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The association between factors which affect the food safety practices of seafood distributors within the southern domestic distribution chains in Vietnam

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ABSTRACT

In order to improve the safety of seafood in domestic distribution chains in Vietnam, a better understanding of factors affecting the practices of seafood distributors is necessary. The objective of this research was to identify the factors affecting the food safety practices among distributors in three major sites. A mixed methods design including qualitative and quantitative methods was used. Questionnaires were completed by 180 workers at various points of the seafood distribution chain. The survey revealed poor knowledge of food safety and hygiene amongst distributors and ineffective use of food safety management practices throughout the domestic seafood distribution chains. There was generally a low level of compliance with food safety regulations. One potentially positive outcome is that seafood distributors are concerned about critical feedbacks and complaints from consumers. Therefore, improving consumer knowledge may have a positive impact on food safety practices in the domestic seafood distribution chains.

1. Introduction

Vietnam's prominence is increasing in regional and international markets for seafood products. Seafood exports have risen rapidly since the 1990s (Directorate of Fisheries, 2015). Despite the quality of exported seafood products, a considerable amount of unsafe raw seafood is still supplied to domestic markets (Gerber, Turner, & Milgram, 2014; Nguyen, 2011, 2012). Seafood was the second most common source of food poisoning events in Vietnam from 2010 to 2014 (Vietnam Food Administration, 2015). These report has raised concerns for Vietnamese government about the food safety management system, the physical environments of fish distribution points and the quality of the fish distributors themselves within for the domestic distribution chains.

The domestic seafood distribution chains (DSDCs) in Vietnam contain complex processes involving many stages and traders. Once fish are unloaded from ships, they are sold to the first level traders and then proceed through a number of middle trading levels before reaching retailers. 'Seafood distributors' include seafood handlers, intermediate traders and retailers. Seafood distributors have direct contact with seafood while undertaking various activities including unloading, sorting, washing, storing, and transporting seafood.

The government of Vietnam has recognised that ultimate responsibility for seafood safety lies with the distributors (Nguyen, Dalsgaard, Phung, & Mara, 2007; Vo, 2006). In 2009 national technical regulations (QCVN) were developed and issued by the Ministry of Agricultural and Rural Development (MARD, 2009a; MARD, 2009b). The regulations have a strong focus on the physical environment, personal hygiene and food safety training in an effort to protect food safety for consumers and to enhance the quality of Vietnamese seafood. However, ess emphasis is placed on food handler behaviour. Food safety standards are more likely to be improved when all factors affecting seafood safety, including food handling practices, are controlled (Green & Selman, 2005).

Numerous studies have noted food handlers' knowledge and attitudes are important factors that influence food safety and hygiene behaviours (Aziz & Dahan, 2013; Ball, Wilcock, & Aung, 2009; Haileselassie, Taddele, Adhana, & Kalayou, 2013; Mendagudali, Akka, Swati, Shedole, & Bendigeri, 2016; Sharif, Obaidat, & Al-Dalalah, 2013;). Accurate knowledge positively affects attitude

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formation which leads to desired behaviours (Ball et al., 2009; Haileselassie et al., 2013). Therefore, food handlers' food safety knowledge is critical when attempting to improve food safety and hygiene practices. However, it is noted that knowledge alone is not sufficient. Several studies have found food handlers fail to implement appropriate practices despite having the requisite food safety knowledge (Clayton, Griffin, Price, & Peter, 2002; Subratty, Beeharry, & Sun, 2004). Subratty et al. (2004) found that food vendors are quite aware of hygiene conditions; however, they do not translate their knowledge into practice. Clayton et al. (2002) reported that 63% of respondents admitted to failing to implement adequate handling practices that they knew were appropriate.

Food safety is also influenced by managers and worksite norms. For example, managers can emphasise the importance of food safety and ensure that staffing levels are appropriate to meet work demands (Green & Selman, 2005) Rennie (1995) identified worksite norms and rules, including social interactions and expectations of co-workers, influence food safety behaviours. Positive worksite norms facilitate safe food handling behaviours (Brough, Davies, & Johnstone, 2015; Mitchell, Fraser, & Bearon, 2007).

There are few studies on the Vietnamese DSDCs. No systematic research has been conducted regarding the factors that affect food safety practices among domestic seafood distributors. The aims of this research were to evaluate food safety practices of seafood distributors and investigate the associations between six interrelated factors including seafood distributor characteristics; training in food safety; knowledge of food safety; attitudes to food safety; concern of managers, co-workers, and consumers about food safety; and the working environment; on the food safety practices of seafood distributors in the DSDCs in Vietnam.

2. Materials and methods

Qualitative in-depth interviews were conducted with 11 participants including seafood handlers, retailers, and owners or traders in the DSDCs and food safety experts. Four focus group discussion were held, involving a total of 30 participants including seafood handlers, retailers, and owners or traders. In-depth interviews and focus group discussions were held to identify factors that would be most relevant for inclusion in the questionnaire and to explore how to use terminology/words in the survey questionnaire that are appropriate for fish distributors in Vietnam.

The questionnaires were developed using information from literature and the interview and focus group findings. The questionnaires were administered orally in-person, to 180 participants including 30 middlemen traders, 60 seafood handlers, and 70 retailers between May to June 2013. The participants were working in 6 fishing ports, 9 fish markets and 32 trading establishments in Khanh Hoa province, Ba Ria Vung Tau province, and Ben Tre in Vietnam (Fig. 1). The participant were randomly selected on each day of data collection and participation was voluntary. The visual aid were used to enhance participants' understanding of questions if necessary (e.g. all of five possible answers of multiple choice questions were printed out in big font, therefore, the participant could pointed directly to answer).

As recommended by Ary, Jacobs, and Sorensen (2006), the construct validity of the questionnaires was assessed by subject matter experts. Two PhD level food safety experts from Nha Trang University, a food safety law expert and two seafood traders reviewed the questionnaires. Their feedback was used to revise the questionnaire. Once finalised, the questionnaires were tested on 5 seafood handlers and retailers.

The questionnaires consisted of seven parts. Part one included questions about demographics (e.g. age, gender, income from their current job, education level, type of settlement, and number of years in the seafood business) and whether the participant had experienced a fish-borne illness. Part two explored prior training and awareness of procedure manuals for food safety and hygiene in the DSDCs.

Part three assessed knowledge of microbiologic hazard development, identifying fish contamination and fish-borne illness, knowledge of safe temperatures, and personal hygiene. The thirteen questions in part three were all multiple choice with five possible answers including "do not know" for the purpose of minimizing the possibility of selecting the correct answer by chance. The food safety knowledge score was determined by adding all the correct answers together (correct answer = 2, incorrect answer or do not know = 1). Consequently, the lowest possible score was 13 and the highest possible score was 26. The scores of each section were classified as no knowledge (no correct answers), low knowledge (one correct answer), moderate knowledge (two correct answers), and good knowledge (three or four correct answers).

Part four of the questionnaire focused on the participants' attitude toward seafood safety and hygiene. This part was divided into four sections including attitude to seafood safety in job responsibility and training (e.g. question "safe fish handling is an important issues in my job responsibility"), risk of fish borne illness from personal hygiene and worker's health, risk of fish-borne illness from poor control of time and temperature, and risks of fish borne illness from unclean contact surfaces containers and tools. Responses to the ten questions were made using a likert-scale, from 1 = strongly disagree to 5 = strongly agree. Numeric responses to these questions were added to yield a range of possible scores from 10 to 50.

Part five of the questionnaire related to the concern was shown by managers, co-workers and consumers about food safety and hygiene. These questions used a Likert-scale ranging from one to five, with 1 = never and 5 = always.

Part six focused on satisfaction with working conditions and jobs including appropriate physical environment; cleanliness and sanitisation of structural environments; time pressure; and satisfaction with their job in terms of job character and organisational matters. Responses to the six questions were recorded using a Likert-scale of one to five, with 1 = strongly satisfied to 5 = strongly dissatisfied.

The final part of the questionnaires assessed participants' habits. The eighteen questions covered a range of practices including personal hygiene, cleaning contact surfaces, and time and temperature control. These questions used a Likert-scale ranging from one to five, with 1 = never and 5 = always. However, five questions were reverse scored (i.e. 5 = never and 1 = always) to ensure respondent attentiveness. Numeric responses were added to produce a score ranging from 18 (poor food safety and sanitation practices) to 90 (correct food safety and sanitation practices).

Parts three, four and seven were developed having regard to several published questionnaires (Annor & Baiden, 2011; Ansarilari, Soodbacksh, & Lakzadeh, 2010; Baş, Ersun, & Kivanc, 2006, 2007; Gomes-Neves, Cardoso, Araujo, & Costad, 2011; Jevsnik, Hlebec, & Raspor, 2008; Omemu & Aderoju, 2008; Sun, Wang, & Huang, 2012; Tokuc, Ekuklu, Berberoglu, Bilge, & Dedeler, 2009; Walker, Pritchard, & Forsythe, 2003), the qualitative interview and focus group findings and the relevant Vietnamese regulations.

2.1. Data analysis

Statistical analysis was performed using SPSS (version 21) for Windows for all variables. Identification of bivariate associations between food safety practices and factors utilised correlation