et al., 2017). These food safety challenges result in food and water-related diseases such as diarrhoea, typhoid and cholera. In 2016, over 1.5 million cases of diarrhoea were reported, the fifth highest frequency of all traceable foodborne diseases according to the Ghana Health Service (2017). There is also evidence that most fruit

and vegetables sold in Accra metropolis have pesticide residues above the maximum threshold (Blankson, Osei-Fosu, Adeendze, & Ashie, 2016; Fosu et al., 2017).

In Ghana, vegetables are mostly eaten either processed or cooked. However, in recent times the urban population has started eating vegetables in their fresh state (Gonzalez et al., 2016, p. 84). Most of these vegetables (and fruit) are sourced from traditional open markets, which supply about 70 percent of all fruit and vegetables sold in Ghana (Gonzalez et al., 2016, p. 84). Open markets also supply wholesalers serving corner shops, hotels and restaurants.

Previous research suggests that unsafe food handling practices in the domestic environment, including food preparation, handling and storage, are an essential cause of food-borne illnesses (e.g. Behrens et al., 2010; Ergönül, 2013; Young et al., 2017). Such unsafe practices include serving contaminated food, inadequate cooking, sourcing food from unsafe market outlets, use of improper hygiene practices and extended storage times (e.g. Badrie, Gobin, Dookeran, & Dunca, 2006; Behrens et al., 2010; Bryan, 1988). Research suggests that consumers

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do not follow recommended food handling practices at home, or use inadequate practices (e.g. Redmond & Griffith, 2003; Tomaszewska, Trafialek, Suebpongsang, & Kolanowski, 2018).

Most consumer-related research to date has focused on unsafe food handling practices at home from a risk-increasing perspective. There is evidence to suggest that psychosocial constructs differ in their contribution to explaining use of unsafe practices. In a meta-study, Young et al. (2017) found that knowledge has been the most investigated behavioural construct, but that there are few or inconsistent associations between this construct and use of safe food handling practices. They also found that attitudes and risk perception, other frequently investigated constructs, can predict a wider range of safe practices, while other psychosocial consumer constructs, consumer habits, subjective norms, self-confidence (i.e. as related to self-efficacy) and control have the most consistent relationship with practising safe behaviours. However, only one out of 66 studies reviewed by Young et al. (2017) was from Africa, despite reports from a developing country context of insufficient awareness and familiarity with food quality terms, including agricultural practices (My, Rutsaert, Van Loo, & Verbeke, 2017).

In developing countries, consumers of fresh produce face food-related hazards as a condition (i.e. a state of matters). According to cognitive theory, these consumers rely on cues derived from their context as input to an inferential process (metacognition) on which they base their judgement about the behavioural consequences of acting on cues (Koriat, Máayan and Nussinson, 2006). Previous research across domains suggests that confidence, which is a metacognitive judgement, directs reasoning, perceptions and decision making (Flemming et al., 2015; Fletcher & Carruthers, 2012). Thus confidence relates to the internal evidence, or probability, that a given judgement is correct. As regards food safety, previous research has considered confidence a “taken-for-granted” attitude (e.g. Berg et al., 2005). Existing research suggests that confidence is based on familiarity and trust, which means that confidence can compensate for knowledge deficits (Green, Draper, & Dowler, 2003). Existing research also suggests that consumer confidence in the safety of food is related to the degree to which consumers have trust in various value chain actors (Berg et al., 2005). Therefore, as regards food risks, consumer confidence in relation to actions taken from farm to market is a consequence that can be expected to guide food handling (i.e. determine whether and what type of food handling practice will be needed). There is some evidence to suggest that overconfidence (as a personal trait) is related to optimistic bias, both of which have been found to explain the mismatch between food safety awareness and use of safe practices among food handlers and consumers (Brennan, McCarthy, & Ritson, 2007; De Sousa Carvalho Rossi, Stedefeldt, da Cunha, & de Rosso, 2017). However, it is important to investigate how consumer confidence in the food safety characteristics of the food they buy affects their adoption of adequate food hygiene practices. Specific objectives of the present study were thus: 1) to use a quantitative methodological approach to identify how confidence in food safety among consumers of open-market vegetables in a developing world context (the suburbs of the Greater Accra Region) explains use of safe food handling practices in the domestic environment; and 2) to examine whether differences in consumer confidence in food safety practices along the supply chain affect consumer decisions to delay consumption and to treat vegetables with salt or vinegar before consumption or cooking. Based on the results, implications for food risk communication were considered.

2. Material and methods

2.1. Data collection

Empirical data were collected using a survey questionnaire developed following a literature review and discussions with local experts. A total of 332 individuals were interviewed face-to-face during January

Table 1
Characteristics of the sample (%; n = 332, suburbs of Greater Accra region, Ghana).

Variables	Mean
Male	0.217
Age (in years)	35.42
<i>Age category</i>	
17 to 29	0.373
30 to 60	0.581
Above 60	0.045
<i>Marital status</i>	
Single	0.383
Married, living with spouse	0.488
Married, spouse living away	0.051
Widow/widower	0.033
Separated	0.024
Other	0.021
<i>Educational attainment</i>	
No formal schooling	0.072
Primary	0.211
Secondary	0.485
Tertiary/University	0.229
Don't know	0.003
<i>Relationship with household head</i>	
Head	0.311
Spouse	0.414
Child	0.202
Sibling	0.054
In-law	0.006
Other	0.012

2017 using a structured questionnaire, after pre-test validation.

A stratified random sampling technique was used to draw a sample from the population. A screening question about whether or not a prospective respondent had consumed fresh vegetables purchased from an open market two weeks prior to the interview was used to select individuals for interviews. Respondents were visited at their homes in order to reduce incompleteness rate.

The characteristics of the sample are described in Table 1. About 78 percent of the participants were female, which reflects the fact that women are more likely to be responsible for food purchases. The average age was 35 years (SD = 11.4, min = 17, max = 75), with 58 percent of participants aged between 30 and 60 years, and around 37 percent between 17 and 29 years. Around 49 percent of the participants were married and living with their spouse, and around 38 percent were single. Participants were distributed across educational level and role in the household.

2.2. Measures

2.2.1. Confidence in food safety practices along the supply chain

Based on Lagerkvist, Okello, and Karanja (2015), participants were exposed to 12 statements about food safety measures from farm to market, modified to match vegetables as the product (Table 2). Research shows that microbial infections can be reduced by adequate handwashing (e.g. Malhotra, Lal, Prakash, Daga, & Kishore, 2006). Statement 7 in the original version of the questionnaire (Lagerkvist et al., 2015) was therefore split into statements 7a and 7b, while statement 7c about handling money was added (Table 2). Participants were asked to indicate how confident they were that each of the features are met at the marketplace for the product they normally buy. Following Jersakova et al. (2018), confidence judgements do not correspond to yes/no responses. Therefore, participants were asked to answer each question on a seven-point Likert scale ranging from 1 (not confident at all) to 7 (completely confident).

2.2.2. Food safety practices by consumers

In relation to food safety practices by consumers in their domestic

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