Food Control 90 (2018) 105–112

Contents lists available at ScienceDirect

Food Control

journal homepage: www.elsevier.com/locate/foodcont

Use of the letter-based grading information disclosure system and its influence on dining establishment choice in Singapore: A cross-sectional study

Joel Aik [a, b, *], Anthony T. Newall [a], Lee-Ching Ng [b], Martyn D. Kirk [c], Anita E. Heywood [a]

[a] School of Public Health and Community Medicine, Faculty of Medicine, University of New South Wales, Level 3, Samuels Building, Botany Road, Kensington, New South Wales 2052, Australia
[b] National Environment Agency, 40 Scotts Road, #13-00, Singapore 228231, Singapore
[c] National Centre for Epidemiology and Population Health, Australian National University, Canberra, ACT 0200, Australia

ARTICLE INFO

Article history:
Received 3 November 2017
Received in revised form
25 January 2018
Accepted 23 February 2018
Available online 24 February 2018

Keywords:
Food safety
Food hygiene
Information disclosure system
Consumer

ABSTRACT

The aim of this study was to examine the consumer use of Singapore's letter based grading information disclosure system and its influence on dining establishment choice. We used data from a national survey of 1533 households collected from 2012 to 2013 in Singapore to assess (i) the proportion of adults who refer to the letter grade before dining and (ii) the impact of the letter grade on their willingness to dine at an establishment. We used multivariable logistic regression to account for the independent effects of socio-demographic factors. The proportion of respondents who referred to a letter grade before dining was 64.5% (95% confidence interval [CI] = 62.1%, 66.9%). Propensity for referral differed by dining frequency, ethnicity and employment. Fewer respondents were willing to dine at a 'C' (lower) graded establishment [10.3% (95% CI = 8.8%, 11.8%)] compared to a 'B' graded establishment [85.3% (95% CI = 83.5%, 87.0%)]. Willingness to dine at a 'C' graded establishment differed by dining frequency, housing type and citizenship. The letter based grading information disclosure system in Singapore is commonly used among Singaporeans and influences establishment choice. Our findings suggest that information disclosure systems can be an effective tool in influencing consumer establishment choice and may be useful to help improve food safety in retail food establishments. The implementation of such information disclosure systems should be considered in other countries where it has yet to be introduced and be periodically assessed for its effectiveness and to identify areas requiring improvements.

1. Introduction

Food safety is becoming increasingly important. The World Health Organization estimates that contaminated food causes 600 million individuals to fall ill (approximately 1 in 10 individuals globally), resulting in more than 420,000 deaths annually (World Health Organization, 2015). The economic costs of food-borne illness are substantial. For example, as one of the leading causes of food-borne illness, *Salmonella* is estimated to cost the United States (US) and the European Union (EU) billions of dollars annually (Economic Research Service (ERS) (2015); European Food Safety Authority, 2014). The consumption of food produced outside homes has increased due to time scarcity (Jabs & Devine, 2006) and as a result, the number of individuals who are more susceptible to food-borne illness is expected to grow (Lund, 2015).

Several food safety strategies have been used to minimise the transmission of food-borne pathogens. Food safety management systems (FSMS) aim to systematically identify and eliminate physical, chemical and microbiological contamination in the production process to ensure that food is safe for consumption (ISO., 2005). Legally mandating FSMS in food establishments has been shown to improve food hygiene standards (Djekic et al., 2016). The implementation of a food safety system can reduce microbiological contamination during the food production process (Cusato et al., 2012). Dining establishment operators can achieve higher hygiene standards with better food hygiene knowledge and more positive attitudes towards food hygiene (Läikkö-Roto & Nevas, 2014). For example, in a hotel setting, food handler training has been

* Corresponding author. National Environment Agency, 40 Scotts Road, #13-00, Singapore 228231, Singapore.
E-mail address: joel_aik@nea.gov.sg (J. Aik).

https://doi.org/10.1016/j.foodcont.2018.02.038

demonstrated to improve the safety of the food production process (Gomes, Lemos, Silva, Hora, & Cruz, 2014).

One food safety strategy that has been introduced in several high-income countries is the use of public information disclosure systems aimed at influencing where people eat. Such systems aim to reduce the incidence of food-borne diseases by increasing consumer demand for better hygiene standards in dining establishments. While not necessarily mandatory, these information systems usually require dining establishments to publicly display their assessed hygiene standards for consumers and are complementary to the existing regulatory inspection regimes used by public health agencies. Studies have found that posted hygiene grade cards or inspections scores can lead to improvements in the hygiene standards of food establishments (Jin & Leslie, 2009; Vergeris, 2015; Waters et al., 2013; Wong et al., 2015), and that there is a positive consumer attitude towards food safety certification in restaurants (Uggioni & Salay, 2014). Examples of such systems introduced include the "Smiley Scheme" in Denmark in 2001 (The Danish Veterinary and Food Administration, 2017), the Food Hygiene Rating Scheme in the United Kingdom (UK) in 2010 (Food Standards Agency (UK) (2015b), the restaurant letter grading program in New York City, US in 2010 (McKelvey, Wong, & Matis, 2015) and "Scores on Doors" in New South Wales, Australia in 2011 (New South Wales Food Authority, 2017).

The incidence of reported non-travel related food-borne illnesses in Singapore rose by almost 200% from 15.9 to 47.0 per 100,000 population over a 13-year period (Ministry of Health (Singapore) (2015). Singaporeans are consuming meals prepared away from homes more than before; almost 2 in 3 dine out at least 4 times a week compared to 1 in 2 more than a decade ago (Health Promotion Board Singapore, 2010). The exact disease incidence attributable to dining establishments is unknown. However, dining establishments are known to be an important source of foodborne diseases (Gormley et al., 2011; Gould et al., 2013; Jones & Angulo, 2006; Park, Kwak, & Chang, 2010) and consumers have to rely on establishments to ensure that the meals that they prepare and sell are safe for consumption.

Singapore introduced its food hygiene grading system in 1997. Public health inspectors from its National Environment Agency (NEA) periodically assess the hygiene standards of each licensed dining establishment. Establishment operators are usually not informed of their visits. The outcome of one of these regulatory inspections is then displayed in the form of a colour coded certificate containing the grade 'A', 'B', 'C' or 'D'. The prominent display of the assessed grade is legally mandated. An 'A' grading is the highest that can be awarded, while 'D' is the lowest and signifies the minimum standard of food hygiene for business continuity. Since 2012, no establishments have been graded 'D'.

Despite being one of the primary measures implemented to ensure food safety, the consumer use of Singapore's food hygiene grading system has not been examined. In this analysis of survey data collected from 2012 to 2013, we examined consumers' use of the information disclosure system in Singapore and its influence on their choice of dining establishments. We also assessed consumer attitudes, perceptions and practices of dining out and food safety.

2. Materials and methods

2.1. Study population

Singapore is a city-state with an estimated multi-ethnic population of 5.6 million, of which approximately 3.4 million are Singaporean citizens and 0.5 million are permanent residents (Department of Statistics Singapore, 2017). There are more than 37,000 licenced food establishments (Ministry of Environment and Water Resources Singapore, 2017), an average of more than 48 per square kilometre. Licensed establishments include individual food stalls in hawker centres, food courts and coffeeshops, restaurants, takeaway food kiosks and caterers.

2.2. Study design

We obtained data from a household survey that the NEA conducted on the knowledge, attitudes, beliefs and practices of food safety and hygiene of Singaporeans from 2012 to 2013. The aim of the survey was to collect household information to identify opportunities for improvement in food hygiene and safety programmes. The NEA obtained a random sample of 1700 household addresses from the Government Department of Statistics Singapore and sent a letter of notification to each of them in the four main languages used in Singapore (English, Chinese, Malay and Tamil) to inform them of the purpose of the survey and to provide assurance on data confidentiality. The NEA outsourced the data collection to a market research company and both were responsible for training bilingual (English and one other main language) interviewers to conduct the face-to-face surveys using structured questionnaires that had been pretested in a pilot face-to-face survey on 50 individuals. Survey respondents were randomly selected from each household by choosing the adult with the nearest upcoming birthday. Respondents were given a S$5 voucher for their time. The questionnaire comprised 14 close-ended questions on attitudes, perceptions and practices of dining out and food safety, including factors related to dining establishment choice and dining frequencies; and 10 socio-demographic questions: age, citizenship, gender, ethnicity (according to the ethnic groups defined by the government), education, marital status, number of children, employment status, income level and housing type (categorised as public or private housing). Respondents were asked to rank 7 choice factors: (i) cleanliness, (ii) taste, (iii) food hygiene practices of staff, (iv) price, (v) service quality, (vi) recommendations and (vii) hygiene grading, in order of importance for each of the categories of dining establishments. Categories of dining establishment included: (i) hawker centres, (ii) coffeeshops and canteens, (iii) food courts, (iv) restaurants and cafes, (v) food kiosks, (vi) bakeries and cake shops, and (vii) caterers. A rank score of '1' signified the most important factor while '7' signified the least important factor, except for caterers in which the cleanliness and food hygiene practices of staff could not be observed and only 5 factors were ranked.

2.3. Study measures

We analysed two main outcome measures: (1) referencing the food hygiene grade before patronising a dining establishment; and (2) willingness to patronise a 'C' graded dining establishment ('C' being the lowest grade currently given). For the first outcome measure, respondents who either "agreed" or "strongly agreed" with the statement "I always look at the grading of the food establishment before patronising it" were considered as those who referenced the assessed grade. For the second outcome measure, it was assumed that all respondents would dine at the highest 'A' graded establishments. For each of the 7 categories of food establishments, respondents were first asked if they would dine at a 'B' graded establishment. Those who would were then asked if they would also dine at a 'C' graded establishment. Binary variables were created to reflect the proportion of respondents who were willing to dine at (i) any 'B' and (ii) any 'B' or 'C' and a test for difference in proportions carried out if applicable.