IMPROVING FOOD SAFETY – OPPORTUNITY AND CHALLENGES ON FOOD HYGIENE OF READY TO EAT STREET FOOD VENDORS IN INDONESIA

by

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Abstract

This research investigates the implementation of food hygiene in ready to eat street food vendors in Indonesia. It observed the knowledge, attitude, and practise (KAP) of food handlers, assessed environmental sampling in premises and confirmed KAP result after intervention. This study also examined government and stakeholders view on practices in food safety regulation in small food business, especially street food at the local level in Indonesia. In addition, this thesis also reviewed UK experiences in implementing food law enforcement from food inspectors' perspective as potential lessons learned which could adopted by Indonesia.

The research used a mixed method of quantitative and qualitative analysis, with three phases. The first stage was a knowledge, attitude, and practise survey with food surface contact sampling as a baseline data. The construct questionnaire was designed to align with food safety and national regulation principals. The second stage was an intervention and evaluation of the impact of food hygiene training. The development of the training material was dictated by the first stage results. The last stage was an exploratory study by in depth interview of the government and stakeholder view on food hygiene control. An additional study of UK enforcement officers was carried out to determine their views on food law enforcement.

It was found that street food handlers in Bandung, Indonesia, had adequate knowledge and positive attitude but poor food hygiene practices. The microbial sampling showed high premises contamination with *Enterobacteriaceae*. The relationship ($p<0.01$) between knowledge-attitude (K-A), knowledge-practice (K-P) was evaluated by Spearman correlation. After a training intervention, a significant improvement was identified in knowledge and attitude ($p<0.01$). However, the practices in food hygiene and the microbial contamination were not observed to improve. The practice score relating to cross contamination had a significant ($p<0.01$) and strong correlation (1.000) with available hygiene and sanitation facility. Availability of sanitation facilities would also impact on the microbial contamination. The quantitative research concluded that food

handler's in ready to eat street food should be supported by hygiene and sanitation facilities as well as providing the food business easy access to knowledge and skills.

Results from the qualitative study confirmed that there were general issues in food governance process and its performance related to food safety control. The government system change from centralisation into decentralization has not been followed by strengthening of local governance between main actors and supporting offices to deliver or improve the public service in food safety control. The main goal of protecting public health has not been fully achieved. The food street vendors showed their desire for improving their position and needs support from government in hygiene and sanitation facility. The school showed had less capacity to protect the pupil since they have several barriers such as internal school resources, school infrastructure, parent support and inadequate regulation including its implementation.

The UK study has given insight into several factors that are important and have practical value in delivery of food control. Capacity and capability of organization including human resources, clear guidance and legislation, consistency of implementation are significant contributors.

A conclusion from this study is that bureaucratic and strategic reforms are needed to address the issues faced by food street vendors in Indonesia. This will include strengthening of local government capacity and reform of institutions, personal competence of government officer including their professional integration and infrastructure development. These can help achieve good governance and enhance public service.

The capacity and capability of schools should be supported by all stakeholders to provide a safe environment for pupils in term of food safety.

The existence of informal food sector needs to be addressed by several strategies that might benefit local income and help local government on food security issue. If the existence of street food vendors is recognized there can be mutually beneficial collaboration with local government for example positive impacts on tourism.

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List of Abbreviations

BNSP Badan Nasional Sertifikasi Profesi (National agency for professional certification)

CFU Colony forming units

DEFRA Department for Environment, Food and Rural Affairs

E. coli Escherichia coli

EC European Commission

e.g. for example

EHO Environmental Health Officer

EU European Union

FDA Food and Drug Administration

FSA Food Standard Agency

FSAI Food safety authority of Ireland

HACCP Hazard Analysis and Critical Control Point

i.e. in order words

ISO International Organization for Standardization

IFSS Integrated food safety system

LAEMS Local Authority Enforcement Monitoring System

MoA Ministry of agriculture

MoH Ministry of Health

MoI Ministry of Industry,

MoMAF Ministry of marine affairs and fisheries

MoT Ministry of Trade

NADFC National Agency Drug and Food Control / Badan Pengawasan Obat dan Makanan (BPOM)

PIRT Produk Industri Rumah Tangga (Home industry product)

RTE Ready-to-eat

SFBB Safer food better business

TPB Theory of Planned Behaviour

UK United Kingdom

UoB University of Birmingham

VRBG Violet red bile glucose agar

WHO World Health Organization

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Chapter 1 - Introduction

1.1 Research background

Based on government regulation PP 28/2004, the National Agency of Drug and Food Control (NADFC) and related ministry share responsibilities to enforce food safety in the food business in Indonesia. The National Agency of Drug and Food Control or Badan Pengawasan Obat dan Makanan (BPOM) is an institution that is tasked as a coordinator to control and monitor drug and food safety in Indonesia. Based on Presidential regulation number 80 in year 2017, the NADFC has the function to draft national regulation and implement the policy of drug and food safety.

In order to implement food safety for small and medium food businesses such as home industries, ready-to-eat street food, café, restaurant and low cost eating-places, local health authorities in every district have the responsibilities for monitoring and control (PP 38, 2007).

National data confirmed outbreaks of food illness in Indonesia have been caused by chemical and microbiological contamination. From 2011 to 2017, the percentage of outbreaks caused by microorganism contamination was up to 75% but in only 15% - 30% of cases could the microorganism be identified. Three to five percent (3%-5%) of outbreaks were caused by chemical contamination and the rest (20%-25%) were caused by unknown subjects. The data showed that up to 60% of the outbreaks could be attributed to food industries such as catering, processed food, snack and ready to eat food. The highest rank was caused by home cooked food and the second rank was caused by ready to eat food especially street food (BPOM, 2012a, BPOM, 2013a, BPOM, 2014, BPOM, 2015, BPOM, 2016a, BPOM, 2017a, BPOM, 2018a).

Some studies in food safety confirmed food borne illness could happen because of contamination or improper preparation in the food process. For example, an outbreak of foodborne *Salmonella* Bailey was reported in UK in 2010 and was caused by incorrect preparation of raw bean sprouts (Cleary et al., 2010).

WHO confirmed every year more than 150 million people in South East Asia region get ill and about 175,000 them had died because of foodborne disease. The data also showed that child under five shared almost 40% (60 million) ill case from total case and 50,000 children died. Majority of cases described diarrhoeal symptom which was caused by *Norovirus*, Non-typhoidal *Salmonella*, and Pathogenic *Escherichia coli* (WHO, 2015). Improper handling, transport and storage of prepared food are considered critical points of safety of street-vended food. The cross contamination by pathogens and toxic chemicals can be avoided by running adequate food safety procedures(WHO, 1996). Poor food handling conditions in Indonesia might happen because of inadequate knowledge, attitude and practise of food hygiene and other influence factors. This study focuses on ready-to-eat (RTE) street food because of consumers demand and its existence in many public places.

Street food vendors and low-cost eating-place (*Warung*) in Indonesia contributed more than 20% of the food supply in urban population while lack of identification and infrastructure on food safety also was showed in this marginal sector (Puspa and Kühl, 2007). Vollaard *et.al* (2004) found that restaurants in Jakarta, Indonesia had better hygiene practise compared to street food vendors (Vollaard et al., 2004). WHO (1996) stated street-vended foods might create potential public health problems because of the risk of food borne illness. The lack of basic infrastructure on hygiene and sanitation, limited monitoring by the authorities of the street food vending operations, lack of knowledge of food handlers in food safety, especially with regard to microbial contamination, and insufficient resources for inspection and laboratory analysis were the factual problems found associated with street food vendors by the WHO (WHO, 1996).

In Indonesia, there are many street food vendors such as food hawkers or street food sellers. They have stalls selling at the side of the road, which is on the pavement or pedestrian side. A previous study conducted in one of Indonesia's cities, Bogor, showed that annual sales of street foods amount to US$67 million (Cohen, 1986). In 1983, Bogor as one of the urban cities, with a population of 250 000, had 17,754 street food vendors, one vendor for every 14 inhabitants. Approximately 26 percent of workers active in the informal sector in Bogor city were directly employed as street food vendors (Tinker, 1997).

There is no available data on total sales in Indonesia. However, after the economic crises in 1997, the data confirmed the increasing of informal sector including food business. In 2007, the trend of employment showed that informal sector shared higher (72%) rather than formal sector (28%) (Hartono, 2011), and the informal sector was mostly in agriculture sector (Firdausy, 2000).

WHO defined street food as "foods and beverages prepared and/or sold by vendors in streets and other public places for immediate consumption or consumption at a later time without further processing or preparation" (WHO, 1996). The low cost of the meal and easy access, limited time to prepare own food, also the variety of taste attracted consumers which include children, student workers, and housewives (Winarno and Allain, 1991, Khairuzzaman et al., 2014).

Improving KAP of food handlers by training to prevent foodborne illness has been conducted by several countries. Regulation (EC) No.852/2004 (on the hygiene of foodstuffs) instructs food business operators to implement food hygiene, including training, in EU countries. Food hygiene training has been used to improve food handlers' performance in food safety. In UK, the Food Safety Act 1990, and the Food Hygiene (England) Regulations 2013 required food business operators to register with the local authorities and comply with all basic hygiene requirements, including ensuring food handlers are supervised and trained in food hygiene. The food handlers can use online courses or face-to-face training, either informal or formal. Choudhury *et.al* (2011) argued food hygiene training for street food vendors were urgent because they have weak social economic background and are exposed to more environmental hazards. The group demonstrated a significant change in knowledge and practise after a training intervention.

Cleary *et.al* (2010) stated that systematic national monitoring of foodborne disease by surveillance helped support public health through food safety. In UK, from 1992 until 2008, 2429 foodborne outbreaks have been identified, described and analysed. It showed cases caused mostly by *Salmonella* spp, *Campylobacter* spp, *Escherichia coli (E.coli)* O157. Cross-contamination, inadequate heat treatment, and inappropriate food storage were

observed as influence factors in most outbreaks. The implementation of effective control measures offer the best way to minimize risk of food borne illness(Cleary et al., 2010).

Food poisoning outbreaks result in economic loss as people's productivity changes into health care cost. The economic loss of food poisoning outbreak in Indonesia in 2013 was estimated based on direct health-care costs, direct non-health care cost, and indirect non-health care cost, as approximately US$ 78 million. The high cost of economic loss due to food poisoning outbreaks need a serious strategy from government for handling all aspects of food safety in a better way (Rahayu et al., 2016).

Food safety is closely linked to many food issues such as food quality and foodborne illness. The concept of "One Health" was introduce by WHO as a strategy for designing and implementing programmes, legislation and research in multiple sectors for working together to achieve better outcome in public health. WHO, FAO and World Organization for Animal Health (OIE) work together to tackle cross issues between food safety, zoonoses and health safety. The concept of "One Health" underlines a cooperative governance approach to solve the problem. The attention on food safety issues has highlighted the need of legislation, regulation and governance to ensure the safety of food (Lepeintre J & Sun J, 2018).

This thesis addresses the problems of food safety in ready to eat street food vendors and small, low cost eating-places by examining the KAP food handlers. Ready to eat street food observed in this study was food which did not need much preparation to serve or was cooked in advance at home. The research held in Bandung city, a capital city of West Java. The data from 2011 to 2016 confirmed that West Java province has increasing trend in food illness outbreak(BPOM, 2012a, BPOM, 2013a, BPOM, 2014, BPOM, 2015, BPOM, 2016a, BPOM, 2017a).

Furthermore, this research tried to observe the impact of training on the KAP of food handlers and investigated the limitations that remain after intervention. The governance process of food safety control and its obstacles faced by government was also explored, including the stakeholders' perspective on food safety in Indonesia especially on ready to eat street food vendors. In addition, the food law enforcement in UK today and its

challenges was described to identify any potential learning points that Indonesia might wish to consider when reviewing the national food safety system.

1.2 Research Objectives and Research Question

The thesis describes the street food vendors' food hygiene in Indonesia, from the view not only of food handlers but also regulatory and stakeholders' views. This study tried to capture and confirm all information in comprehensive ways to present it as a whole package from actors that are involved in or influence food safety control in small business especially street food vendors.

Indonesia as the home country of the author is considered for this study because there is still limited research on food safety especially for ready to eat street food vendors and the majority of consumers tend to buy this food. It is thought that the food safety and hygiene practise of street food has grown to be an essential public health issue because microorganism contamination and improper preparation can lead to serious foodborne illness (Rane, 2011, Bhowmik, 2005). It is crucial to do this study in Indonesia since the foodborne illness which is caused by street food vendors did not clear to identify and the previous food safety study on street food vendors in Indonesia had not notified enough food safety infrastructure support for street food vendors.

This research has the following objectives:

a) To determine the knowledge and attitude, and audit practice (KAP) of food hygiene of food handlers in the street food sector in Bandung, Indonesia
b) To investigate microbial contamination of food contact surfaces in the street food sector in Bandung, Indonesia
c) To identify what support street food vendors need from government
d) To assess the impact of a bespoke intervention on the food handlers KAP.
e) To evaluate the existing approach of implementation in food regulation, especially in control of ready to eat street food vendors, in Indonesia.
f) To explore the governance process in food safety control and the barriers faced by the Government Agencies in Indonesia concerning ready to eat street food vendors
g) To understand the view of some stakeholders on ready to eat street food

h) To understand the strategy and limitations in the UK (as a developed country) with regard to food law enforcement.

These objectives address the following research questions:

1) Is the KAP of Indonesian street food handlers on food hygiene adequate for handling their business?
2) Is the any relationship between KAP variables?
3) Is there evidence for microorganism contamination in the study premises?
4) What the kind of support is needed by Indonesian street vendors from government?
5) Can a training intervention improve the food handlers KAP?
6) How does the government implement food safety control, especially food hygiene, for ready to eat street food?
7) What is the stakeholders' perspective on food hygiene in ready to eat street food in Indonesia?
8) As a lesson learnt, what are the views of the UK food practitioners with regard to implementation of food law?

1.3 Research Hypotheses

The research hypotheses were designed according to the specific objectives. H_{01} until H_{03} are hypotheses for quantitative study.

H_{01} The KAP of Indonesian street food handlers on food hygiene are inadequate for handling their business

H_{02} Unacceptable levels of microorganism contamination can be observed in street food premises in Indonesia

H_{03} There are significant improvements in KAP variables after intervention

There are no hypotheses for the qualitative study. The results of such a study should produce a hypothesis for future research. Qualitative research is considered as a hypothesis generating process(Sullivan and Sargeant, 2011).

1.4 Research methods

This research was a mixed method study of quantitative and qualitative analysis and it consists of three phases for collecting data. The quantitative study involved a survey of 269 food handlers on street food vendors in Bandung city. The quantitative study has two phases that used a set questionnaire for observing knowledge and attitude in the food handlers and auditing food hygiene practice in their premises. In addition, sampling for microorganisms on food surface contact was conducted in the study food premises. The first phase was used as the baseline data for describing the real condition of food safety in street vendors in Bandung and the second phase was observing the impact of the intervention. The second phase followed an intervention (training) step and measured its impact on the KAP and premises contamination of the intervention group.

The third phase was a qualitative study held in Indonesia for observing government on food safety control. In addition, a study by survey to food control practitioners was conducted in UK. The study in Indonesia involved interviews with key actors on food safety control such as NADFC (BPOM) institution, health ministry, and local government for exploring the implementation of food regulation and its obstacles. In local health government, food inspectors' perspective also was investigated. In addition, several stakeholders point of view was explored by interview (i.e. education institution, school) to identify their perspective on food hygiene regulation in Indonesia.

In UK, the supplementary study by survey was conducted to collate food inspectors' perspective on food law and enforcement.

1.5 Thesis structure

The thesis is structured into ten chapters. This **first chapter** introduces the research, its objective and key research questions, research method and its structure.

Second chapter reviews the literature that relates to several objectives in this study from food safety to food law enforcement. The food hygiene and microorganism contamination have a close relationship in food safety implementation. The brief overview presents basic

food hygiene and the microorganisms which are pathogen sources in outbreaks, the contribution of KAP to proper food hygiene and training on KAP as a viable public health intervention. Training in food hygiene is a part of promoting food law enforcement. In addition to food law it is also necessary to establish control, monitoring and non-compliance procedures, to achieve and sustain goals for reducing foodborne illness.

Chapter 3 describes the methodology of the research, which consists of research design, rationale and method, sampling strategies, data collection data analysis and ethical review.

In **Chapter 4, 5, 6, 7, 8** present the findings of the research and in Chapter 9 concludes all findings.

Chapter 4 describes food handlers' demographic profile, their knowledge and attitude on food hygiene. **Chapter 5** reports the finding of food handlers' practise on food hygiene and the microorganism contamination in their food premises. **Chapter 6** examines the impact of the training intervention on food handlers KAP and the premises microorganism contamination. **Chapter 7** explores the governance process of controlling food safety in Indonesia and obstacles to implementation from the government perspective especially in ready to eat street vendors and low-cost eating-places. The stakeholders' view on this issue was collated for understanding their perspective in food hygiene on ready to eat street food. **Chapter 8** describes food law enforcement today in the UK from food inspector perspectives and what challenges still occur. **Chapter 9** concludes all findings and proposes recommendations for future work. This includes proposals that can be used by the Indonesia government to minimize gaps in achieving its goal to reduce foodborne illness.

Chapter 2 – Literature Review

This literature review presents an overview of food hygiene, microorganism contamination, KAP of food handlers, training intervention, governance performance, informal food sector, food safety control in Indonesia and food law enforcement in UK.

2.1 Food hygiene

Food hygiene was described by World Health Organization (WHO) as "the conditions and measures necessary to ensure the safety of food from production to consumption" (WHO, 1999). Food hygiene is a basic condition that should be fulfilled by food when it consumed. WHO promoted five key actions for making safe food:

a) "keep clean" by washing hands, sanitize equipment and keep the kitchen clean,
b) "separate raw and cook food" for avoiding the cross-contamination,
c) "cook thoroughly" especially for meat, eggs and seafood,
e) "keep food at safe temperature" for keeping the life shelf and slowing the microbial growth,
e) "use safe water and raw materials" to reduce microorganism contamination.

The food handler is an actor that plays a very important role to implement food hygiene practice in their food production. The lack of hygienic practices by food handlers can lead to the presence of microorganism contamination. A study in 1999 confirmed that hygiene practices of food handlers are one of the five important causes of foodborne illness (Ross and Guzewich, 1999). The manner of hygiene practices should be well implemented from preparation stage to final product for ensuring there are not harmful microorganisms contaminating the food. Pathogenic microbes can enter the food in many ways such as poor personal hygiene, unprotected storage conditions, from the surface of unclean premises or dirty food equipment, contaminated water supply, and contaminated raw materials.

Several studies have shown that personal hygiene is very important to reduce spreading foodborne illness (Green et al., 2006, Strohbehn et al., 2008). Studies stated that hand-washing is a simple and effective way to reduce the risk of contamination from foodborne pathogens (Curtis and Cairncross, 2003, Todd et al., 2010b). The essential parts of hand washing are the use of clean potable water for rinsing and soaps to free microbes from the skin. Hand washing should occur after and before preparing, serving, or eating food. Single use paper towel for hand drying is less likely to cause contamination compared to cloth towels. The newer dryers with high-speed air blades can achieve dryness in 10 to15 sec and are more efficient than warm air dryers(Todd et al., 2010b). In contrast, present study in 2018 confirmed that warm hand dryers with HEPA filter can reduce the number of bacteria which potentially pathogen bacteria but did not eliminate all risk of bacteria (Huesca-Espitia et al., 2018). Hand washing and drying will prevent the risk of cross-contamination from food handlers' hands to food during the food production process. However, some studies showed that the washing hand habit remains poorly implemented by food handlers. A study by Clayton and Griffith (2004) confirmed that only 9% of handlers washed their hands after contacting hair or face and only 25% washed their hands after handling of contaminated equipment(Clayton and Griffith, 2004). Food handlers in retail business are reported to have poor hand washing hygiene when they are handling food (Lubran et al., 2010). Direct hand contact with food can allow carriers to contaminate the food with enteric pathogens including *S. Typhi*, (Vollaard et al., 2004). Other researchers suggest that hand-washing with soap could reduce diarrhoea risk by 47% (Curtis and Cairncross, 2003).

Appropriate washing techniques should not only be implemented well for hand washing but also when washing the utensils or cooking equipment. A study showed that pathogenic bacterial contamination can occur in several utensils such as knives, spoons and dinner plate (Barro et al., 2006). Another study in Japan also confirmed the kitchen has the highest level for bacterial contamination follow by bathing room rather than other place in households. It showed the kitchen has the highest counts of aerobic mesophilic bacteria. The coliform was found in the kitchen cabinet and also refrigerator area while surprisingly the result both *Coliform* and *E.coli* were not detected in toilet (Ojima et al., 2002).

When preparing the food from raw vegetables and fruit, the food should be washed under running water to reduce the presence of bacteria before it is consumed. European Union (EU) Regulation 852/2004 states that the using of detergent, disinfectant, and clean water supply when washing utensils is a must for reducing the contamination. The use of cleaning agent and safe water supply should be applied in a food business to prevent contamination (EC Regulation 852/2004, 2004). Further studies showed that products which have been washed and sanitized are not a guaranteed pathogen free or to have reduced pathogen more than 90-99% (Beaulieu and Gorny, 2002, Sapers, 2003). Modern food industries not only wash and disinfect the fruit and vegetable but also sometimes improve on these technique for maintaining the quality and appearance of the products using processes such as non-ionizing by artificial ultraviolet-C (UV-C) radiation (Wang et al., 2005), heat and power ultrasound (Scouten and Beuchat, 2002).

The appropriate storage temperature for products should slow microbial growth. A study by Shigenobu Koseki and Kazuhiko Itoh (2001) investigated the microbial population (total aerobic bacteria, Coliform bacteria, *Bacillus cereus*, and psychotropic bacteria) in fresh cut-vegetables which showed the growth of each bacterium were influenced by storage temperature (Koseki and Itoh, 2001). Other studies also confirmed that temperature was one of the important aspects to control microbial growth (Nedwell, 1999, Ross et al., 2000). However, storage also needs to consider avoiding cross contamination between foods. Food need to be placed in correct shelf (i.e. not mix between meat and fish in similar way as not mix between cooked food and raw food in a shelf).

2.2 Microbiology contamination in food

Some of the microorganisms found in food are pathogenic or harmful for human health. Based on World Health Organization, the major contributors for human foodborne illness were *Salmonella*, *Escherichia coli*, *Campylobacter*, *Listeria* and Cholera (WHO, 2007). Some common pathogens that remain in food products indicate poor hygiene practice during the food preparation. *Salmonella* and *Escherichia coli* are foodborne pathogens from *Enterobacteriaceae* family.

In the United States, the data between years 2000–2008, showed norovirus caused food illnesses (58%) and it was followed by *Salmonella* spp. (11%), *Clostridium perfringens* (10%), and *Campylobacter* spp. (9%) (Scallan et al., 2011).

From March 1997 until August 1999 in Jakarta city, Indonesia, about 3875 patients with diarrhoea in community and hospital settings were determined by microbiological testing. The result confirmed the present of bacterial pathogen such us *Vibrio cholerae* O1, *Shigella flexneri*, *Salmonella* spp. and *Campylobacter jejuni*, while *S. flexneri*, *V. cholerae* O1, *Salmonella* spp. and *C. jejuni*. *V. cholerae* O1 was isolated more frequently (P<0.005) from the hospital patients than the community patients. Overall, bacterial pathogens were isolated from 538 of 3875 (14%) enrolled cases of diarrheal. Other harm bacterial Enterotoxigenic *Escherichia coli* was detected in 218 (18%) following by Enterohemorrhagic *E. coli* (1%) and *Clostridium difficile* (1.3%). was detected (Oyofo et al., 2002)

NADFC reported that foodborne illness cases in Indonesia between years 2011 – 2017 confirmed 25,565 cases of illness and 64 death due to foodborne outbreak issues. The report also described that microbiological contamination share the highest percentage of cases it (approximately 50%), follow by chemical poisoning (10-20%) and the rest was caused by unknown contamination. The report stated that one of problems in food borne outbreak was unknown contamination because of limitation epidemiology data. It caused by unrepresented sample, incorrect hypothesis and limitation of resources (BPOM, 2012a, BPOM, 2013a, BPOM, 2014, BPOM, 2015, BPOM, 2016a, BPOM, 2017a, BPOM, 2018a).

A study was conducted in 2011 in four areas confirmed that patient of diarrheal infant and children contaminated by Enteropathogenic Escherichia coli (EPEC) (Budiarti et al., 2011). Another study in 2013 was held by NADFC. It collected sample of RTE street food about 9252 samples across Indonesia and found high number of pathogen bacteria. It confirmed about 21.31% of samples positive Coliform more than 10 MPN/ml, 0.56% respectively positive for S. aureus and Salmonella spp and 4.04% E. coli more than 3 MPN/mL (Septiany, 2015).

Several studies on foodborne pathogen were summarized in Table 2.1.

Table 2.1 Foodborne pathogens

Foodborne pathogens types	(Author, Years)
***Enterobacteriaceae* family**	
The existence of the *Enterobacteriaceae* family in ready to eat food is an indicator of poor hygiene. Their presence is linked with incorrect food handling practices including in preparation, cooking, poor personal hygiene of food handlers, unclean equipment, cross contamination and inadequate storage and temperature conditions	(Rodriguez et al., 2011)
Mixed salad, fruit, and raw vegetables can be contaminated by *Enterobacteriaceae* family.	(Camelo, 2004)
In 2010, 231 laboratories across UK reported outbreak cases because of *Salmonella* Bareilly between August and November. Investigation of outbreak *S.*Bareilly showed the bean sprout consumption was correlated significantly with illness.	(Cleary et al., 2010).
A study invesstigated cases which was caused by foodborne gastrointestinal diseases detected *Salmonella sp, Shigella sp,* and *Shiga toxin* producing *E. Coli* from faecal specimens in outbreak cases in UK	(Timothy J. Dallman, 2014)
Enterobacteriaceae family such as *Escherichia coli* and *Salmonella* can be found in meat, poultry meat and its products.	(Al-Mutairi, 2011, Zhao et al., 2001)
In USA, *Salmonella* outbreaks caused estimated 380 deaths every year. The people who are infected by *Salmonella* typically develop diarrhoea, fever, vomit and abdominal pain at 12-72 hours after infection. For higher risk groups like elderly, pregnant women and infant, the effect can be severe and cause death. Red meat, poultry and its product including eggs, and milk are main source for this pathogen.	(CDC, 2016)
The contamination of pathogen (*Staphylococcus aureus and E. coli 157:H7*) can happen in production stage in household environment because of cross contamination.	(Pérez-Rodríguez et al., 2007)
Campylobacter	
Campylobacter has been mentioned as a common bacterial pathogen linked with human gastroenteritis in several countries. The study reviewed that a large share contamination in retail poultry was caused by *Campylobacter.*	(Suzuki and Yamamoto, 2009)
Campylobacter can be found in meat and its product.	(Ghafir et al., 2007)
A study in the UK reported a water-borne outbreak of *Campylobacter* gastroenteritis that affected 234 pupils and 23 staff at a boarding school, occurred over period of 8 weeks. After investigation, it was found the open storage tank was contaminated by faecal material from birds or bats. This was the most likely source of pollution.	(Palmer et al., 1983)

Table 2.1 Foodborne pathogens (continued)

Foodborne pathogens types	(Author, Years)
Listeria monocytogenes	
Listeria monocytogenes, which causes listeriosis, has a high mortality rate between 20% and 30%.	(Rocourt, 1996)
Listeria monocytogenes mainly affects mainly pregnant women, their foetuses and immunocompromised with 24% mortality rate. The incidence highly found in seafood products, meat, and poultry.	(Farber and Peterkin, 1991)
In 2000, a *Listeria* outbreak in France caused seven of 26 patients to die. The report showed that most of them had eaten pig tongue which is a French specialty food product. Furthermore, the cross contamination from knives used to cut other products was identified as the cause of the case.	(Dorozynski, 2000)
Listeriosis was reported as an outbreak in the United Kingdom in autumn 2003. It was occurred in pregnant women after they consumed sandwiches in a retail outlet in one hospital and it caused a severe symptom.	(Dawson et al., 2006)
Listeria monocytogenes can be spread from the environment, through poor personal hygiene, and raw material supply before the food process begins.	(Wenger et al., 1990)
Recontamination from the environment or equipment was the primary source of *L. monocytogenes* in many commercially prepared ready-to-eat (RTE) processed foods.	(Tompkin, 2002)
Cooking process, temperature-controlled storage, and controlling pH can slow the growth of the microorganism. *Listeria monocytogenes* can be found in several foods such as meat, poultry, vegetable, milk/dairy and seafood and its product	(Dalton et al., 1997, Farber and Peterkin, 1991, Fenlon et al., 1996)
Clostridium Perferingens	
Other bacterial pathogens that have been reported as causing outbreaks were *Yersinia enterocolitis, Clostridium perfringens, Staphylococcus aureus, Bacillus cereus, and Mycobacterium Bovis.*	(FDA, 2012)
CDC data showed the fatality of 289 outbreaks of *Clostridium perfringens* was reported in severe condition. It confirmed eight deaths, 83 hospitalized and 15,208 people showing symptoms. In USA, based on that estimation, *Clostridium perfringens* is the second most common bacterial cause of foodborne illness.	(Grass et al., 2013)

Table 2.1 Foodborne pathogens (continued)

Foodborne pathogens types	(Author, Years)
Staphylococcus aureus	
The presence of *Staphylococcus aureus* is linked with the contamination in meat, poultry, salad and milk/dairy products	(Hennekinne et al., 2012, e Loir, 2003)
S. aureus can be found in the air, dust, water, environmental surfaces and animals, but the main source of the toxigenic form is human beings. *Staphylococcal* food poisoning (SFP) outbreak cases have been reported in several countries. Nausea, vomiting, diarrhoea, weakness, sweating, fatigue myalgia, headache, and fever are the symptoms of this attack.	(Hennekinne et al., 2012)
Poor food preservation practices or cross-contamination from surfaces and utensil equipment may lead to food contamination by *Staphylococcus*. Improper handling i.e. storage temperature and inadequate personal hygiene of food handlers' hand which carrying enterotoxin S.aureus results in *Staphylococcal* food poisoning.	(Hennekinne et al., 2012, Argudín et al., 2010)
S. aureus as a common cause in foodborne illness may enter the food chain during food processing, preparation, wrapping, mincing and storage. An infected human handler or person with skin infection who carries *S.aureus* can be a vehicle for contaminated food. Even though *S.aureus* are killed by cooking the bacteria produce heat stable enterotoxins which is still able to cause illness. *S. aureus* enterotoxins caused foodborne illness that estimated 241,000 illnesses per year in US. Improper food handling practices in the retail industry was majority cause for Staphylococcal food-borne disease (SFD) outbreaks.	(Kadariya et al., 2014)

2.3 Safety requirement of food premises for street vendors

Several studies showed personal hygiene such as washing hands was important for reducing cross contamination (Green et al., 2006, Strohbehn et al., 2008, Todd et al., 2010b). Availability of a safe water supply, applying sanitation, hygiene promotion and adequate personal hygiene by washing hands reduced food borne illness (Kusumaningrum et al., 2003, Cairncross, 2006, Barro et al., 2006). WHO (1996) stated several requirements of food premises for street food vendors for reducing risk foodborne illness. These are summarised in Table 2.2 (WHO, 1996).

Table 2.2 Food safety requirements for street vendors

Food safety items	Requirements
Personal Hygiene	• Food handlers should wear clean proper clothing (apron, hair covering) • Having clean short nail and removing jewellery • Stop their activities if they suffer from diarrhoea, vomit, communicable disease • Washing hand with soap and clean water after involving in activities that potential to present contamination, and before handling ready to eat foods • Unhygienic practices like chewing or eating, sneezing, smoking, touching mouth and nose etc.
Water Source and Ice	• Water use for drinking water should safe and supplies by potable. • Water used for washing utensil, food and hand should be use running water. If use a bucket, it should make sure the water clean and not re-use. • Ice used for food and beverage should be prepared and stored in clean manner.
Raw materials and ingredients	• The presence of physical hazards raw material can be seen by its appearance • Raw material should use stored separately from other raw or cook material for avoiding cross contamination. • Raw material needs to stock in clean and safe container • Moist ingredients i.e. sauce or food additive should monitor their visible deterioration, replace regularly, check expired date
Work materials and equipment	• Food premises should easy to clean and maintain including work equipment material and surface that use for food preparation can clean effortless • Equipment and utensil store kept free from contamination • Utensil, container and equipment made from safe material or no hazardous material to food • Cutting board for cooked and raw material need use separately
Cleaning and sanitation process	• Cleaning procedures by anti-microbial soap should ensure equipment and utensil clean properly • Food staff need to control hazards by sanitizing if required, and they should be trained to adopt appropriate cleaning and sanitation program

(WHO, 1996)

Table 2.2 Food safety requirements for street vendors (continued)

Food safety items	Requirements
Food preparation, storage and packaging including temperature control	• Prepared food served cool food need to store at less 10^0 C • Prepared foods served hot for sales period extends over 4-5 hours need to keep at a temperature of at least 60°C for inhibiting growth of microbes • Avoid contact between raw and cooked or prepared foods that will be consumed without extra heating • Raw eaten food (i.e. salad, cut fruit) should be clean and wash sufficiently by safe water • Clean and dry place protected from defect • Packaging food should use safe material package, not hazardous to food or contaminated it
Design centre or location and common facilities for street vendors	• Makes possible to equipped common facilities for promoting good hygiene practices in washing and sanitation • Availability Potable water and electric supply • Having waste disposal services, drainage, toilet and vehicle park

(WHO, 1996)

2.4 Knowledge, Attitude, and Practice of Food Handlers

Based on WHO (1996), it appears that many of the food handlers of street food vendors especially in developing countries need to improve practice in their personal hygiene such as hand washing and sanitation facilities. However, many studies also showed that outbreak of food poisoning also occurs in caterers which has more facilities to support food safety culture.

Poor attitude and practices may contribute to food contamination. Various studies have confirmed outbreaks of food poisoning occurred in caterers because of bacterial contamination (Dawson et al., 2006, Dorozynski, 2000, Hennekinne et al., 2012)**.** A study in in UK, from 1992–2003 showed most outbreaks of food poisoning occurred in caterers(Hughes et al., 2007) and were caused by the inadequate time and temperature control of food (70 %), while cross-contamination contributed around thirty per cent (Wilson et al., 1997, Bryan, 1978).

Another study in England and Wales described the link between domestic catering and foodborne outbreak of intestinal illness. *Salmonella, S. enteritidis* phage type 4, *Clostridium perfringens, Bacillus cereus, Campylobacter sp* and *Escherichia coli* were the sources of microbial contamination. Inappropriate storage, inadequate heat treatment, cross contamination, an infected food handler, and other faults in food handling were the reason for the food poisoning in these studies (Ryan et al., 1996).

A study in the UK evaluated HACCP and PRP implementation by small business. It found only 42% of managers from the 102 food businesses tested had heard of HACCP and could not describe it in detail (65%). It also showed poor knowledge of food handlers on cleaning and disinfection procedures in many business such as Bed and Breakfast business and ethnic takeaway (Walker et al., 2003b).

Inadequate knowledge, attitude and practice of food handlers may cause cross-contamination or transmit pathogens themselves because of poor of personal hygiene. In Turkey, poor knowledge of correct temperatures when preparing and producing food, acceptable storage temperature ranges, and cross-contamination were found in more than half of the respondent (Baş et al., 2006). A study in Malaysia showed a satisfactory result of KAP levels of the food handlers, but poor practices in several measures like refreezing a food item, unclean working area, and personal hygiene needing to be improved (Abdul-Mutalib et al., 2012). Another study in Iran indicated that food handlers had an acceptable level of knowledge and excellent attitudes but had poor practices toward food hygiene measures, and the majority of them (67–78%) had lack of knowledge about microbial food hazards (Ansari-Lari et al., 2010). A recent study in at public school was conducted to determine KAP about 400 food handlers in Jakarta. The result showed that knowledge and attitude of them were excellent, with means score (SD) of 82.32 (±11.55) for knowledge and 80.15 (±10.1) for attitude. However, the practice was poor (53.04 ±10.67). Significant correlation was confirmed between knowledge and attitudes ($p < 0.001$), between attitude and practice ($p < 0.001$) and knowledge and practice ($p < 0.001$). The data also showed that education level has a significant correlation with food hygiene training on the KAP level ($p< 0.05$) (Cempaka et al., 2019). Other studies have been done to identify the knowledge, attitude and practise performance in food handlers (Akabanda et al., 2017, Angelillo et al.,

2000, Askarian et al., 2004, Rahman et al., 2012, Samapundo et al., 2016). These are summarised in Table 2.3.

Table 2.3 KAP references and study finding

Reference	Study aims and Finding
Akabanda et al., 2017	Evaluating knowledge, attitudes, and practices of food safety to 235 food- handlers in Ghana. The result showed that food-handlers had sufficient knowledge on hygienic and sanitation practice. Practices. However, more than two third of participant (76.2%) did not know about pathogen (*Salmonella,* Hepatitis A). In general, even though food-handlers have enough knowledge in food safety but the result showed they still have hesitation in food hygiene practices during handling and processing food.
Angelillo et al., 2000	Evaluate knowledge, attitudes, and behaviour food safety and foodborne illness among 411 food handlers in Italy. The finding indicated that less half of the respondents (48.7%) knew the foodborne pathogens. Their understanding was aligning among those with a higher education level, having practice in longer period of time, and who had trained ($p < 0.05$). Majority of food handlers has positive attitude how to control and preventive food borne illness and it was likely achieved by those who had trained. However, in practice, the study observed they still have lack of personal hygiene did not used gloves (79.2%).
Askarian et al., 2004,	Evaluation knowledge, attitudes, and practices of food staff concerning food hygiene in 31 hospitals, both government and private hospital in Iran. This study finding confirmed the respondents has insufficient knowledge regarding the pathogens and the correct temperature for the storage. Respondent who had experience had better attitudes and practices. Most of participant had positive attitudes, but they still have limitation in practice of food hygiene.

Table 2.3 KAP reference and study finding (continued)

Reference	Study aims and Finding
Rahman et al., 2012,	Evaluated the knowledge, attitude and practice level of food safety among 361 food vendors in Malaysia and determine the predictor factors. The finding showed that respondent had poor knowledge, attitude and practices. Food safety training and knowledge showed as influence factors for food safety practices.
Samapundo et al., 2016,	Assessing the level of knowledge, attitudes and practices of 120 consumers and 40 street foods vendors in Vietnam. The study confirmed consumers had good levels of knowledge and attitudes on food safety. However, the street food vendors had poor food safety knowledge and attitude levels. Majority of respondents (95%) had not received any training of food safety. The study also observed poor of food hygiene practices in food premises (no adequate access to potable water, open site air stand, poor wastewater, hand washing facility and disposal facility). In addition, it also confirmed that more than half of the respondent (52.5%) did not do proper separate raw, partially cooked food and cooked food.

A study by Howell et.al (2008) showed that insufficient training, inadequate resources, inconvenience to perform the practice and time limitation were barrier aspects that influenced the food hygiene practice (Howells et al., 2008).

From the reference about KAP study showed the identification of knowledge, attitude and practice can help to describe food safety culture in food premises. A study in Kenya confirmed that a barrier to hygiene practices was the access to water supply, soap. Poor social economic factors also influenced the practises(Schmidt et al, 2009). Hygiene and sanitation promotion cannot stand alone without increased access to sanitation and hygiene facilities to have significant positive impact. As stated in the WHO Hygiene Improvement Framework, hygiene prevention from foodborne illness need to be supported by hygiene promotion; an enabling environment by policy improvement, strengthening institution, financing and partnership; and access to safe water supply, soap

and its facilities must be provided(WHO, 2005). From all reference it showed that food hygiene practices need to be supported by hygiene sanitation facilities and interventions.

2.5 Training and Intervention as Public Health Strategy in Food Safety

For many decades, public health studies about social and behaviour theories have been conducted in order to change individual behaviour by intervention and preventative health programs. The development of Health Belief Model (HBM) was applied in 1950s during the research of public health for explaining and better understanding health behaviour (Rosenstock, 1974). Another psychology model, Theory of Reasoned Action (TRA), now known as Theory of Planned Behaviour (TPB), tried to explain health behaviour and its intentions. In TRA, people tend to perform a behaviour when they have a positive reason and belief that they need to perform it (Ajzen, 1985). TPB focused on an individual's strong intention for performing behaviour. Achievement depends on motivation and ability (behaviour control) (Ajzen, 1991). The Theory of Planned Behaviour (TPB) model has shown positive support for predicting intention of behaviour in single action or general behaviour categories (Armitage, 2001).

Individual behaviour is influenced by several factors such as individual factors, knowledge, motivation, development stage and habits socialization; cultural groups/socio groups factors, socio economic factors (i.e. education, poverty), political factors and environmental factors. Those factors tend to interact and connect to each other (Edberg M, 2015).

Many food-borne outbreaks are caused by inappropriate food handling practices of the food operator, and training is used in many countries as a strategy for reducing foodborne illness. In EU countries, all food handlers are obligated to have an adequate knowledge of food safety with formal training or non-formal training to ensure consumer safety (EC Regulation 852/2004, 2004). The main objective is to ensure food handlers know how to behave hygienically but the training activity can have several other effects as well, such as adaptation to changes, quality improvement, productivity growth, increased employee motivation and improved internal relations in company (Castellanos, 2011). Choi & Yoon

(2015) argued training is a company investment for boosting employee commitment and competence (Choi and Yoon, 2015). Another study also showed staff who were formally trained tend to have higher level of hygiene than those who were not trained(Kirby and Gardiner, 1997).

Training is an essential factor for intention to use behaviour. TPB model can be used as a tool for understanding the factors influencing the food handlers' intention to carry out safe food handling practise (Seaman Phillip & Eves Anita, 2010). A meta-analysis of food safety training and intervention studies showed that food safety training has positive impact on knowledge and improved attitudes food handlers practices (Soon, 2012). Another study also confirmed that KAP on food safety and hygiene changed after training by comparison with levels measured before training. Their food safety knowledge increased significantly (p value < 0.01) from an average of 24.35% to 66.2%. Good practices increased from 37.5% to 50.8% after training interventions (Choudhury et al., 2011). The studies mentioned above indicate the need for training and increasing awareness among food handlers regarding food safety and food hygiene practices. Training should be provided routinely to minimize the food safety hazard.

Effective food safety training contains two phases, the first phase is to improve knowledge. Better understanding can also positively affect attitude. The second phase involves transferring knowledge to practice. In addition, motivation and supervision, especially coaching, should result in good competence of the respondent (Sprenger, 2004).

However, some of the studies in Table 2.4 confirmed other results of training. A previous study observed the sources of training, certification, and experience significantly affect the level of food safety knowledge.

Table 2.4 Several training studies

Training studies	(Author, Years)
A study on comparison of knowledge on food safety among managers in restaurant in Oklahoma confirmed that training source, certification and work experience affect the food safety knowledge level. However, the length of hours of training did not appear related to increased knowledge.	(Lynch, 2003)
A study in UK surveyed food premises and showed there was no relationship between function of staff in premises and level of knowledge. Knowledge level of staff was not related to practise, but their practise might be influenced by external factors such as availability of equipment and company commitment	(Powell et al., 1997)
A construct questionnaire based on TPB and The Health belief model to examine food handlers' beliefs on food safety and determine food handlers self-reported practise. The study found that behaviour change will not arise as a result after training. It showed that the need for training should be based on a risk approach and food safety practices in premises will be applied if there is an appropriate management culture and sufficient resources to support implementation after training	(Clayton et al., 2002)
Forty-six studies of food hygiene training and evaluated the effectiveness of training. The study discussed the need for the development of evaluation criteria to improve the effectiveness of food hygiene training. Food hygiene training will be effective if it changes the behaviours most likely to result in food borne illness. There was a notion that training leads to changes in behaviour, based on the Knowledge, Attitudes, and Practices (KAP) model. However, the study suggests that training results in improved knowledge, while in terms of changing behaviour and attitudes to food safety the effects were still debatable. Decent training methods should be developed to have better outcomes which would be to change behaviour as well as imparting knowledge.	(Egan et al., 2007)
A study in Ireland surveyed head chefs and managers. It showed they had adequate knowledge in some aspects of food safety and food safety practice but most of the head chefs did not respond correctly about their responsibilities in food safety under current legislation. Staff had not enough understanding on HACCP concept. The manager and head chefs are key actors for ensuring food safety practices are well implemented and ensure all staff had adequate knowledge	(Bolton et al., 2008)

All studies above indicated that the company commitment, management food hygiene culture and its equipment influenced the performance of practices and so play an important role to deliver an essential food safety standard to consumer.

2.6 Governance performance on food safety control system

2.6.1 Food control system

In order to develop a food control system at national level there needs to be a clear framework as mentioned in Codex Alimentarius Commission (CAC) guidelines (Figure 2.1).

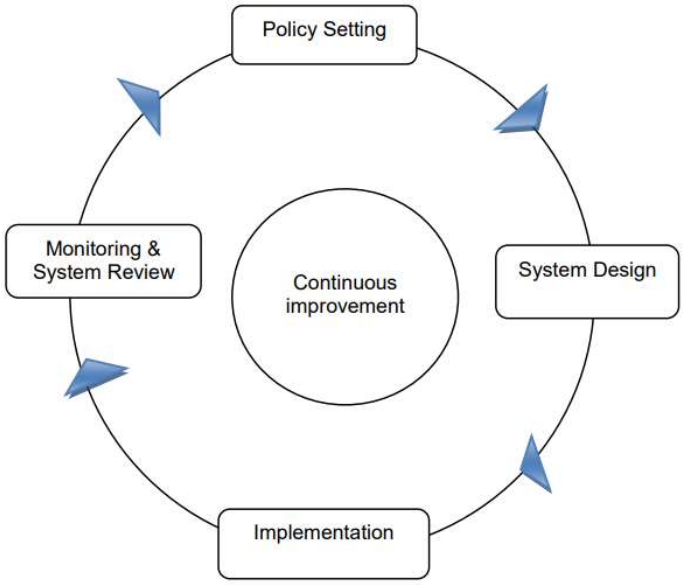


Figure 2.1 Framework for the development of a national food control system (CAC, 2013)

In the setting of policy, the engagement stakeholders, including food business operators and consumers need to be considered by the competent authority. Once the public policy and its outcomes are established, it should be clearly articulated and defined to have effective actions.

The roles and responsibilities of participants i.e. the central government, the competent authority, third parties such as auditors or quality assurance bodies, food business and other stakeholders have to be identified clearly. The competent authority needs to have

powers and mechanisms sufficient to manage and operate the national food control system.

Coordination and communication between authorities, having adequate resources including capacity and capability in human resources and infrastructure i.e. access to laboratories, needs to be developed. The design system for allocation of resources and how the system is funded need to be provided including for surveillance, investigation, emergency preparedness and response to food borne and food related incidents. Sufficient guidance, training and awareness programs for all relevant stakeholders should be facilitated for effective implementation. When the legislation is implemented, the competent authority should have the ability to identify non- compliance and carry out enforcement. The preventive and corrective actions have to confirm when food business operators are not in conformity with legislation. Monitoring and control programs should be regularly assessed against the objectives, legislation and other regulatory requirements to ensure the effectiveness of control programs. The procedure and criteria for assessment should be clearly defined and documented. All food control systems need review to ensure its achievement and proof against future challenges(CAC, 2013). Food control systems need to be supported by good governance performance monitoring for handling their task and responsibilities to protect public health.

In food control systems, governance organization is one important element. Different forms of governance organization exist in different countries, which are multiple agencies, single and integrated system. However, to ensure the food control system is consistently used across government levels, national control must be centralised at the top governmental level whatever system is approved (Neeliah and Goburdhun, 2007). In several countries that apply the multijurisdictional system with federal, provincial and municipal authorities and division of responsibilities (e.g. Canada) or partly centralized and decentralized e.g. Denmark and Italy, there are problem issues on overlap and duplication of programmes (Neeliah and Goburdhun, 2007). Saudi Arabia experience on changing food control system from decentralization to centralization showed positive movement such as improve capacity building and also support the new Saudi food law in implementation of

HACCP or any similar/equivalent to become mandatory for food business(Al-Kandari and Jukes, 2012).

There are several issues that need to be addressed in a food control system. These include the need for the program to be regularly reviewed and evaluated, ensuring the system is correctly organised and resourced especially when many control agencies are involved. For developing countries e.g. in Africa, food legislation on quality and safety seems to receive little attention in administration and enforcement because they are still focusing on food supply or food security (Neeliah and Goburdhun, 2007).

2.6.2 Decentralization in Indonesia

Indonesia, a unitary state, is one of the largest archipelago countries and consists of several regions. It has three levels of government: central, provincial, and city/district.

The economic crisis in 1998, followed by the fall of an authoritarian regime at that time triggered alteration from the old regime to a democratic multiparty system. Indonesia started to adopt social reform. Before the year 1999, central government regulated all policies and controlled the benefit from all resources. Equality and disparities in term of public facilities and advantages of resources was higher. The locality that had natural resources did not have proper shares. The development facilities were centralized. This condition led to displeasure, high tension (Firman, 2003) and growing independence movements in the regions between 1990 and 2000 e.g.. Aceh and Papua (McGibbon, 2004). The former province in East Timor finally established the Republic of Timor Leste in 1998, while sporadic independent movements meant that Aceh and Papua were granted special autonomy in 2001.

Decentralisation objectives are to encourage better government services, to make public services better quality, more efficient and effective, and raise accountability of local government (Usman, 2002, Firman, 2010). Decentralization is not a panacea, but it can potentially adapt a bottom up approach for many authorities to improve service quality for the public. It can provide service delivery which is more responsive, accountable, integrated and accessible to citizens (Gaster, 1996).

In 1999, the local government (regional autonomy law) (Law 22, 1999) and fiscal decentralization(Law 25., 1999) were passed by Indonesian parliament. This reform was a big bang approach to share responsibility for both political power and budgets to local government by decentralization scheme. Without preparation time for transition for preparing local government to do task and its function, the decentralization policy in Indonesia was considered as an ambitious practice in modern history (Firman, 2010). Both laws were also projected to cope with separatist sentiment and enhance the public prosperity in Indonesia.

Law 22/1999, revised by Law 32/2004 and latest revised by Law 23/2014, by passing provincial government, transferred certain central government powers and responsibilities to local government (district and city) forming all administrative sectors except for security and defence, foreign policy, monetary and fiscal matters, justice, and religious affairs, without conditions and limitations. These excluded sectors are still controlled by the central government. The concurrent power where collaboration is organized among central, province and local shows decentralisation of power. However, the concurrent power is divided between basic services and non-basic services. The focus of the decentralization process was to move responsibilities from central to district/city level, for health, education, public infrastructure, environment, communication, transport, agriculture, manufacturing industry and trade, capital investment, land, cooperatives, labour force, and infrastructure services. The objective was to provide better local service delivery (Nasution A 2016).

Law No. 25/1999 regulated fiscal balance between central and regional governments for supporting the operational of local government to manage their responsibilities.

Because of decentralization, the functions and its resources (personnel and assets) from the central government transferred to the provincial and the district/city. All resources are now under the authority of the regional governments, in order to strengthen their capacity to operate effectively and efficiently. The change in government administration should be followed by initiative and support from government employees (Usman, 2002). Usman (2002) argued local governments should accommodate the responsibility and need to

reform their internal structures organizations. A detailed transition plan, including supporting regulations, must be set to clarify the procedures and processes that need to be undertaken of responsibilities.

Provincial government has two functions, first is as a representative of central government and second as regional autonomy that manage matters devolved to districts or municipalities administration (Law 22, 1999).

In 2016, a study confirmed that decentralization in Indonesia has had positive value such as a rise in productivity and employment, promoting economic growth in the authorities. The decentralization of government functions was not followed up by improving capability and competence resources to produce public service and to promote economic growth in their authority. A limitation of competence resources in public treasury and auditing and lack of government function still occur. A lack of capability of central government for monitoring and controlling the implementation of functions transferred to the subnational level has also ensued (Nasution A 2016).

A study by Firman (2010) argued that decentralisation in Indonesia has not had the advantage of practise in terms of implementation reform. Improvement is more to coincidence than to planning. Decentralization spirit which should bring the governance process closer to citizen or stakeholder participation and recognize their needs with transparent, responsive, and accountable systems has not yet well implemented.

2.6.3 Good Governance and government performance

According to UNESCAP, governance means "the process of decision-making and the process by which decisions are implemented". Good governance performance has eight major characteristics including participation, consensus orientation, accountability, transparency, responsiveness, effectiveness and efficiency, equity, strategic vision, and rule of law(UNESCAP, 1997).Fukuyama defined governance as an ability of government "to make and enforce rules and to deliver services"(Fukuyama, 2013). Fasenfest also defined that "governance is a set of decisions and processes made to reflect social expectations

through the management or leadership of the government"(Fasenfest D, 2010). Governance is a process of actors (governments) and stakeholders' involvement in particular themes.

Government at any level can potentially become part of a governance process(Bryant C, 2019). Good governance indicates that society in general is feeling contented with the solution, process and its procedures. In the context of public service, government has capability to deliver services with efficiency, work productively, transparently, and accountably. In addition, people or stakeholders should be heard, involved in decision making process and have human rights respected. Good governance in contemporary administration addresses issues such as "institutional development, capacity building, decentralisation of power and authority, relations between politician and appointed officials, coordination and the role of head government play in promoting good governance" (Agere, 2000).

Good governance is a required condition for supporting government agenda in achieving outcomes. In public health context, it ensures that actions are delivered according to the system's rules and provide benefit to outcomes (Gray JA, 2013). The first step for achieving good governance is measuring performance that represents how the government works. Typically how they are implementing accountability, transparency, efficiency and effectiveness e.g. to facilitate FBO inspections(Devaney, 2016).

A key element of good governance is the accountability and transparency, as this helps in combating corruption, enhances stakeholder participation and facilitates the working of the legal and judicial framework (Agere, 2000).

A study in 2018 recommended that stakeholder collaborations between actors, effective coordination between stakeholders, building social capital, involving community empowerment and its engagement, capacity development, linking knowledge and decision-making were essential for supporting successful adaptive governance practices (Sharma-Wallace et al., 2018).

Varied concept of performance appears in several studies. The high performances government showed that they have capability to propose and justify their policy and having data or resources to achieve their aims (Lempert RJ and Popper SW., 2005). Another study argued effective management is the essential aspect to overall government performance because the quality of management ensures an effective mission and good use of resources (Ingraham et al., 2003). In addition, ability, work motivation, and internal factors i.e. leadership and others factors which can support or inhibit its performance (Mullins, 2008, Moorhead, 2012). The performance (ability) of an institution or organization was described as its capability while ability was described as personal competence in order to deliver a job or task (R.Nagarajan and Prabhu, 2015). Competency is defined as "a generic body of knowledge, motives, traits, self-images, social roles and skills that are causally related to superior of effective performance in the job"(McClelland and Boyatzis, 1980). Many studies showed that organization culture i.e. commitment to work place, leadership, strong team spirit, performance orientation has impact for organization performance in achieving overall organization goal (Shahzad et al., 2012, Cresswell et al., 2014, Aktaş et al., 2011). The capability or competence of local government and professionalism of government in internal controls has a positive influence on implementation of good government governance (Nofianti and Suseno, 2014).

The references on government performance is summarized in this Figure 2.2.



Figure 2.2 The government performance

2.7 Informal food sector

Finding a definition for the informal sector is quite difficult but several visible activities that characterise the informal food sector are food production in urban areas, small catering business, retail sale of fresh product, prepared food and ready to eat food sold as street food(FAO, 2003). Mostly street food vendors in urban area are a migrate product from rural. The presence of street food vendors in developing countries is influenced by urban population growth and they choose to run street food business because of its demand and attract by possibility to achieve high incomes (Winarno and Allain, 1991). Street food vendors usually sell their product with affordable price and are located at many points of sale e.g. school, office, stations, or market which provide easy access for their consumers.

The numbers of street food business are increasing in many developing countries (Draper, 1996). Monetary crisis in 1998 also has been suggested as a trigger for the rapid increase of street food businesses, especially in developing countries like South East Asia (Bhowmik, 2005). This economic condition was followed by demand providing opportunity to create a business on street food. The earning prospect and higher consumer demand for food attracted people to run a street food business.

However, informal activities offering their services maybe constrained because they may have limited resources, lack of fund, inadequate support of clean water and hygiene and sanitation facilities for supporting their activities. There may also be issues relating to the health of the vendor or a lack of nutritional quality (FAO, 2003). In term of interventions for street food vendors, any program will be more successful if managed and coordinated in a working group that consists of local authority officials, district representatives, vendors association, producers and consumers to promote good attitude and policies (Argenti, 1999). FAO confirmed there are several interventions for supporting the informal food sector that can be executed by governments(FAO, 2003):

a. promote relevant legislative and regulatory policy,
b. improving understanding of the needs and limitation for identifying street food vendor problems

c. provide training, update relevant information and supply for hygiene and sanitation facilities,
d. review existing regulations that focus on relevant problem including enforcement and monitoring and ensure local policies support informal food sector activities
e. having a team of local authority officials and staff for increasing collaboration on informal food activities
f. improving access to services needed by food business and its infrastructure to increase sale, enhance quality and safety of product and equipment for premises
g. maintaining communication and handle conflict between stakeholders
h. offering training programmes i.e. food hygiene safety and nutrition, marketing and sales technique,
i. supporting strategy and monitoring the implementation of those programmes

The food security of urban citizens is related to household income because of the cost of accessing food , available food variety and consumer consumption habits (Argenti, 1999). Changes in consumption pattern because of population growth, urbanization and environmental change in East Africa bring the informal food sector as a key player in the food security agenda. The affordable price and ease of access provided a crucial service in the urban poor(IIED, 2016).

Argenti (1999) stated what the local authority needed to do in order to address urban food security issues. Adequate understanding of urban food marketing and its distribution i.e. logistic support, food distribution arrangement (itinerant market, weekly markets, etc.) can benefit urban food security. Developing a strategic plan in urban food security by medium and long-term planning with respect socio-demographic, spatial, economic development is a first step. Strengthening collaboration with central government can be done by generating national policies in urban food security, including its marketing, and by improving policy and programme strategy. Enhancing technical competence of officials at all levels through training and information programmes supported the implementation of policies and regulations. Partnership among city and local authorities for technical assistance and exchange experience can enrich collaboration and smooth implementation

of regulation(Argenti, 1999). Argenti also confirmed similar statement about intervention steps as mentioned by FAO (2003).

In South Africa, the informal food sector that consists of retail product, fresh food, meat & livestock and ready prepared food is an essential daily food choice, playing a significant role in food security of urban poor. However, there are barriers to business survival such as competition with supermarkets, waste management and pollution, and security challenges from local gangs (money protection) or law enforcement officials (bribe). By neglecting food security strategies and programs for including the informal sector in their policy and programmes resulted in a failure to provide important goods and services to the urban poor. Battersby et.al (2016) argued the essential view that both formal and informal food sectors need to be addressed in a similar manner as part of the same food system and have to be recognized when developing policy and planning responses to meet local food security needs. Policy and strategies need to be reviewed to accommodate the informal food sector (Battersby et al., 2016).

2.8 Food safety in Indonesia

This section describes food safety implementation in Indonesia and the role of key actors in sharing responsibility for food legislation.

2.8.1 History of food safety in Indonesia and its actors

Prior to the year 2000, Directorate General for drug and food control in the Ministry of Health (MoH) had responsibility for control and monitoring food safety. In 2000, the directorate was expanded to optimize performance, and finally the National Agency Drug and Food Control (NADFC) was established as an independent government agency (KEPPRES 166, 1999). As stated in Presidential Decree, NADFC is a non-department government agency with its own tasks, function and structure which is responsible to the President (Keppres 103, 2001).

Based on the latest president regulation PP 80/2017, NADFC is responsible for protecting public health by the control and supervision of pharmaceutical drugs, drug material, narcotics, psychotropic substances, precursors, addictive substances, traditional medicines, health supplements, cosmetics, and processed foods(PP 80, 2017). NADFC only has three deputy units for supporting their task and function. However, in 2018, NADFC developed one additional deputy unit which was for prosecuting their tasks in drug and food enforcement (BPOM, 2018d). In order to support task and function, today, NADFC has technical implementation units, called Unit Pelaksana Teknis (UPT), in several places. Based on the regulation which created and defined it, the NADFC, has several functions such as drafting drug and food control plans and programs, laboratory testing, local inspection and sampling of production facilities, distribution of food and its certification, food issue investigation, and consumer information services (Figure 2.3).

The main branches of UPT are located in several provinces. In total there are twenty-one branches in Indonesia. Each NADFC UPT has several divisions including testing (chemistry, biology), control/monitoring (inspection, certification), prosecution, information & communication.

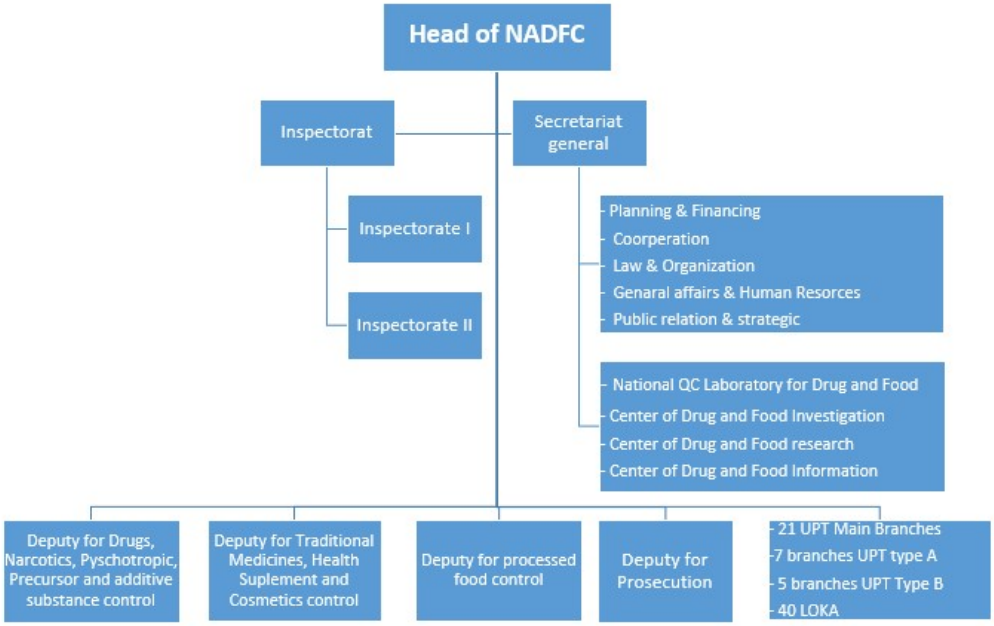


Figure 2.3 Organization structure of Central NADFC (BPOM, 2017b)

In addition to the main branches, the UPT, NADFC also has smaller branches which are called UPT type A and UPT type B.

UPT Type A has several sections from testing chemistry, testing biology, control/monitoring, prosecution, information & communication. It has seven branches of UPT type A in Indonesia. UPT Type B has several sections for testing, control/monitoring & prosecution, information & communication. In total UPT type B has 5 branches. Although both branches carry out similar functions, they have different resources and assets, for example in testing parameters, human resources and competence and laboratory infrastructure.

In 2018, NADFC extended their services by developing forty official area offices called LOKA. The additional official area was developed to address the NADFC work load. LOKA is also expected to support their services to the public, especially as catalyst for sustaining food business. Moreover, it is expected to enhance collaboration with local government (BPOM, 2018d). In 2017, staffing tasks and function was organized based on a new regulation of NADFC head(BPOM, 2016b). Structure of NADFC organization and its UPTs can be seen in Appendix VIII.

Based on Government regulation 28/2004, responsibility for food safety which applies Good Practices from farm to table was shared between several government institutions depending on the type of food (Table 2.5).

Table 2.5 Good Practices and its key actors

Ministry	Responsible for	Type of food
Ministry of agriculture (MoA)	Good agricultural practices	Fresh food (raw material and direct consumption)
Ministry of marine affairs and fisheries (MoMAF), Ministry of agriculture (MoA)	Good fresh handling practice	
Ministry of Industry (MoI), Ministry of Trade (MoT), MoMAF, Ministry of marine affairs and fisheries (MoMAF), NADFC	Good manufacturing practices	Processed food
Ministry of Industry (MoI), NADFC, Ministry of Health (MoH)	Good distribution practices	Processed food
	Good retailing practices	Fresh foods, processed food, home business industry, ready to eat foods
NADFC, MoH	Good ready to eat food practices	Ready to eat product

2.8.2 Food safety implementation and its legislation in Indonesia

This sub chapter describes food safety in general implementation and focuses on processed food, home business industries and ready to eat food safety implementation regulation.

2.8.2.1 Food safety system

Food Law was first published in Indonesia in 1996 (Law 7, 1996). Before it was issued, food issues in Indonesia were covered by Health Law 23/1992. In 2012, Food Law 18/2012, food law covered food safety and nutrition and also food security and food sovereignty(Law 18, 2012). In order to support food safety implementation, several key legislations from related institution had been developed and are described below (Table 2.6).

Table 2.6 Key regulations on food safety in Indonesia

Key Indonesia food safety regulations	
Health Law, 36/2009 (replaced Health Law 23/1992)	• Food and drink need to comply with standard requirements, labelling information details • Prohibited using deceptive words or claims which cannot be verified • Public nutrition
Food Law 18/2012, Food (replaced Law 7/1996)	Food, safety, food security, food sovereignty, penalties of non-compliance, obligation to followed food regulation and standard
Halal Law 33/2014, Halal Assurance	Halal certification for consumers' product in general. It is voluntary based, and regulated based on institution usually for imported product.
Trade Law 7/2014	For ensuring the product quality, several products should follow national quality standard.
Small Medium Enterprise Law 20/2008	Approval of food business based on industry size and business turnover
Consumer Protection Law 8/1999	Requires business to follow regulatory standard.
Government regulation PP 69/1999, Label and food advertising	Label food as a part of food packaging and must followed several details: name product, ingredients, net weight, manufacturing and its address, expire date and nutrient content.
Government regulation 28/2004, Safety, Quality and Food Nutrient	Implementation of good practice in food safety and its responsible institution. Sanitation, of food, additional ingredients, genetically modified food, food quality and its certification

A national program, integrated food safety system (IFSS), was developed in 2004 by key stakeholders involved in food safety chain from farm to table to improve food safety in Indonesia. The program model followed WHO guidance, "Guidelines for Strengthening a National Food Safety Programme" that helps to harmonize food safety programs and laboratories with international standard.

The IFSS was a network that was developed by risk analysis to cluster stakeholders in three groups in order to optimize all activities in food safety. These three groups are: Food intelligence (risk assessment), Food safety control (risk management), and Food safety promotion (risk communication). The three networks in IFSS was projected for improving communication, sharing information and collaboration. NADFC is in charge as secretariat office for all networks. The members consist of the Food Security agency known as Badan

Ketahanan Pangan (BKP), local health authorities, local industry, academicians, trade offices, consumers associations and other related institutions. Food intelligence network has the obligation for reviewing food risk-based data (foodborne illness surveillance, inspections, research, and other relevant data) from related institutions including government, industry, and academician. Food safety control has obligation to collaborate with related institutions in order to control food safety (standardization and food legislation, certification, laboratory testing, export-import). Food safety promotion has obligation to promote and communicate on food safety issues by several activities, from media promotion (poster, brochure), training and workshop for food industries, consumers and food control praticioners.

One IFSS program that still remains is INSRASF. Since 2010, Indonesia has developed a rapid alert system for food and feed (INRASFF) as a management system for handling food safety issues. It was a site for national early warning in food safety, with NADFC as a national contact point (NCP). This site is a main source for preparing and responding to food notification information from national and international sources. The information will follow up notifications and inform the public to protect public health. The INRASFF working group consists of the food safety competent authority (MoA, MoH, MoMAF, MoI, MoT and NADFC) both central and regionally. In a joint initiative between WHO and FAO on International Food Safety Authoritihies Network (INFOSAN), Indonesia is represented by NADFC as the emergency contact point.

2.8.2.2. Food safety control for processed food and ready to eat food

2.8.2.2.1 Processed food

In order to implement the latest president regulation PP 80/2017, NADFC is delivering comprehensive drug, food controls, including pre-market, and post market controls for processed food. In addition, NADFC also conducted risk-based sampling and laboratory testing. Food law enforcement in drug and food is based on investigation, laboratory and monitoring process.

Regulation of NADFC head, number 26 in year 2016, obligated all processed food which is produced domestically or imported in food retail business to have a retail food approval letter for trade distribution. The processed food should have been produced following the relevant guidance and have approval from NADFC. Food business can register their product before distributing it in market. Both domestic and imported processed food should pass audit performance. The audit performance can be proven by GMP/HACCP/ISO 22000/ other certificate from accredited institution, good retailing practices audit and certificate health certificate for imported product. For local product, food business should have audit performance i.e. good manufacturing practices or risk-based management program, or local government result for both of items which is good distribution practices and good retailing practices.

Based on venture capital, the type of business was classified into micro, small, medium, and large/manufacturer (Law 20, 2008). Micro has a net worth maximum 50 million IDR not included land and building with annual sales maximum 300 million IDR. Small business was categorized for business that have a net worth in range more than 50 million IDR to 500 million IDR. Medium business has a net worth more than 500 million IDR until 10 billion IDR. Food business in small, medium and large category should registered to NADFC. While for micro business was categorized for PIRT food product.

Registration of business is based on risk level and consists of high risk, medium risk, low risk, and lower risk. The food business can apply online to NADFC website and upload all documents required for verification process or send manually (hard copies) by mail. Evaluation has three possible results: it might need further clarification, rejected or approval. After having approval, food business will have approval letter and having registration code “BPOM RI MD” (domestic product) or” BPOM RI ML” for imported product following with certain code numbers. This needs to be put on their product to show that they already passed all requirements. The “BPOM RI MD” and ” BPOM RI ML” codes will expire after 5 years and it can be extended. Manufactures can apply to extend six months before the expiration date. However, if there are any violations or breaking of rules, NADFC will give administration sanction based on violation types. The highest sanction from NADFC punishes the business by banning them for three years. In this case,

the food businesses have responsibility to withdraw their product from the market. If the items since the previous registration have changed or there is new information related to quality, safety, nutrition or food label, the food business should apply for review of their approval licence (BPOM, 2016b). Food businesses are also obligated to follow regulations about food labelling and advertisement as stated in government regulation(PP 69, 1999).

Since 1999, Indonesian government applied decentralization and delegated local government to plan and to decide organization of activities (Law 22, 1999). Government regulation, PP 28 year 2004, stated that delivery of food safety controls for home businesses industry (PIRT) producing processed food and ready to eat food is delegated to local government (PP 28, 2004). the new local government Law is changed to Law 23 in year 2014 (replace Law 32/2004 which replaced Law 22/1999) which is clearly defined sharing responsibility between central and local government in district/city. The law 23 in year 2014 confirmed the transferred certain power of central government including responsibilities to local government for more powerful forming in all administrative sectors. As a main actor in food safety, NADFC has a role to support local government (PP 28, 2004), by providing guidance and training for local government food inspectors. In another government regulation 38/2007, it stated that local health authorities in province and district/city are mandated to help government activity for food control and its monitoring. The local government has the task and function for handling PIRT product certification, empowering (authorising) food inspectors and handling outbreak of foodborne illness.

PIRT processed food, does not need to have a BPOM MD registration code but it is mandatory to have registration approval and the food must be labelled before it is distributed to consumer. Pangan Industri Rumah Tangga (PIRT) processed food is a home industry product that has more than 7 day's shelf life. It produced by home business industries, or small less development business (SLDB). Local government issues PIRT processed food production licenses and control-monitors post marketing for PIRT processed food(Law 23, 2014).

Government regulation PP 28/2004, clause 43 in article 1-3, stated that PIRT processed food is mandatory to have PIRT production certificate approved by Major city/Regent District. While in article 4, government regulation PP28/2004 stated NADFC should provide guidance for approving PIRT processed food such as type of food, and steps for assessing PIRT processed food business. There are several requirements for PIRT processed food to be approved by local government. NADFC should provide guidance for local government on how to approve PIRT processed food and what kind of requirement that should completed by PIRT food business (BPOM, 2018c).

In 2009, the government published Public Services Law 25/2009. Since then, one integrated service office called Pelayanan Terpadu Satu Pintu (PTSP) has started to be known and some cities have already implemented it. It is an office that served any kind of public issue such as tax, business licence. If food business wants to register their product, they can come to Pelayanan Terpadu Satu Pintu (PTSP), which offers one integrated service office or local health authority. However, until today only a few cities have implemented those services. In fact, the Indonesia government still faces obstacles for implementing PTSP. Bureaucracy problems, resources and unmatched legislation is suspected as main root causes for low implementation of PTSP (BKPM, 2013).

Many food businesses for PIRT processed food come to local health authority for registering their product. After the food businesses applies and fills out the form, the local health authority will verify the document. Applicants should have a training certificate in food safety. Government conducts free two days training, and participants will be issued with a certificate if they have a minimal mark of 60. The local health authority will visit their place for an administration crosscheck and to observe the premises. They can also give recommendation as stated in Inspection Procedure for Home Industry Food Production Facilities(BPOM, 2012d) . The local health officer may take food samples and send it to laboratory. The food business needs to fill out the form and complete all requirements such as having a food safety training certificate, proven standard recommendation result by local health visitation, and compliant label. When all registration requirements are completed, the local health industry will provide a certificate for production PIRT. The “PIRT” code with 15-digit numbers and food label must be shown on the food packaging.

The approval certificate will be valid for 5 years and it can be extended. The food business shall apply for extension at least 6 months before it expired. In Table 2.7, the food type codes are those stated in Guideline for Home Industry Food Production Certification (BPOM, 2012b), which was replaced in 2018 (BPOM, 2018c).

Table 2.7 Registration number code of PIRT

PIRT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Note
Digit 1 : Packaging type (glass, plastic, carton, etc.)
Digit 2, 3 : Food type (Fruit, Dried meat, oil and fat, etc.)
Digit 4, 5 : Province code
Digit 6, 7 : City/District code
Digit 8, 9 : Registered number product
Digit 10-13: PIRT serial number
Digit 14, 15: Valid year expire approval licence

The home food business (PIRT) should have certain infrastructure and practices including safe water supply, food production facilities, and hygiene and sanitation facilities, promote staff personal hygiene, safe food storage, supporting control process and maintenance food product including withdrawal, record and documentation system. There is also the requirement for training as stated in Good Practice of Food Production for Home Industry (BPOM, 2012c).

In order to control and monitor a PIRT product, Food inspectors in district/city, District Food Inspector (DFI), must follow guidance based on Regulation of NADFC head, number 23 year 2018, Control and Monitoring Guidance for Home Industry Food(BPOM, 2018b). DFI is a government officer from a competent institution, has a DFI qualification in food production and a mandate (authorisation) to supervise food safety in PIRT product. NADFC regulation confirmed that PIRT supervision will be effective and efficient if supported by food safety control infrastructure in central and district. Five key elements for food safety control in PIRT are a) food legislation, b) food safety management control in district/ city, c) d) food control institution, food laboratory testing and e) communication, information and education.

The competence standard of DFI is stated in national standard competence of Indonesia, which known as Standar Kompetensi Kerja Nasional Indonesia (SKKNI). It is used as a reference for food safety professional certification both PKP and DFI. “Penyuluh Keamanan Pangan” (PKP) is food safety instructor. NADFC, local health government, local trade and halal food institution, local small enterprise, local marine affair and fisheries are targeted as food safety instructor. Training for PKP and DFI are already available online by e-learning or standard or manual by 5 days training(BPOM, 2018b).

In addition, the food safety certification process is also conducted by professional certification body, which is called ‘Lembaga sertifikasi Profesi’ (LSP). This is accredited by the national professional certification agency (BNSP). The professional certification body comprises assessed personal for ensuring competencies related food i.e. food safety audit, food handlers.

2.8.2.2.2 Ready to eat food

2.8.2.2.2.1 Hotel, café and restaurant

Local government is responsible for control and monitoring of ready to eat food such as canteen, restaurant, hotel, café, small eating place i.e. food stalls including ready to eat street food (Law 23, 2014). For ready to eat food, local government (local health or PTSP) awards a hygiene sanitation acceptance certificate (sertifikat laik sehat) for restaurants, cafes and hotels which fulfil the requirements as stated in MoH Decree 1098/2003. There is free registration, but the applicant is responsible for water quality testing, food testing, and swabbing food contact surface, rectal swabbing of food handler and testing raw material for food production. Businesses must complete an application letter and form with several attachment documents. Owner and food handler need to attach training hygiene and sanitation certificate, kitchen layout, a letter assignment for staff who was responsible for restaurant or hotel, and recommendation letter from hotel or restaurant association. Recommendation letter from the association should state that the food business is an association member and have fulfilled hygiene sanitation based on the assessment of the association. When the application has been verified, the local health authority will assign a sanitarian team of 3- 5 persons for visiting and conducting sampling

and observation to premises. Several variables are observed in the premises such as location, building (layout, construction, and design), staff locker, food production tools, insect and rat control, storage, raw material sanitation and hygiene facilities including safe water source and personal hygiene. Food handlers need to be in a healthy condition, and she/he should not carrier communicable diseases. They need to check their health condition, at least twice per year. All variables are weight scored and calculated to give a total score. The premises will pass if the score total is more than 700 points including sample testing results.

Scoring has been classed into three levels:

a. Level A with score 901-1000, certificate will be in blue font colour with white background.
b. Level B with score 801-900, certificate will be in green font colour with cream background.
c. Level C with score 700-800, certificate will be in white font colour with green background.

The certificate will be valid for three years. There will be an inspection in twelve months. If the score showed lower in two inspections, the level of certificate will be downgraded or withdrawn. For premises that have not reach 700 points but committed to improve, it will be granted as a temporary certificate, expired in 6 months, and can be extended twice. If food business offense the rule based on customer report or outbreak case, the health office will come to investigate along with police. The health office based on report might give oral warning or written warning or ask police for forcing to close the business. If they completed all requirement, they can open their business again. This certification can be applied for by all food business in hotel, cafe or restaurant both in individual/ from non-legal entity and legal entity such as company firm. Training is given free by local government, but the seat places are limited. Food safety training with 35 hours (based @ 45 minute per hour) is required for the owner or food manager while for food handler only 10 hours training is needed.

Local health inspectors can do unannounced inspections to food business that already have the health acceptance certificate. Health acceptance certificate shall be placed in visible spot for consumers to see. If there is a change of location, owner replacement, or foodborne illness, the certificate will not be valid. Local government can publish the names of restaurant or hotel that had certificates once per year. The score represents a basic valuation when restaurant and hotel was evaluated and it can be published in a feast day as a reward system(MoH, 2003c).

2.8.2.2.2.2 Catering

Based on MoH decree Hygiene and Sanitation for catering (MoH, 2003a) , catering is classified based on its service coverage and possibility of risk into level A (A1-A3), level B and level C. Level A refers to general public consumption. Catering level B is for dormitory, company, health facilities, offshore drilling service, and domestic transportation. Catering level C covers international transportation including airlines. In any form of catering it is mandatory to have a trade licence from government and a health hygiene sanitation certificate.

The application letter for catering is as described above for hotel, cafe and restaurant. The difference is the method for scoring of premises. The highest score is 100 point in total. Point A1 minimal should have score range 65- 70, for A2 the score range can be between 70 and 74, and for A3 score range need on 75-83.

The lower score range is related to different infrastructure needs. For example, for range level A2 there are additional requirements to that of A1 namely the need for a vented extractor, three tub washing facilities, a changing and locker room. Level B catering facility should have minimal range score between 84 and 92 and the highest catering service facility should have score minimal 92.

Food handlers are prohibited from being pathogen carriers. Both owner and food handler should have training, of 35 hours and 10 hours respectively.

Catering food business should inspected at least twice a year by local health and association using the requirements and forms stated in MoH decree (MoH, 2003a). Certificate expiry date is the same as with hotel, café and restaurant.

2.8.2.2.2.3 Other ready to eat food

In Ministry of Health Decree stated that "makanan jajanan"/ snack food is a food or drink that is processed by food handlers in the premises and served as ready to eat food sold to the public but not catering, hotel, café and restaurant. As a developing country that has many kinds of dishes, availability of ready to eat street food or low-cost eating place and food stalls can be found easily in public places. Simple canteen and ready to eat street can be found in schools, some of them having a space inside the school grounds or right in front of the school. NADFC has published guidance for snack school meal for nutrition balance and food safety(BPOM, 2013b). A study in 2010, by Yasmin and Madanijah, at Jakarta and Sukabumi observed ready-to-eat street-food vendor behaviour in school. It showed almost half of participant (46.3%) had lower education/elementary school and only one third (31.5%) had food safety awareness. More than fifty percent of participants (51.9%) had insufficient knowledge of food safety and nutrition and 74.1% of the participants had poor or lacking food safety practices.

Spearman Pearson correlative test confirmed there was a positive correlation between education level and food safety and nutrition knowledge, level of education and food safety practices. It also defined no significant correlation between nutrition and food safety knowledge with food safety practices (Yasmin and Madanijah, 2010) .

To address this situation, in 2003, Ministry of Health published simple hygiene guidelines for food handlers (MoH, 2003b). It advised about personal hygiene, equipment, safe water and material source, clean food contact, and food premises construction. Developing centralized locations for food premises was suggested. It should be located far from contamination source such as garbage disposal, waste treatment facilities, slaughterhouse and crowded roads or high-speed road. The centralized premises should be able to access basic sanitation facilities covering clean water source, wastewater disposal, waste disposal place, rat and insect control. Location should set by local government. It can be controlled

by government or public and must have a person in charge responsible for the activity. The person in charge should register it, maintain general sanitation and hygiene facilities and report any poisoning to primary health care or local health district as soon as possible and or at the latest within 24 (twenty-four) hours after receiving or knowing the incident.

Control and monitoring ready to eat street food are the responsibility of the local district supported by sanitarians in primary health. Sanitarian use stickers to indicate premises that are registered or have food safety awareness. The data of food premises (type of food premises, address, owner and food handler, location, and food group or association membership (if available) is collected by the sanitarian. It is evaluated and reported to local health. Periodic sanitation inspection on hygiene sanitation implementation for centralized food premises are conducted by environmental health division in local health office. Samples for testing (food and or specimen) in laboratory will be taken if it necessary. The testing charge for routine activity becomes the responsibility of premises. The results will be sent to the client and copy to local health (copy letter). Random laboratory testing, such as surveillance, will be charged to local government. Control and monitoring by local government should be evaluated by provincial level. Evaluation result is reported to major or regent with copy letter to local health, province health and central health. The detail variables for evaluation and how to calculate it are not stated in MoH decree.

In MoH guidelines (2003) also stated that participants in hygiene sanitation training will be led by sanitarian who had bachelor's degree education and experience. Participants who fulfil requirement can take written evaluation, if passed, the participant will be granted the certificate. Based on MoH Decree, the person in charge and food handlers should have food safety training, each 35 hours and 10 hours, respectively (MoH, 2003b) However, the minimal mark for passing training in legislation has not been clearly stated and in practice the legislation has not been implemented well i.e. requirement for passing training for ready to eat street food vendor has not been enforced.

2.8.2.3. Handling food borne illness Outbreak cases

Food borne illness outbreak is a condition of two or more persons having illness with similar symptoms after consuming food and when it is confirmed by an epidemiologist, that the food is the source of foodborne illness.

The procedure for handling food borne illness, based on MoH regulation in 2013 about foodborne illness outbreak, focuses on food borne illness alert, food borne illness confirmation and foodborne illness prevention (MoH, 2013a). When food borne illness is reported, the primary health care will confirm and conduct an early investigation. This will be carried out by a sanitarian and epidemiologist, gathering information by interview from the patient. They will also check food production process including tools and raw material. They will find persons who consumed the food but did not show illness. They may take food samples if there is any left to sample, as well as faecal samples and do analysis and interpretation of the questionnaires and sampling results. A primary oral report to local health and to NADFC laboratory or local health laboratory is followed with a written early report. When epidemiologist report showed it was a foodborne outbreak, local health determined the outbreak situation, the investigation will be continued by sending samples to the laboratory and conducting further investigation. Outbreak determination should be defined to ensure coordination and optimize human resources.

The outbreak determination situation will be withdrawn if the report shows no further victims are found. If it happened in more than one districts/cities or crossing area, principal government needs to be involved taking over the outbreak cases. Government makes it mandatory to conduct epidemiological investigation to victims and all aspect related food hygiene sanitation. Sampling and specimen collection are conducted by health officer, placed and labelled with relevant information: victim information, food type, date and time, health officer sampling in charge. Faecal specimens may be taken from cases of those suspected of exposure to the pathogen. According to health regulation 70/2016, organism indicator for microbiology contamination was *E.Coli* and *Enterobacteriace*. While pathogen for ready to eat food are *Salmonella spp, Camphylobacter spp, E. coli O157:H7 (STEC), E.Coli VTEC, Listeria monocytogenesis, Vibrio parahaemolyticus*[(b)], *Clostridium perfringens, Coagulase positive staphylococci, Bacillus cereus* and *other pathogenic Bacillus spp.*

In order to prevent increased outbreak cases, public awareness, risk control factors and surveillance need to be addressed. Risk control factors can include closing the food production facilities, withdrawal and destruction of the food, implementation of food hygiene sanitation, prohibiting food consumption of the food implicated as the outbreak source and any other activities that necessary taken for preventing and handling outbreak cases, depending on outbreak type and its investigation result. In local or central, the government need to develop an outbreak rapid response team who will be involved in investigating and controlling outbreaks of foodborne illness. It consists of medical practitioners, epidemiologist, sanitarian, laboratory analyst, and related sector staff including public. In central government, experts can be involved after minister of health approval. Funding is the responsibility of local government. However local government can ask for aid from provincial government or central government. When outbreak cases happen in ports, airports or cross border, funding can be claimed to central government. Local health a report outbreak cases to head of local authority with copy to provincial health, NADFC and central health government.

2.9 Food Law Enforcement in the UK

This sub chapter describes food law that applies in EU and UK today. Food law enforcement in EU has been set up as regional role and implemented in all European Union countries and UK. Based on literature, UK has had experience in Public Health interventions including food for many decades and now the development in food regulations to address environment change after BREXIT are still being considered.

2.9.1. Fundamental Food Law and its Regulations

EU food law focuses on Authorities, Business and Consumers. Each are addressed in a different way. The food businesses play an important part to ensure they fulfil the requirements when they are handling food. Government as a public authority needs to ensure compliance of food business and must deal with non-compliance conditions. Consumers rely on general consumer protection law if they want to take a legal action against a food businesses (Van der Meulen, 2013). In EU, Regulation (EC) 178/2002

described the general food law approach as holistic from “farm to fork” in all business in the food chain and includes feed for food producing animals(European Commission, 2002). Other new regulations followed as whole packages laying down requirements such as GMO (Regulation 1829/2003 and 1830/2003), food hygiene (Regulation 852-854/2004), etc. Regulation (EC) 852/2004 contains general rules for food business on hygiene. It sets requirements for food premises and its facilities, personal hygiene of staff, and food handling. In addition, European Food Law also set standards for enforcement of food law, which was Regulation (EC) No 882/2004, for ensuring official control performance in compliance with feed and food law, animal health and animal welfare rules.

The UK, decades before EU regulation, had already had several acts and regulations. The last Act still in force, the Food Safety Act 1990 allows a local authority via Environmental Health Officer to control and monitor food premises and control the premises and product if they are noncompliant or sell unfit product that cause risk to customers. It also stated main responsibilities for all food business to ensure their product are safe for consumer, served as consumer expect and presented as it is, not false or misleading. In order to enhance enforcement in food safety, Food Standard Act 1999 was also published, and it became a fundamental law for establishing FSA in 2000. FSA now is central competent authority in role for food safety and food hygiene in UK. It has power and supporting functions in relation food safety i.e. application of legislations, setting food standards, advice and guidance, collaboration with local authorities.

2.9.2 Stage of Food Law Enforcement

Legislation impact is one of the factors that affect the condition of food safety of SMEs in the UK. Routine inspection of food business in order to assess food safety compliance is completed with available enforcement tools. This includes educational approaches to food business such as providing information guidance on the requirement of food law and best practice (i.e. put online information, conducting training, production of guidance leaflet), and advisory visits. Formal enforcement approaches such as statutory notices, prosecutions and premises closure are also available if needed(Yapp and Fairman, 2006).

These are well tested methods which can be adopted for improving food safety of SMEs in other countries.

A longitudinal study in a group of retail butchers also confirmed that licensing can be effective in improving food hygiene and compliance. Using a hygiene audit and environmental sampling, the study demonstrated improved food hygiene in the participants after the licensing was implemented. The license could only be awarded after formal training and HACCP implementation. However, there is a cost to the higher standard. This study also mentioned that after licensing approximately 30% of the group were no longer in the trading as before. Either they had altered the product to make their process simpler or had ceased to do business (Smith et al., 2002).

Similar to the UK, that has non-formal enforcement and formal enforcement, in Ireland food law enforcement has a three steps approach. The first step is promoting food law enforcement by giving support, advice and guidance though several media such as guidance books, giving a link to training provider who is well recognized, giving eLearning resources and other useful information, so the food business or public can access the information easily and confidently.

The second step is monitoring and assessing compliance by conducting audit and inspections, sampling, monitoring and investigation if they need to carry out further checks. Food inspectors also promote compliance by giving advice and support through inspection and enforcement activities. The last step is responding to non-compliance. If inspectors found a non-compliance, they respond first using non-formal action by giving warning letter/report notification. If the non-formal way has not worked well by food business or made violation to consumer health, formal actions taken by prosecution, legal notice, penalty or if appropriate suspension, alteration or withdrawal of approval (FSAI, 2018). According to Braithwaite (2011), the enforcement pyramid proposed two enforcement styles between persuasive and punishment when approaching a food business, but usually education and persuasion was the first approach that were mostly used rather than formal warnings and criminal prosecution(Braithwaite, 2011).

Best Practice *OECD Best Practice Principles for Regulatory Policy* (2014) confirmed that ensuring effective compliance with rules and regulation is a vital aspect for forming a well-functioning society and belief in government. Regulatory enforcement plays an important role in public health and other essential public goals. Inspections are one of the most noticeable ways and significantly used to enforce regulations and to ensure regulatory compliance (OECD, 2014).

2.9.3 Enforcement Actors and its collaboration

Law enforcement needs key actors who have responsibility for specified roles and function. A legal basis for empowering these on behalf of the institutions, needs to first provide food law, which can be well implemented. This has been done by UK when implementing Food Safety Act 1984 following with Food Safety Act 1990. These provide the framework for all food legislation in UK. Moreover, following the Food Standard Act 1999, the FSA was established as an independent government agency that is responsible for supporting enforcement food safety in central institution.

FSA has developed good relationship with local authorities and support local authority by giving guidance, code of practices and framework agreement to ensure consistency between local authorities when enforcing feed and food law to food business. This has been developed in consultation with the local authorities, local government association and professional bodies.

Framework Agreement on Official Feed and Food Controls by Local Authorities described the strategy how FSA supervises the local authorities to meet standards in enforcement activity (FSA, 2010). Codes of practices on Food and Feed Law gives the instruction to local authorities which they should follow and implement when enforcing Food and Feed Law to food business(FSA, 2017a). The Practices Guidance provides for giving further direction to enforcement officers and food business for ensuring all regulations clearly understand and well implemented.

For delivering enforcement of official controls officers require a standard qualification. FSA used to provide CPD training in food safety matters such as sampling, labelling, food

hygiene etc. FSA Smarter Communication also developed communicating tools for local authorities. It is used to make collaboration easier and to locate resources such as forms, templates, tool kit and guidance. Furthermore, FSA conducts regular audit to local authorities to monitor how the officers deliver controls and monitoring food business. Local authorities can upload the data from activities such as interventions, sampling and enforcement in Local Authority Enforcement Monitoring System (LAEMS). This allows the FSA to track the delivery of official controls across the UK. The results are also reported annually to the European Commission, along with all other member states.

Beside FSA and local authorities as regulatory bodies, UK also had several key bodies in relation to food manufacturing such as Department for Environment, Food and Rural Affairs DEFRA), Department of Health and the Health and Safety Executives. Others groups also play important role for regulation enforcement such as professional bodies, local government association and trading standard institute (see table 2.8). Beside those regulatory systems, third party compliance is important in food manufacturing and processing such as BRC global standard food which deliver by UKAS accreditation audit scheme or the national food safety certification scheme (Safe and Local Supplier Approval, SALSA) which was developed for small and micro food producers (BIS, 2013).

Sharing responsibility with other institutions, clear autonomy and mapping coordination means that each institution has clearly defined roles that can help to avoid dispute and vague implementation between them.

Table 2.8 Enforcement actors and its collaborator in food safety in UK[1]

Role	Institution	Function
Central Competent Authority	FSA	An independent Government department for protecting public health and consumer throughout UK. It supports local authorities in regulation implementation by giving advice and guidance in food law enforcement.
Official Control Authority	Local authority	A government body in local council that responsible for food business in the area. It has own food safety team that consist with lead and authorised officer for conducting food law enforcement.

(BIS, 2013)

Table 2.8 Enforcement actors and its collaborator in food safety in UK[1] (continued)

Role	Institution	Function
Professional and Representative Bodies	CIEH	A register professional charity that sets qualification standards, provides training and accredits own course qualifications for education of inspectors, members and EHOs. Universities deliver the accredited courses. In addition, it provides idea to policy development in central Government
	The Trading Standards Institute	A professional body supported and represented Trading Standards Officers. It is a non-profit membership organization.
	The Local Government Association (LGA)	A national membership organization contains 415 authorities from council, fire authorities, and national parks. It is a represent local government working for supporting, promoting and improving local government. It has aims to influence and set an agenda on several issues to council and deliver local resolutions to national problems. In food safety, in the past, LGA provided guidance and advice on a practical enforcement issues relating to both food hygiene and labelling.
Third party compliance schemes	The BRC Global Standard	It is a product and process certification standard that responses to British Retail Consortium to answer worldwide need on safe food and consumer products in specific requirements in production, packaging, storage and distribution. The certification audit scheme performed by third party that has accredited by UKAS.
	Salsa: Safe and Local Supplier Approval	A national food safety standard developed for small and micro producers for making easy supply to national buyers on local or regional level. SALSA certification granted to producer who complied both product safe and legal requirement. Launched in 2007, it is a joint venture between the Food and Drink Federation, The National Farmers Union, the British Hospitality Association, and the British Retail Consortium but is not UKAS accredited. It operated by The Institute of Food Science and Technology across UK.

(BIS, 2013)

In Food law - Code of practice (England), 2017, Chapter 4 about Qualifications and Competencies, stated environmental health officer who carry out control and intervention should comply with requirement qualification and competencies. The officer should register to Environmental Health Officers Registration Board (EHORB) or the EHORB

Diploma in Environmental Health. The officer also needs to have two-year post qualification experience and involved in food enforcement(FSA, 2017a).

The Chartered Institute of Environmental Health (CIEH) specialized for developing education of members (inspectors) and other environmental health practitioners. CIEH also sets standards, and accredits its own courses qualifications(BIS, 2013). In addition, another independent health education institution which recognised as a competence awarding body i.e. Royal Society of Public Health (RSPH), Highfield Awarding Body for Compliance (HABC) also providing vocational health-related qualifications through UK for public participant or food business operator who would like to take their qualification in many subjects such as food hygiene, health and safety and health improvements.

2.9.4 Official Food Control for Enforcement

Inspection of food businesses needs to be carried out by a person who is qualified or competent in audit, with a clear understanding of regulation and relevant guidance (Sprenger, 2004). In addition, ISO/IEC 17024 stated that having good personal attribute (i.e. communication skill, decision making, taking note), adequate skill, competence and experience provided their work effectively and professional. The ISO standard mentions the need for development and maintenance programs to ensure competence and personal skill. It also stated that profession certification can demonstrate their abilities and individual performance(ISO, 2012).

In food law enforcement in food safety and hygiene, UK has applied a deterrent and a due diligent approach. In order to promote food law enforcement, government through FSA used website media to publish several regulations and information that can be accessed easily by the public or businesses online. In addition, business guidance on how to run food business and its requirements for all food business are available in their website and FSA help food business linked with local authority. Regards those approaches in food law enforcement, food enforcement staff play important role for ensuring all legislation is obeyed and in place to protect consumer health. They were visiting, giving advice, inspecting, dealing with any complaint, sampling, and investigating outbreak cases.

The Food Law Code of Practice recognized two defined roles for delivering official controls for hygiene and standard: Lead Food officer and authorized officer. Lead food officer can be an officer that employed by another authority which meet with the competence and requirement. An authorized officer (Food Safety Officer or EHOs), which undertake assessment of compliance with food law enforcement, need to have specific qualifications and competence in food safety for delivering official control. Before competent authorities authorized them, EHOs or Food Safety Officers need specific qualifications from Chartered Institute for Environmental Health (CIEH) that includes work-based training as well as University level courses. Then, they also need to register with the Environmental Health Registration board (EHRB) in England, Wales and Northern Ireland or The Scottish Food Safety Officers' Registration Board (SFSORB). They must also follow continuing professional development (CPD) for their career to ensure keeping up to date. All competences for both lead officer and authorised officer are clearly described In Food Law Code Practices (FSA, 2017a).

In 2000, Food Standards Agency (FSA) was established as responsible for food safety and food hygiene throughout the UK. Based on Food Standard Act 1999 and Regulation (EC) No. 882/2004 the FSA is nominated as a competent authority for monitoring and auditing local authority feed and food law enforcement to ensure the law enforcement is effectively implemented. FSA has annual programs to audit local authority, which focus in service organization & management, service delivery (service planning, service delivery, database, staff training & authorization, documented policies and procedures) and internal monitoring arrangements.

The food standards agency (FSA) in UK provides the framework for local authorities to monitor food business based on food law and regulation. All food business should be registered to local authority before they open their food business. Registration is free and the food business is required to provide basic detail of its business including address and its activities. Article 5 of Regulation (EC) 852/2004 stated food business operators are required to have food safety management procedures based upon the principles of HACCP (Hazard Analysis Critical Control Point). In addition, for small food businesses, the FSA created "Safer Food Better Business' (SFBB) packs as an appropriate guide for food safety

management procedures and food hygiene regulation small business(FSA, 2013). In conducting food law enforcement, related with promoting law enforcement, FSA put all information in their website about all regulation, news and food alert, business guidance, food hygiene and safety information and advice including hygiene rating of food business.

When conducting inspections to food business, the local authority employs Environmental Health Officers (EHOs) or Food Safety Officers for enforcing food business to comply with food safety requirements. The officers have a team was led by Lead Officer who reported to Group Leader and they will observe the premises condition, how the food handlers work and process the food, food safety management system and the type of food that make and prepare in premises. Authorized officers have a right to visit the premises at any reasonable hours. Inspector may visit the food business for several reasons from inspections, sampling, and complaint follow-up to advisory visits. They will discuss problem and recommend on possible solutions or in serious case, they will carry out prosecution. The inspection result has a variety of possible actions. If the premises showed satisfactory result and is not breaking the legislation, there will be no further action. The officer will just write the data and hygiene score. The second action might be only an informal notice by letter and schedule to check it in the next visit. The official controls gave food hygiene rating to food business after inspection score revealed. These are available to the public on the FSA website. However, in England the food business can choose whether to publish or inform to their consumer about the score their premises has achieved. In Wales, it is compulsory for the business to publish the hygiene rating score.

Food Safety Act 1990 also empowered EHOs to seize or detain food (up to 21 days) if food fail to comply with food safety and food hygiene requirement. Authorized officer also can serve improvement notices that state the non-compliance observed and the FBO has not less than 14 days allowed to comply the notice. If there is, failure to comply the FBO can be prosecuted for committing an offence. Based on that condition, the court can impose a fine or imprisonment if the FBO is found guilty. Officers can also issue a prohibition notice, closing the business or prohibiting a process if there is an imminent risk to public health. The enforcement authority must get confirmation from the courts of their actions. This will result in a prohibition order from the court and the FBO need to fix all items that

are stated before it can continue trading. The authority will determine within 14 days and can issue certificate within three days after food premises is clear and no longer a health risk (Sprenger, 2004, FSA, 2017a).

Inspectors might visit the food business if they received a consumer complaint or there is an outbreak. The inspectors will investigate, take a food sample if necessary and carry out enforcement action if the food business fails to comply food safety standard and hygiene regulation. When food business violates the food law i.e. failure to comply or to act upon a notice, the next step is prosecution in criminal courts. If convicted, fines or suspension can be applied to the food business as the consequences as well as adverse in publicity.

The frequency of inspection depends on risk to the consumer, such as the type of food and its handling, level of compliance to food law. The food business with higher risk will be inspected more frequently than those premises with low risk. The range of inspection for food hygiene is at least every 12 months to at least 3 years depending on the risk category that showed from the rating score.

The rating score derived from Food Law Code Practice (FLCoP) food hygiene scoring system. The food hygiene score is on a scale from 0 to 197. The total scores showed intervention three areas; food hygiene and safety procedures, structure and confidence of management. If the score of food premises is more than 50, it means the food premises needs urgent improvement and the rating is zero. The highest (best) category is five with range score from 0 to 15, which means food premises has highest compliance in three areas and is broadly compliant with food law and regulation. For food standard, the range scale score is from 0 to 180, used to scoring risk that influence to frequent inspection schedule.

For food premises, UK implemented 'Food Hygiene Rating Scheme' (FHRS) for encouraging food business to enhance their hygiene standards. The food business can display FHRS stickers' status of their premises where consumer can see it. This rating information can help consumers to make decision about hygiene of food premises. There were six categories from 0 to 5 which top rating showed highest compliance of legal requirements.

2.10 Conclusion

This chapter has reviewed the essential literatures of food hygiene and safety requirement for ready to eat food that is relevant to this study. Knowledge, attitude and practices of food handlers play important role in food hygiene and reduce risk of contamination. The understanding of food handlers KAP can help to describe food premises and its services in hygiene implementation and particular conditions which need to be improved in the future. Several intervention including training can be used as an action plan for reducing foodborne illness. However, the training and other interventions should be designed and measured to ensure good implementation of food hygiene and sanitation in food premises.

The intervention, policies and regulation of food safety need support by government and stakeholder. Good governance process for supporting government performance in order to deliver public service should be measured and performed in proper way.

Ready to eat food as a part of the informal sector has a positive prospect since the trend of informal sector shared higher employment compared to the formal sector after economic crisis in Indonesia in 1997. Food safety in Indonesia until now has changed since NADFC was established in 2000. The shared responsibility between government actors in food safety which was created by this change has not so far been evaluated. This needs to be addressed and its effectiveness measured with regard to food safety control.

In UK, the food safety system has changed since FSA is established in 2000. As an EU member, UK also implemented EU directives and regulations besides national Food Law. FSA as a main actor in food safety control supports local authority and is a collaborator for supporting food safety implementation in UK. Compared to time establishment between UK and Indonesia, UK implementation on food safety control appears to have developed a better system with integrated elements to support its implementation.

Chapter 3 – Research Methodology

3.1. Introduction

The first chapter showed food illness outbreak in Indonesia was caused by chemical and microbiological contamination. As one of the sources of outbreaks of foodborne illness, ready to eat street food, has higher demand needs to be addressed by government. Food hygiene regulation for ready to eat street food has been published by MoH decree. However, the implementation of it has not been fully evaluated yet. The knowledge, attitude, and practice of food handlers in food premises can be measured to describe the situation in the sector and identify any gaps. The baseline of KAP of food handlers need to be confirmed. An intervention for KAP by training will be developed and assessed to measure any resultant change. In addition, this study also investigated the key actor's work responsibilities and its work process collaboration between them in food safety control especially for RTE street food.

This chapter describes the research design and method used, sampling strategies, data collection and data analysis. The research objectives required multiple phases with a combination of quantitative and qualitative approaches to collect the data.

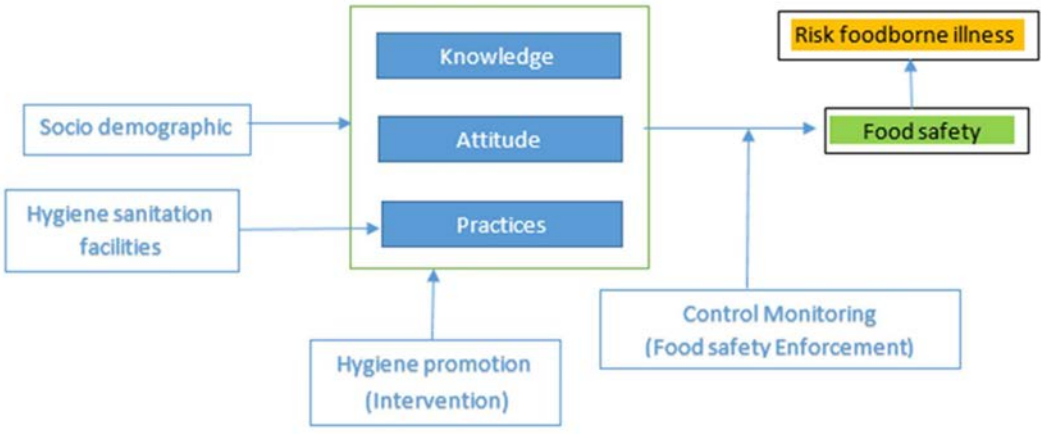


Figure 3.1 Conceptual framework on food safety

In Figure 3.1, the research design was developed according to several entities in conceptual framework which can impact on food safety especially food hygiene implementation. The socio-demographic is an internal factor that reflects the specific population and can contribute to KAP in food safety issue. Socio-demographic characteristics are predictor factors that might relate respondent response in food safety perception, attitude, allied with responsfood safety and quality (Wilcock et al., 2004, Taylor et al., 2012).

Hygiene promotion by communication, giving information and awareness or intervention can also improve KAP of food handlers (Al-Tawfiq and Pittet, 2013, Skhosana, 2003). Barriers on hygiene sanitation facilities will inhibit food hygiene practices. Food safety enforcement (control and monitoring) provide sustained implementation of food safety systems by key actors and encourage achieving high food hygiene standards that reduce risk of foodborne illness.

3.2. Research design and its method

This study used a mix of methods with sequential design to answer the research questions (Figure 3.2). The research design required several phases of data collection and its analysis. The design for later stages were reliant on data from earlier phases.

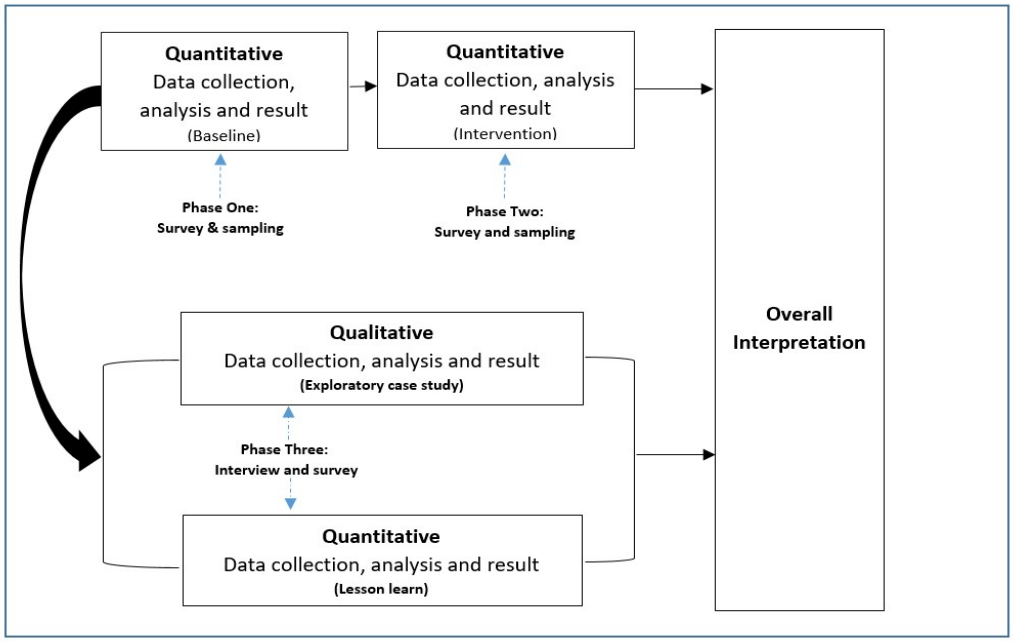


Figure 3.2 Design method

The first and second phase were quantitative approaches. The KAP of food handlers selling ready to eat food and the environmental microbiology in their food premises were examined to determine a baseline condition. Then a training intervention was designed to address the problems identified. After delivery of the training intervention, the second phase was conducted to identify any difference in KAP level of the food handlers or the microbiological contamination in the premises. Both phases are explained in Chapter 4, 5 and 6.

The KAP levels were measured using bespoke questionnaires for the Knowledge and Attitude and an Audit to evaluate the Practices. A basic food hygiene on knowledge questionnaire was constructed based on food hygiene requirement references (WHO, 1996, MoH, 2003d, FSA, 2015). It covered several factors (i.e. temperature, storage, cleaning) related to those references. Knowledge questionnaire used multiple choice format which is a reliable tool for assessing knowledge and also easy to respond and answer by respondents(Moss, 2001). The multiple-choice has been proven as appropriate instrument to measure of food safety knowledge and it can be use with a wide variety age group (Byrd-Bredbenner et al., 2007). Attitude question was modified based on previous research (Baş et al., 2006). It used Likert scale for measuring attitude as a measurement tool. The number of questions for each knowledge and attitude was considered consist of 10 questions for avoiding slow response and times consume on response time since the survey also did practice observation and environmental sampling. Response times are affected by question characteristics (i.e. the total number of questions, number of clauses/categories) which may reflect reading time, location of the question taken as well as respondent characteristics (Yan and Tourangeau, 2008). The method is summarised in Table 3.1. Evaluating the KAP is necessary to support the development of future strategy.

A quantitative method approach by survey is typically used in these studies to measure knowledge and attitude, while observation is usually used for investigating food hygiene practise. A number of studies evaluating changes in KAP have also been done to measure the impact of training (Choudhury et al., 2011, Ehiri et al., 1997, Fraser, 1995, Egan and et.al, 2007, Powell et al., 1997).

A KAP survey can be used to explore what is thought, known, believed, and done on a certain topic in specific population. The KAP result has proven a valuable tool to plan and evaluate programs related to the topic and identify any gaps. The survey can identify adoption of activity and action as well.

The third phase of the research was divided into two sections.

As described in Chapter 7, the first section evaluated food policy in Indonesia approached by government, its implementation regarding food law enforcement for small food business especially ready to eat street food vendors and clarified obstacles and root causes faced by them. It also gathered information on the views of stakeholders on KAP in food handlers and food law enforcement. The key participants were government officials that are involved in food safety control. In depth-interviews of public officers to gain information about history, institutional factors, the internal dynamic which influence policy is regularly used as an exploration method (Jiwani and Krawchenko, 2014).

Table. 3.1 Methodology for quantitative phases

Items	Definition	Analysis Tools	Assessment Criteria	Observation
Knowledge	"Understanding information about a subject that is acquired by experience or study"[1]	Quantitative data: • Ten questions with multiple choice • Point score for correct answer	The basic food hygiene questionnaire • Temperature • Cross contamination • Storage • Cleaning • Personal Hygiene Rates the correct answer (maximum 1 point)	✓ Survey as a baseline ✓ Survey after Intervention
Attitude	The way of thinking or feeling about certain of thing[1]	Quantitative data: • Measurement scales for agreement using Likert scale	Trend comparisons of agreement on food hygiene view	✓ Survey as a baseline ✓ Survey after Intervention

[1] Cambridge dictionary

Table. 3.1 Methodology for quantitative phases (continued)

Items	Definition	Analysis Tools	Assessment Criteria	Observation
Practices	Actual performance or carrying out by a person of a particular activity[1]	Quantitative data: • Cross check form by indirect measurement (observed in food premises) • Point score for compliance	It had two major groups to asses: • Cross contamination section consists of items influence on it • Sanitation and hygiene infrastructure facilities Statistical scale, rates the compliance item (maximum 1 point)	✓ Baseline ✓ After Intervention

[1] Cambridge dictionary

The second section in phase three explored the implementation of food law enforcement in UK, as a developed country, with an existing strategy. The objective was to identify any good practice that could be used or adapted for purposing better strategy of food law enforcement in Indonesia (see Chapter 8).

3.3 Rationale for Selection of the Research Methods

The choice of research design by using the combination method was driven by the research question and objectives. The purpose was

- to collect objective data relating to the actual conditions of street food vendors
- to explore the food law enforcement by government in Indonesia
- to seek the other perspectives from stakeholders.

Recently combination quantitative and qualitative has been used as a distinct approach to several fields (Bryman A, 2006). Research paradigm is characterised by ontology (What is the nature of truth?), epistemology (What is the relationship between the researcher and the known?) and methodology (How can the researcher go about finding out the knowledge?) (Guba, 1990).

Quantitative methods can be experimental or non-experimental i.e. surveys (Creswell, 2003). Surveys allow for collecting quantitative data which can be analysed or used to measure relationships between variables on the sample population (Saunders et al., 2016 , Brannen, 1992). Quantitative method offered techniques for testing a hypothesis and confirming the findings. It involves counting and measuring by numeric analysis or statistical methods through polls, surveys or other statistical data (Babbie, 2010, Stephen Gorard, 2003, Gilham B, 2000)

The qualitative research approach is usually used for exploring or for explaining social issues or examining human problems in individuals or groups by words and actions in narrative or descriptive ways to represent the condition experienced by them (Maykut P & Morehouse R 1994). Recently, public health study and health policy analysis used qualitative analysis as a method (Orton et al., 2011, Arredondo et al., 2018, Walt et al., 2008). Palmer et.al (2018) practiced qualitative study for designing policy and implementation in health care units (Palmer KS, 2018). Qualitative method presents techniques to investigate and to explore an issue that cannot be comprehensively evaluated by quantitative study(K Laws, 2004).

This qualitative study intention did not test theories or prove hypotheses about government work performance or governance process for controlling food safety or the stakeholder view about controlling food street vendors. It was rather to explore their perspective in depth based on experience, and extract data which might explain the condition of food street vendors and enlighten what can be done to improve it in the future.

Considering how nature and balance of enquiry fits with the research study is an important step for conducting a study. Constructivism naturally correlates with a qualitative study, which can work from different set of assumptions to a quantitative study. A constructivism paradigm believes there is no single truth. This paradigm determines what is the meaning behind activities, to try and find an understanding of phenomena through participants and their subject view(Creswell, 2018).

The element of constructivist term and its implication for practice concerns multiple realities from different perspectives. The data is collected where it is comfortable for the participant. This circumstance helps keep them on subject, and establishes closeness between interviewee and participant (Creswell, 2018).

There are several strategies used in qualitative studies such as grounded theory, phenomenology, ethnography, case study and narrative (Creswell, 2003). Case study enables a researcher to investigate a situation, determining what actually happens and to discover barriers using a well-ordered approach (Gilham B, 2000).

For this qualitative research, case study strategy by interview was used for explaining the condition that had been observed in the quantitative phases. Case study is a strategy for gaining an in-depth understanding about an issue or situation. The interest is to process the whole context – when, how or why a question was being posed and finding the exact root cause (K Laws, 2004, Yin, 2003). Case study has been used for observing performance management in a government institution (Norhayati and Siti-Nabiha, 2009).

Case studies can be used in both quantitative and qualitative approaches or mixed between them (Bryman A, 2006). One of the advantages for using mix method is that the qualitative data can be used to recognize the factual condition or explain more clearly what was behind the quantitative outcomes (Bryman A, 2006, Creswell, 2003). In addition, the strength of research in a mixed method approach is considered to be greater than stand-alone either qualitative or quantitative study (Creswell, 2018). A study, in 2017, argued the outcome of tandem research using quantitative and qualitative studies expanded and strengthen conclusion in order to answer the research question posed (Schoonenboom, 2017).

The use of this approach is described in Table 3.2. The table shows how the combination method was used in data collection and analysis to address the research questions.

Table 3.2 Relationship between Research Question, Method of Data Collection, and Data Analysis

Phase	Research Question	Method of Data Collection	Data Analysis
Phase 1	RQ1: Is the KAP of street food handlers on food hygiene adequate for handling food in their business? RQ2: is there any relationship between KAP variables? RQ4: What the kind of support is needed by Indonesian street vendors from government?	Survey KAP questionnaire (RQ1 & RQ2) including demographic profile to food handlers Rank choices questionnaire for recognizing the need of street food vendors	Statistical analysis (descriptive and interferential)
Phase 1	RQ3: is there evidence for microorganism contamination in study group premises?	Environmental sampling of food contact surface	Descriptive statistic
Phase 2	RQ5: Can training intervention improve their KAP and reduce microorganism contamination?	Intervention and re survey to control and intervention groups	Statistical analysis(descriptive and interferential)

3.4 Sampling strategies

3.4.1 Quantitative

The quantitative study has the following aims:

- Evaluating the knowledge and attitude, and audit practice (KAP) of food hygiene food handlers (street food vendors) and its microbial contamination
- Analyzing the KAP level and microbial contamination after intervention
- Assessing perception of UK food inspectors on food law enforcement

In the first phase, data on the knowledge, attitude and practices (KAP) of the sample group (food handlers in street food premises) was gathered as baseline data. The second phase

examined KAP using the same technique after the intervention. Survey, factual observation, and microbial food surface contact took place in both phases. The participants in the first and second phase were from the same sample group. However, the number of respondents in second phase was smaller as it included only those who participated in the intervention.

Participants for the study were gathered using an opportunistic approach. Before starting the main survey, a pilot project in four sub-districts were carried out to test the methods. twenty-five street food handlers in four sub-districts in Bandung city were all approached and invited to participate in the study. The response rate for pilot questionnaire was high (80%). 20 volunteer respondents agreed to participate and completed the questionnaire. The purpose of the pilot project was to test the questionnaire and its measurement including time requirement for this study, also to evaluate the minimum sample size.

The test results showed there was no significant different on KAP for four sub-districts by using one-way Anova test (Table 3.3). Therefore, using only one sub-district would be valid. Explanation for choice of statistical test is described in Appendix I.

Table 3.3 p-value of KAP pilot project

Items	K	A	P
p-value	0.768	0.096	0.813

The consistency of questionnaire was measured by using reliability consistency test. The common measure reliability coefficient used Cronbach's alpha (Bujang et al., 2018). It confirmed the value was 0.51 for knowledge, 0.69 for attitude, and 0.40 for practice. In this study, the result showed that the consistency on practice questionnaire was weak. The item analysis in several test questions should be modified to improve clarity. The questionnaire needs to be improved. As the result of the prior validation study, the sample size minimum required was calculated. Based on the level of significance of 5% with a confidence interval of 95%, with alpha 0.05, beta 0.1 based on knowledge question by Kendall Tau correlation calculated a minimum 253 respondents needed for this study. From the pilot study, the allocation time needed for conducting this study was minimum

35 minutes and maximum 60 minutes. Three questions were subsequently simplified to ensure the meaning was clear, but no other alterations were required. The results of the pilot study were not used in study results.

The respondents were selected according to the following inclusion criteria:

a) All small business food such as ready to eat street food vendors in tent (stay or temporary), cart, hawker, mobile or low-cost eating places in front of street
b) Trading in the sub-district of Lengkong, Bandung.
c) Willing to be a respondent (volunteer)
d) Able to communicate verbally in the relevant language (Indonesian)

On approaching the respondents, the informed consent was read out which can be found in Appendix II, and they were asked for their agreement to participate. The survey used survey sheet as stated in Appendix III. Both survey and microbial contamination sampling are conducted together in one premises, usually it was started by survey follow with environmental sampling. Environmental sampling to food contact surface was collected to each premises using Bacticount sampling kit.

For phase two, the participants were allocated into groups according to their food hygiene training. Participants in phase one who had had previous training by government or other institution were identified and allocated into Group 1 (pre-trained). Group 2 (untrained) comprised participants from phase 1 who had no food hygiene training. Some members from each group then volunteered to participate in the bespoke training intervention created for this project. This ultimately resulted in four groups for comparison:

Group 1a –pre-trained (government training only)
Group 1b – pre-trained and intervention
Group 2a – no training at all
Group 2b – intervention only

In phase three, the study was conducted in UK to food investigator/EHOs with opportunistic sampling strategy. A structured survey by email invited the participants, to

provide information on food law enforcement in UK. A copy of the survey can be found in Appendix VI.

Table 3.4 Participants for Survey in UK

Resources	Item of questions
Inspectors	• Legislation and Regulation • Guidance and its enforcement • Work satisfaction • Management of enforcement including FSA audit process

3.4.2. Qualitative

The qualitative research has the following aims:

a) Observing government work on food regulation implementation especially controlling of ready to eat street food vendors.
b) Collating stakeholders' views on hygiene of ready to eat street food

The purpose of objectives has been stated in section 1.2 is to have an integrated view about implementation of food safety control in Indonesia and to provide some insight about the level of KAP and environmental contamination in street food premises. Using in depth interviews allowed the researcher to dig deeper into regulator perspectives than using a structured survey. For the same reason it was also used to collect stakeholder feedback on food hygiene and its enforcement. A semi structured interview with open questions was used in this study because it has flexibility and allows natural discussion without losing the structural points of questions(Gilham B, 2000). The purposive sampling study was conducted in Indonesia by conducting involved in in-depth interviews to selected key regulators from national level and provinces, Bandung local health district and stakeholders. Purposive sampling is a non-random technique that selects respondents who are knowledgeable and experienced to capture the information required (Patton, 2002). Purposeful sampling can also be used to support quantitative research by helping to explain the results (Palinkas et al., 2015). Selected participants that are involved in food safety control (NADFC and Health Office) and stakeholders who intersect with food street vendors were chosen for this study. The participants are listed in Table 3.5.

NADFC is the responsible regulator for food safety in Indonesia (competent authority). However, NADFC and local health authority share responsibilities in food safety control based on government regulation. The Local health district in Bandung City was selected for this study, as this was where the quantitative phase of the research was carried out in their local area.

The Health Ministry, as a national department, who published Health Law and its regulation and is responsible for public health in general, was also included.

Several stakeholders linked with food business such as SME offices, education office, primary school, and one of association food street vendors who have knowledgeable on food street vendors were approached and invited to participate in the study. Primary school was chosen because based on NADFC report that confirmed many cases of food poisoning outbreak happened in elementary school rather than other level local schools because pupil used to buy food from street food vendor in front of their school and the school did not have appropriate canteen to sale safe food to the pupil (Liputan 6 Mia Mel, 2013).The stakeholders were asked to give their view on food hygiene in ready to eat street food and its problems.

In Table 3.5 described the selected participants who participate in qualitative study. The approach technic and how to have the key person who listed in the table are supplied in 3.5.2.

Table 3.5 Selected Participant for Interview

No	Participants	Roles	Items of questions
Regulator			
1	NADFC Central	Key person representative	✓ Work scope and collaboration ✓ Implementation regulation practices and obstacles faced
2	NADFC West Java Province	Key person representative	
4	MoH Office and Health Province Office	Key person representative	
3	Local District (Local Health) Bandung City	• Key person representative • Sanitarians	

Table 3.5 Selected Participant for Interview (continue)

No	Participants	Roles	Items of questions
Stakeholders			
5	SME local district	Key person representative	✓ Work scope and collaboration for controlling street vendor ✓ Implementation regulation practice and obstacles faced
6	Spatial plan local district	Key person representative	
7	Education office (ministry, province and local district)	Key person representative	
8	Head teachers in Primary School	Key person representative	✓ Collaboration for controlling ready to eat food in in school ✓ Responsibility for controlling food hygiene ready to eat street food in school ✓ Regulation and obstacles faced
9	Local *Street vendors* food *Community*	Key person representative	✓ Work scope ✓ Work collaboration for ready to eat street food ✓ Obstacles faced

The selected participants were approach as explain in 3.5.2.

3.5 Data collection

3.5.1 Quantitative

In phase one and phase two for KAP food handlers, this quantitative study used a bespoke questionnaire and observational audit constructed specifically for this study. The questionnaire was tested and used in pilot project (See section 3.4.1).

3.5.1.1 Study Population

In Phase one, a cross-sectional study with opportunistic approach was conducted in one sub-district in Bandung city, Indonesia, from August 2016 to January 2017. Bandung city was chosen because it has many kinds of street food and is an urban area. Bandung is the capital of West Java Province, where the incidence of bacterial food poisoning has been increasing between 2011 and 2016. The respondent of street food vendors in a single sub

-district of Bandung city were approached in person and invited to join the project. The purpose of the project was explained to them, including an assurance that all of the data obtained would be anonymised and confidential. A total of 272 street food vendors were approached. Of these, 269 agreed to participate, giving a response rate of 98.89%. The respondents were given a small souvenir after completing the survey (a bacterial soap for hand washing and a liquid detergent for cleaning their utensils and cookware).

The microbial sampling on food contact surface (environmental sampling) was conducted by taking contact samples using a dip-slide kit. This allowed evaluation of the presence/absence of *Enterobacteriace* family and Total Viable Count (TVC).

In Phase two, as a longitudinal study, the population was selected from phase one and divided into 2 major group (pre-trained and untrained) and those major groups were treated by intervention. Both groups had a control group for evaluating their achievements after the intervention.

In phase three, the survey data was conducted to UK food inspector/ EHO. The data population was taken based on email response of participants.

3.5.1.2 Instrument and Data Collection

3.5.1.2.1 KAP Study

The main tool for evaluating the food business operators' KAP was a bespoke questionnaire and observational audit that was designed for this study. It was designed in English and then translated into Bahasa (Indonesian) and verified by Indonesian Native. The questionnaire for delivery used Indonesia language.

The researcher was supported by five assistants that had qualifications with food science background and having good communication skills in Indonesia and local language. The assistants were a fresh graduated from university majoring on food science. They were selected regards their CV and passed interview selection that conducted by researcher. They were pre-trained by researcher about this study and on how to take samples to

standardise their performance in sampling. The researcher was along with them taking survey to respondent.

Interviewers conducted face-to-face interviews to street food vendors, recording the results on the questionnaire and observing the premises in question. The interviewers collected the data at the participants' places of work, i.e. at the street premises used for serving food.

The data was collected by interviewers in the food premises by reading out knowledge and attitude questions to the food handler and recording answers on a standard form.

The data for practices was recorded by the interviewer based on observation and recorded on a standard form. The interviewers also carried out the environmental sampling. One interviewer carried out all aspects of the data collection in an individual food premises. The knowledge questions and attitude questions were asked first. Then the interviewer would make the observations for the practices audit and take the environmental samples. On average, this took 50 minutes at each premises. However, interviewers would wait or pause when the food handler needed to serve their customers so as not to interfere with their business. The questionnaire was described in Appendix III.

In Part I of the survey, demographic data such as age, sex, marital status, education level, number and type of employees (self-employed/employee) were collected to evaluate any connection with KAP outcomes. Details were also collected on the type of food, type of premises (i.e. stall, mobile street vendors, tent, stand or hand cart) and opening hours.

Part II of the questionnaire focused on the food business operators' knowledge. It consisted of ten questions (maximum score 10) presented in a multiple-choice format. It tested the respondents' basic factual knowledge of food hygiene and covered aspects of storage, cleanliness, preparation, and personal hygiene linked to the transmission of microorganisms. The interviewer read out the questions and possible answers, with the respondents asked to choose one answer from among the options. The interviewer completed the questionnaire based on the respondent's answers. It only has 10 questions because it considered time of survey which taken while their business.

The knowledge level was categorized based on total score obtainable (maximum 10) which was converted to 100%. Respondents were divided into three knowledge levels; poor, inadequate and excellent. Those respondents achieving marks below 60% were considered to have poor knowledge, 60% -70% was classified as adequate, and above 70% was considered as excellent. Since ready to eat street food vendors in Indonesia are not obliged to pass food hygiene training or only had consultation and supervision by sanitarians, the score categories are adapted from other training standards. These score categories were modified from CIEH and Indonesia MoH.

Part III evaluated the food business operators' attitude. The attitude sections consist of 10 items. The participants were asked whether or not they agreed with each of the ten statements presented to them. Responses were given on a Likert scale, with the options ranging from 1 (strongly disagree) to 5 (strongly agree), with the respondents being asked to indicate the number that corresponded to their opinion. The maximum score possible was 50, with a higher score representing a better attitude to food hygiene.

Part IV of the questionnaire evaluated the food hygiene practices of the food business operators. This was based on an audit carried out by the interviewer on the premises. Observations were made based on the factors that contribute to safe food production, e.g. personal hygiene, food storage, pest control and utensils/equipment. The source of water supply was investigated, including whether ice was commercially bought or self-made. The presence of facilities and sanitary utilities was determined, e.g. the availability of toilets, adequate washing facilities, a sink, surfaces, waste and food packaging. The availability of cold storage/refrigeration was also checked. The higher the score achieved, the better the hygiene practices on the premises.

Additional questions for food handlers about what they kind of support need from government also was asked. The result will be displayed in Chapter 7 supporting the qualitative study.

In Phase 2, the researcher designed and delivered the training intervention and then revisited the participants' food premises to re-evaluate the KAP and take environmental samples. In phase 1, the researcher has asked their contact and identify their address of

premises. The training was delivered near with their premises in appointment point who already agreed by them. Data collection strategy and evaluation tools were the same (see Chapter 6).

The design of intervention content reflected the respondents' results from the baseline survey. The design plan of study was described in Figure 6.1. The intervention content design is described in Table 3.6 and Appendix V. Training materials are included in the accompanying CD. It focused on cross contamination, proper temperature storage and personal hygiene. The intervention was delivered at the end of 2017. Training was given by only one trainer to small groups (3-5 food handlers) to ensure an interactive lesson. In Table 3.6, described material and training method for intervention. The training module included PowerPoint and pictures, as well as an interactive demonstration on hand washing technique. Small group training was conducted at a site near the premises. This made attendance easier for the respondents regarding both time and access. The training intervention lasted at least 60 minutes until 90 minute per group depending on the discussion and questions from the participants.

Table 3.6 Material and training method for intervention

Lesson	Aims	Training Method	Material
Personal hygiene	To enable the food handlers for maintaining their personal hygiene appearance and cleanness, also learn to prevent contamination actions.	Lecture, discussion and demonstration	Slide, pictures, and hand washing practise
Cleaning including Sanitation, Waste and Pest Control	To enhance cleaning procedure, sanitise, waste management and pest control	Lecture and discussion	Slide and pictures
Food contamination	To informed about source of cross contamination and to enable them for preventing the cross contamination	Lecture and discussion	Slide and pictures
Storage, Cooking (including temperature)	To informed about proper storage, proper cooking including temperature	Lecture, discussion, demonstration	Slide, pictures and thermometer

The material of intervention also delivered about safe packaging for ready to eat street food as additional information.

Approximately three weeks after the intervention, the participants were re-evaluated using the same KAP tools used in the baseline study. The evaluation of intervention was chosen in short time about three weeks because the time for conducting it was limited and has not sufficient time to conduct in ideally condition. This result only gives a point of view as a pilot study that might be used by government in further development on food safety intervention. Other study on food safety intervention also used small sample (N=45) for intervention that follow up at four week (Ryan et al., 1996). Comparison between trained and untrained groups was made to identify any changes in knowledge, attitude, and practise scores.

3.5.1.2.2 Microbiology contamination

Microbiology quality was evaluated in premises by environmental swabbing using a Dip Slide Kit. Bacticount Dip slides from TSC Biosciences were used for the environmental sampling. Bacticount slides are a plastic surface with agar on each side. One side (the red side) contained Violet Red Bile Glucose (VRBG) agar used to confirm the presence of *Enterobacteriaceae* and the second side (flaxen colour) was nutrient agar for total counts and mould. The dip slides are contained in individual lidded clear plastic tubes making them convenient and easy to use in the field. The slides are incubated in the tubes.



Figure 3.3. Bacticount VBRG Slide (Tcsbiosciences, 2001)

Samples were taken from a food contacts surface in each premises. These included cutting board, utensils, glasses and plates.

The average ambient temperature during sampling was 27 $\pm$ 3^0C. Two-hundred and sixty-nine sample swabs (one from each vendor) were collected. Sampling was carried out between 09:00 a.m. and 18:00 p.m. The average time sampling at each vendor was 15 min.

The dip slide was removed from its tube by pulling the plastic tab at the top. It was then pressed onto the surface to be sampled, making sure the entire agar had full contact with the surface. The agar was left in contact with the surface for approximately 20 seconds, then turned over to the other side and applied again to the surface adjacent to where the first contact was made. The dip slide was then replaced in the tube. After exposure the samples were kept in a safety box during transportation to the incubator location and were incubated on the same day at 35^0 C for 48 hours.

After incubation finished, the results were read and recorded. Colonies appearing on the red agar (VRBG) represented the count of *Enterobacteriaceae.* Total viable count and mould appear on the yellow/cream colour side (nutrient agar). The number of bacteria and mould (CFU)/cm^2 was calculated. An *Enterobacteriaceae* bacterial reference chart supplied by VBRG Bacticount was used to categorise the number of bacteria in the sample as follows:

- up to 2.5 CFU/cm^2 (very slight growth),
- more than 2.5 but less than 12 CFU/cm^2 (slight growth),
- more than 12 but less than 40 CFU/cm^2 (moderate growth),
- more than 40 but less than 100 CFU/cm^2 (heavy growth)
- more than 100 but less than 250 CFU/cm^2 (very heavy growth).

More than 250 CFU/cm^2 cannot be counted as it results in a lawn of bacteria. Evidence of mould appeared as a furry colony on the nutrient agar. The reference chart of mould & total viable count (TVC) that was supplied by suggests categories of slight (0.4 CFU/cm^2), moderate (1.6 CFU/cm^2) and heavy (4 CFU/cm^2).

The reference chart for *Enterobacteriaceae* and Mould was supplied by manufacture of *Bacticount.*

In phase two, microbial testing was carried out on food contact surfaces for 45 respondents 3 weeks after training to investigate any practise alteration. The sample was collected from respondents in groups only who had trained (see Figure 6.1). The result was compared to those from the same respondents in first period of sampling before the intervention. All respondents were re-sampled in the same way that described in this section above.

3.5.1.2.3 UK food inspector survey

In Phase 3 for the quantitative study held in UK, a structured survey by synchronous email was conducted order to gain information from food inspectors on food law enforcement. A questionnaire was designed to gather information from Enforcement officers in England regarding the delivery of food controls. The questionnaire can be found in Appendix VII.

The questionnaire was drafted in SurveyMonkey for ease of use. Various types of question/answers were needed, including some with free text options, and SurveyMonkey allowed this flexibility. Once the survey questions had been drafted and the logic input, it was sent to two food control specialists in the University of Birmingham to evaluate the content validity. Changes were made to the wording of some answer options to reflect language commonly used in the profession and/or the Food Standards Agency Food Law Code of Practice. This was done to ensure clarity for the sample group and consistency with regard to answers. After the changes two Enforcement Officers were asked to complete the final draft as a pilot. It took 8-10 minutes to complete and no further alterations to the survey were required.

The cover email was sent in the name of the project supervisor (Madeleine Smith). She is Head of Group and would have been recognised as such by all the recipients, enhancing the likelihood of participation. The purpose for which the survey was being sent was explained to the participants. Participants were assured of anonymity and confidentiality.

On 14 February 2019 the questionnaire was sent via SurveyMonkey to a sample of 211 enforcement officers in England. All officers had studied at the University of Birmingham in some capacity over the preceding 20 years. The University of Birmingham offers baseline

qualifications in food safety (Higher Certificate in Food Control), Environmental Health (MSc Environmental Health), post qualification training in the form of the MSc Food Safety, Hygiene and Management and Continuing Professional Development in the form of targeted short courses on specialist subjects (e.g. food labelling). Using an email list of alumni from these courses gave access to a stratified sample which was geographically broad (within England) and with varying education levels but all of whom were part of the target population of Enforcement Officers delivering food controls.

The link remained available for two months. Email was used as a tool to approach and gather information because it is cost efficient, can reach a large geographical area and reduce time required to collect the data set (East, 2008). The main limitation compared to face to face communication is that it limits the possibilities to ask further questions and get in depth responses (Opdenakker, 2006).

3.5.2 Qualitative

Data collection by in-depth interview face to face involved key respondent representatives in two institutions, the NADFC in central and provincial level, and Health institution in central, province and local office. The semi structure questionnaire interview can be found in Appendix VI.

A cover letter supported by the sponsor of this research in Indonesia was sent to each institution, inviting named individuals to participate in this research and to contact the researcher. When the participants responded, a discussion of the aims of the study took place, including confirmation that the respondent was the key person involved or in charge of this study issue. When the institution had a reorganization and change of person in charge, they redirected the researcher to the correct person. For NADFC central office and Ministry of Health, the request letter was sent directly to the directorates. Conducting research in local government (province, city, and district) must have approval and a research permit from BANGKESPOL provincial office and BANGKESPOL city/district office.

The request for research permit from BANGKESPOL required a copy of the research proposal, copy of researcher ID, cover letter, research permit letter and a completed

application form. For NADFC in provincial branch, local health in provincial and local level, both of request letter permit and approval research letter from BANGKESPOL needed to be submitted directly by researcher. Once this was carried out, agreement was received by email or phone and included information for the contact person in charge. The fastest response was usually within a week and maximum took one month. Once permission had been granted an appointment was made with the relevant. For stakeholders, the process for requesting interview followed similar steps. BANGKESPOL is a government office in local (provincial, city, and district). One of their tasks is approval for conducting research in their authority area. If the cover letter is from a foreign country, it is necessary to have approval from Ministry of Home Affairs as well. This was used as a supporting letter when asking research permission in central government or local government through to BANGKESPOL office.

Interviews in the local health district involved one key person that managed and handled the control and monitoring in food hygiene, including three sanitarians who acted as representatives for food enforcement for ready to eat food. Stakeholders from others government institutions that related to food business i.e. SME local district and Education institutions, also involved as targeted respondents including head of primary schools. In addition, one of the ready to eat street food community were also invited to share their perspective in this issue. The community street vendor was recommended by SME local office. Officers provided his name and the phone number as being the leader of the community. The approach to targeted person was via text and asked his willingness to join the study and arrange the time for interview.

Indonesia has an association for street vendor, Asosiasi Pedagang Pekerja dan Pedagang Kaki Lima (APPKL), and it is a legal association. However, the program and membership in each district and municipal are still not completely effective yet. Local APPKL has not addressed by all street vendors in Bandung city. Street vendor in Indonesia is called Pedagang Kaki Lima (PKL). More than one community or forum for street vendors are available In Bandung city. One of it was named 'Forum PKL' Bandung. It is a community street vendor who collaborate recently with local government task force. Local government task force who responsible for it is called Satuan Petugas Khusus (Satgasus)

PKL. Forum PKL and Satgasus invited stakeholders for supporting the project Street Valkenet Malabar to improve Malabar Garden as a local culinary tourism point. It supported street food vendor for having better premises cart/food tent and sanitation support facilities such as water supply and waste.

This community is still on-going process to have legal business permission. Some of food business that participated in survey are members of this forum. The interview was conducted in their office or place that choose by participant for ensuring their comfortable enough to share the information.

Data collection by in-depth interview has strengths in that it can gather a wide variety information from participants. The weakness is that it involves personal interaction between interviewee and participant. Comfortable feeling, interview skill, having understanding in their native language are all elements needed for a successful interview session(Marshall C. & Rossman G, 1994).

The data was collected by recorded Dictaphone and was coded to anonymize identity. Interviews were carried out in Bahasa (Indonesian language) and responses translated by the researcher for presentation.

3.6 Data Analysis

Data analysis for all method was described in Appendix I Selection of Data Analysis.

3.6.1. Quantitative study

All results from the quantitative phases were calculated using SPSS Version 24.

In phase one, univariate (descriptive t-test) analysis was used to describe the demographic profile of respondents. The KAP of the food handlers was analyzed using frequency, mean, median and standard deviation, while the food safety knowledge scores for the respondents were calculated based on their answers to each of the multiple-choice questions. The correct answers were assigned a score of +1, or 0 in the case of do not know/wrong option and the total score was converted to a percentage. For the ten attitude questions, a score was calculated based on the 1–5 Likert-scale responses. Question

numbers 2, 6 and 9 were reverse scored because they were negative questions. The negative questions was used to filter out the invalid response of responders and improve the reliability of questionnaire (Józsa and Morgan, 2017).

For the audit, +1 point was awarded when the auditor/interviewer found evidence for the practice on the respondent's premises, with 0 points recorded when they failed to find it. If something was missing but unnecessary in the context of the business, the question was omitted (for example, if ice was not used because it was not needed). The total score for each respondent's practice was calculated by summation and then standardised to 100 to accommodate the omission of any unnecessary questions.

Univariate analysis was used for calculating KAP score (H_{01}), and to figure microbial contamination (H_{02}). Bivariate and multivariate analysis were used to investigate the correlation between socio-demographic elements and KAP. The relationship between the KAP scores was computed using Spearman's non-parametric test.

The results for hypotheses H_{01}-H_{02} is presented in Chapter 4 and Chapter 5. In the quantitative study, further analysis by SPSS version 24 for cross-microbial contamination based on type of food service, type of location, sale position, type of food handler and type of food facility also were carried out.

In phase two, for hypothesis (H_{03}) about intervention, confirmation of its improvement was evaluated by univariate and bivariate analysis. The Mann Whitney independent test was used to compare between groups for KAP. Median values were compared between interventions to investigate any changes of KAP score. The t-test was used to evaluate any differences in socio-demographic characters. The Wilcoxson rank test were used to analyse paired samples before and after training for investigating the KAP.

In phase three, perspective of food inspectors in UK used t-test univariate for data analysis.

3.6.2 Qualitative study

Results from the interviews in the qualitative study were recorded by Dictaphone, transcribed and summarised. In qualitative research, the participants response or how they respond to the issue or situation i.e. words and understanding need to be captured by the

researcher as it is constructed by participants. The objective of a qualitative study is "to discover patterns which emerge after close observation, careful documentation, and thoughtful analysis of the research topic" (Maykut P & Morehouse R 1994). Many studies showed thematic analysis as a qualitative approach for the past two decades (Boyatzis, 1998, Braun and Clarke, 2006, Greg S. Guest, 2012). Braun and Clare (2006) argued that thematic analysis is a useful and flexible method because it captured an important element of the way to understand a situation. It is not necessarily driven by the most prevalent but by a particular logical question(Braun and Clarke, 2006). This qualitative study was categorised into themes based on six steps (Braun and Clarke, 2006):

a) Familiarize with the data by listening to the recording data, and re reading the transcript. This provides familiarity and understanding with all content and aspects contained in the data,
b) Consign initial codes for describing the content and provide indication of the transcript context,
c) Search for patterns or themes in the codes across the different interviews,
d) Review themes. Identify themes by combining, refining and separating all the coded extracts. The data in initial themes should stick together and be meaningful. Generate a thematic map to tell an accurate story about the data.
e) Define and name themes. This step is the refining step which generates clear definition and provides theme names which capture aspects of the data as a comprehensive analysis
f) Produce report. The meaningful themes which contribute to understanding the data should relate to research question and literature for description the findings.

Thematic analysis can be used for both inductive and deductive approach. In inductive, the pattern can identified based on the data itself which has been collected from specific questions i.e. interview and not driven by theoretical interest (Patton, 2002). While in deductive approach, the researchers works from top to bottom (Creswell, 2018). The approach is driven by theoretical interest, explores a known theory, test the hypotheses, and supports or opposes the theory.

This study used a hybrid inductive deductive thematic analysis. Firstly, the data analysis used an inductive approach for generating initial coding with the next step focused on how the governance process was perceived to be implemented by the participant. Secondly, once the data analysis progressed, it became more deductive in that it involves theory which underlined the findings. In deductive analysis, the theory can be modified if the findings differ from previous theory(Hyde, 2000).

In previous studies, Lincoln and Guba (1985), confirmed that qualitative research must have trustworthiness or believability of research finding which collected sufficient information from participants. The researches need to confirm how the study findings were credible, transferable (applicable to similar situation), confirmable and dependable. Several approaches can be used to demonstrate trustworthiness (Lincoln, 1985) such as: the triangulation method which is combination to provide credible data, developing an audit trail so people can understand and judge the finding, peer review the briefing in a research team for confirming the neutrality of researcher, and respondents confirming the finding and highlighting if something is missed in the research.

In order to elicit trustworthiness, the researcher asked respondent to provide credible data, summarized the interview and taking respondent feedback.

3.7 Ethical Review

This ethical review form was submitted and reviewed by Ethical Review Committee of the University of Birmingham with reference number ERN-18-1830. All requirements followed to University's Code of Practice for Research.

As the project involved human participants, it was necessary to apply for ethical approval through the UoB internal procedures. An Application for Ethical Approval was originally submitted in July 2016 as part of an application Newton Fund Institutional Links scheme. The grant was not awarded and a second application for ethical approval was submitted in July 2017 before the second stage of the data collection, with a third application in October 2018 prior to the start of the qualitative data collection stage.

3.8 Conclusion

This chapter has described the phases for conducting research. The tools, variables and appropriate methodology has identified and confirmed before to use it. The variables were socio-demographic, knowledge, attitude, practices, microbial contamination testing for baseline data in phase one and for intervention in phase two. The qualitative method has been developed from selecting participants and evaluating input. In addition, this chapter also described method and data collection for taking food inspector perspective in UK on food safety and hygiene enforcement.

Chapter 4 - Food Hygiene Knowledge, Attitudes and Practices of Food Handlers

4.1 Overview

To understand the condition of food hygiene in ready to eat street food, it is important to have updated data of knowledge, attitude and practices (KAP) characteristics of food handlers of ready to eat street food. Informal food sector in developing countries showed many kinds of limitations while it creates important income (Scott, 2007, da Silva A et al., 2014). It contributes a significant share of the economy in informal sector of most developing countries (Alimi, 2016).

Phase one of this study used a quantitative approach to collect the data from food handlers on socio-demographic, knowledge, attitude and practice as stated in previous chapter. The data collection was explained in section 3.5. The inform consent and questionnaire is described in Appendix II and III. The results of this study described the socio-demographics of respondents and KAP levels in this sample group. The data will also identify those items related to food hygiene that need to improve. The discussion addresses research question number one and identifies any possible areas for improving food safety of ready to eat street food.

4.2 Results

4.2.1 Socio-demographic

In total, 272 street food vendors were approached from one district of Bandung. Of these, 269 agreed to participate and completed the questions (response rate = 98.89%). The distribution of the respondents' socio-demographic characteristics is given in Table 4.1. The respondents can be characterised (see Table 4.1) as being majority male (76.2%), between the ages of 41 and 60 years (44.2%). More than half of the respondents (65%) had attended elementary school and junior high school (9 years), while slightly more than a third (34.9%) had graduated from high school (12 years) or higher. Almost all of the respondents were working full-time as street vendors (98%), with a majority of them working long to very long hours. Over half of the respondents worked between 8 and 12

hours a day, 5 to 6 days a week (57.6%). Carts (64%) and tents (33%) were the most common forms of premises. Just over half of the total respondents (55%) reported a lower income than the Bandung local monthly wage rate of IDR 2,800K in 2017, suggesting that, in spite of the long hours spent working, street food vending does not necessarily provide a good level of income. Only 17.5% of them had training from both local government and stakeholders (owner and non-government organization).

Table 4.1. Socio-demographic variables and characteristics of street food vendors

Variable category		Number	%
Gender	Male	205	76.2
	Female	64	23.8
Age group (years)	Teen (15–24)	42	15.6
	Young (25–40)	102	38.0
	Mature (41–60)	119	44.2
	Elderly (> 60)	6	2.2
Education level (years)	≤ 6	76	28.3
	9	99	36.8
	≥12	94	34.9
Profit per day (IDR)	< 50 K	17	6.3
	50–100 K	131	48.7
	101–200 K	64	23.8
	201–300 K	26	9.7
	301–400 K	9	3.4
	> 401 K	22	8.2
Job type	Part-time	5	1.9
	Full-time	264	98.1
Length of work	< 1 year	43	16.0
	1–3 years	45	16.7
	3 < x < 5 years	52	19.3
	5 < x < 10 years	33	12.3
	≥ 10 years	96	35.7
Sale position	Stay	226	84
	Move	43	16
Type of vendor	Hawker	5	1.9
	Cart	172	64.0
	Tent	88	32.7
	Car/Truck	4	1.5

Table 4.1. Socio-demographic variables and characteristics of street food vendors (continued)

Variable category		Number	%
Type of vendor	Hawker	5	1.9
	Cart	172	64.0
	Tent	88	32.7
	Car/Truck	4	1.5
Trained	Yes	47	17.5
	No	222	82.5

As stated in Appendix I, the statistical analysis for socio-demographic and knowledge, attitude, practice used descriptive analysis t-test univariate and bivariate correlation.

4.2.2 Food Safety Knowledge

Only 47 of the participants (17%) had been trained in food hygiene. This included training by the local authority, the business owner or another local empowerment community organisation. The mean knowledge score for the participants was 60.39 $\pm$ 1.26 (mean $\pm$ SD score), which is below the minimum pass (70%) set by the Chartered Institute of Environmental Health for comparable level tests. The maximum possible score was 100, and no one achieved this score.

The participants were categorized into three groups based on score: excellent (>7), adequate (6-7) and poor (<6). Overall, the majority of respondents demonstrated adequate knowledge in food hygiene according to Indonesia MOH. In Indonesia, for food home business industries hygiene training, a participant will be passed if they had minimum score of 6. However, in UK, Chartered Institute of Environmental Health that evaluate basic food hygiene training for UK food handlers set up higher score. Candidates must score above 70% to be considered successful.

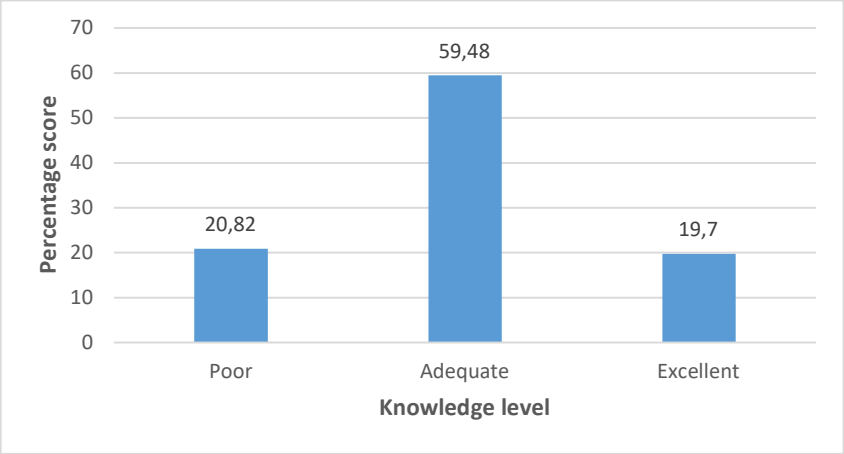


Figure 4.1 Knowledge level of food handlers

Looking at the categorization of the knowledge scores, the data confirmed that a higher percentage of pre-trained respondents (34%) had food safety knowledge in the excellent category compared to the untrained respondents (16.7%) [Fig 4.2]. In addition, the pretrained group has higher percentage score in adequate and excellent (87.2%) rather than untrained (77.5%).

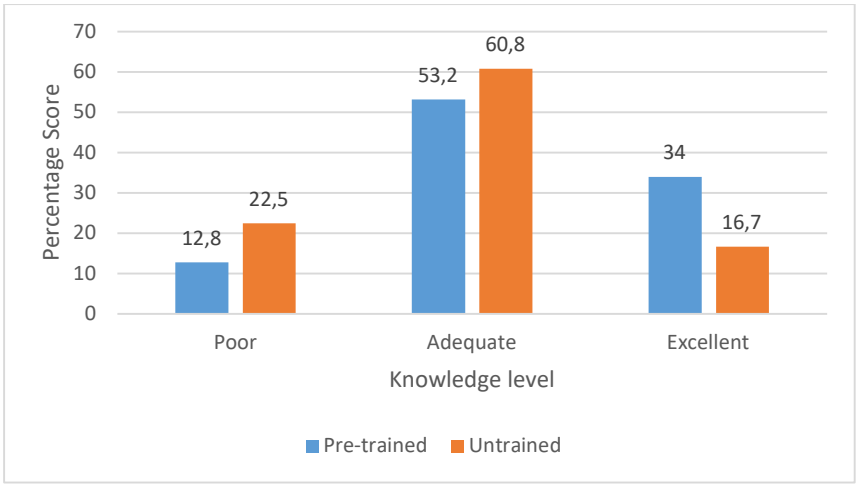


Figure 4.2 Knowledge level of the pre-trained and trained groups

Only one person answered correctly for chiller temperature and less than five per cent of the participants gave the correct answer for freezer temperature, indicating that knowledge in the critical area of temperature control is poor. Generally, the respondents

gave adequate answers in the cross-contamination, storage, cleaning, and personal hygiene sections [Table 4.2].

Comparing the answers from the group who had had food hygiene training with those from the untrained group reveals little difference (in percentage) in the knowledge for chiller temperature, cross-contamination, cleaning, washing and smoking. However, the pre-trained respondents gave more correct answers to the questions about freezer (10.6%) and storage temperatures (81%) compared to the untrained respondents. One anomaly, as shown in Table 4.2, is that fewer of the pre-trained compared to the untrained respondents answered correctly regarding the wearing of protective clothing gloves, aprons, etc. (78.7 % vs 86.5% respectively).

Table 4.2. Response to knowledge of hygiene and safety between the pre-trained and untrained groups

	Knowledge Questions & Correct Answers	Total persons (% correct) N=269	Knowledge answer (%)	
			Pre-trained, N=47 (% correct)	Untrained, N=222 (% correct)
Temperature				
1	What is the correct temperature for a chiller? **0–8 °C**	1 (0.4)	0(0)	1(0.4)
2	What is the correct temperature for a freezer? **-18 °C**	13(4.8)	5(10.6)	8(3.6)
Cross-contamination				
3	If you have raw meat and fish, should you use the same or a different chopping board? **Differently**	158(58.7)	27(57.5)	131(59)
4	Which is the correct statement for storing raw meat and cooked meat? **Raw meat and cooked meat should be placed on different shelves.**	250(92.9)	45(95.7)	205(92.3)
Storage				
5	Which is the correct statement for storing meat and fish? **Fish and meat should be placed on different shelf.**	175(65.1)	39 (83)	136(61.3)
6	What is the benefit of keeping food in a refrigerator? **Slowing germs growth.**	186(69.1)	38(80.9)	148(66.7)
Cleaning				
7	How would you clean a knife after cutting raw meat? **Wash it under a running water with detergent.**	254(94.9)	43(91.5)	211(95.1)
Personal Hygiene				
8	Which is the most important food with regard to the need to wash your hands after handling it? **Handling raw meat**	203(75.5)	43(91)	160(72)
9	Is smoking allowed when preparing food? **Not allowed**	250(92.9)	45(95.7)	205(92.3)
10	Wearing a mask or gloves, apron when you work, is it important? **True**	229(85.1)	37(78.7)	192(86.5)

4.2.3 Food Safety Attitudes

Overall, the food handlers demonstrated a positive attitude (median score 44, with a score range from 10 to a maximum possible score of 50 points). Table 4.3 shows the attitude of the respondents to applying food hygiene practices and their knowledge of the risks to their food business.

Table 4.3. Total responses for respondents' attitudes by Likert Scale (1–5)

Attitude	Median	Total Response, Likert Scale (5)				
		Strongly Disagree				Strongly Agree
		1	2	3	4	5
1.Handling food safely is important part of my job responsibilities	5	-	-	-	52(19.3)	217(80.7)
2. Having clean nails is not important when handling food (reverse-scored)	5	-	1(0.4)	3(1.1)	35(13.0)	230(85.5)
3. Storing food at the correct temperature is important for food safety	5	2(0.7)	2(0.7)	7(2.6)	100(37.2)	158(58.8)
4. Applying good food hygiene practice in my daily work should happen all the time	5	-	1(0.4)	4(1.5)	80(29.7)	180(68.4)
5. Better knowledge about food hygiene safety is important	5	1(0.4)	-	1(0.4)	41(15.2)	226(84.0)
6. It is acceptable for raw food and cooked food to be kept on the same shelf (reverse-scored)	5	4(1.5)	13(4.8)	5(1.9)	21(7.8)	226(84.0)
7. Chewing, eating and smoking when preparing food produces a risk of contamination	5	4(1.5)	11(4.1)	21(7.8)	77(28.6)	156(58)
8.Selling food without consideration for your customers' health and safety may result in a penalty such as a fine and/or jail as a punishment	4	5(1.9)	12(4.5)	25(9.3)	103(38.2)	124(46.1)
9. The use of safe materials as ingredients from approved/trusted suppliers is not necessary (reverse-scored)	5	4(1.5)	-	17(6.3)	52(19.3)	196(72.9)
10.Selling food without consideration for your customers' health and safety will risk a loss of customer trust.	5	1(0.4)	2(0.7)	-	30(11.2)	236(87.7)

All of the respondents (100%) agreed or strongly agreed that practising food safety while they worked was important (question 1). Having clean nail was agreed or strongly agreed by more than 90% respondents (question 2) while less than 90% of them aware on risk contamination (question 7). Although 96% of the food handlers agreed or strongly agreed

that it was important to use the correct temperature for storing food (question 3), it was clear from the knowledge questions that many of them (99%) did not know what that temperature should be.

Having better knowledge (question 5) on food safety and applying good food hygiene (question 4) are important aspect that was agreed by most respondent (more than 95%). In question 6, 99% respondent stated that it was unacceptable for raw and cooked meats to be kept on the same shelf. This is consistent with the knowledge questions, where the same percentage stated that the products should be stored on different shelves.

This appeared to be for both legal and economic reasons, as 84% agreed or strongly agreed that selling unsafe food could result in punishments (question 8), and 99% considered it would affect customers' trust in their food (question 9). Most of the respondents (92%) agreed it was necessary to use safe ingredients from a trusted supplied (question 10).

4.2.4 Food safety practice

The observation on food hygienic practices revealed some good and some poor practices. Many of the more serious issues of non-compliance relate to structural problems such as the provision of water and hand washing facilities. The median overall score for hygiene practice in the group was 44 (maximum possible 100). The responses are summarised in Table 4.4.

One area of consistent non-compliance related to the protection of food from cross-contamination. Only 24.5% of those observed used a head covering or hat (Q1), and only a very small proportion (5.9%) wore protective clothing (Q5). Only one of the respondents (0.4%) used disposable cloths for wiping surfaces (Q6). Nearly half (45.4 %) of the participants failed to use food-grade containers for storing food (Q7), while almost one-third (32%) did not cover food to protect it from contamination (Q9). Cleaning was another area in which poor practice was identified. The use of dirty containers for food storage (Q8) was identified for 21% of the respondents. The majority (87%) of the respondents took no measures to control flying insects during their work activity (Q12), although there was no evidence of pests in over 80% of the premises (Q13). A number of particularly dangerous

practices were observed, for example, nearly 40% of those who handled raw and ready-to-eat food did not use separate chopping boards (Q16).

Table 4.4 Food handlers' practices in preventing cross-contamination

		The total response (%) *n=269*		
	Observed Cross contamination	**Yes**	**No**	**NA**
Code	**Personal hygiene**			
Q1	Staff wearing a head covering/tying back hair	66(24.5)	203(75.5)	
Q2	Clothes are clean	262(97.4)	7(2.6)	
Q3	Clean, short and unpolished nails	244(90.7)	25(9.3)	
Q4	No smoking/chewing/eating	226(84.0)	43(16.0)	
Q5	Using apron/protective clothes	16(5.9)	253(94.1)	
Q6	Disposable cloths or paper towels for wiping surfaces available	1(0.4)	268(99.6)	
	Storage			
Q7	Food is stored in food-grade containers	147(54.6)	122(45.4)	
Q8	Food containers are clean	212(78.8)	57(21.2)	
Q9	Food is covered to protect it from contamination	183(68.0)	86(32.0)	
Q10	Food is stored based on consideration of free from cross-contamination between materials	262(97.4)	7(2.6)	
Q11	Food is stored at a minimum of 45 cm above the ground	265(98.5)	4(1.5)	
	Pest Control			
Q12	Controls in place for flying insects	35(13.0)	234(87.0)	
Q13	No evidence of flying insects	222(82.53)	47(17.47)	
	Utensils			
Q14	Using stainless steel and hard plastic materials or other suitable materials	265(98.5)	4(1.5)	
Q15	Knives, chopping boards and other equipment are clean	211(78.4)	58(21.6)	
Q16	Separate chopping boards for raw ingredients and ready-to-eat foods are available	40(14.8)	26(9.7)	203(75.5)
Q17	Disposable plate or packaging use	121(45.0)	148(55.0)	
	Source of water			
Q18	Available	153(56.9)	116(43.1)	
Q19	Water tanks/hoses are clean	118(43.9)	151(56.1)	
Q20	Water for cooking not from reused water	269(100)	0	
Q21	Ice used for food is made/bought as safe	38(14.1)	15(5.6)	216(80.3)

Many respondents (75.5%) did not actually use a chopping board on the premises because the food had already been cooked at home, and it was not possible to observe the practices used at home within this audit. Clean, potable water can be a problem for street food vendors, as mobile premises cannot be attached to mains water supplies. Just over half (56.9 %) of the respondents had a water source available near their premises (Q18), meaning that 43% had to rely on transporting and storing water. In 56% of the premises,

the tank used for storing water was not clean (Q19). Some of the respondents bought ice, and of those who did, 28% admitted to buying ice without knowing it was safe (Q21). The others make it themselves, using boiled then cooled tap water. For question that assessed the cleanness i.e. Q2, Q3 (personal hygiene), Q15 (utensils), Q19, Q23, Q32 and Q40 about the cleanness of hygiene sanitation facility were assessed by observation and visual judgment of the interviewer.

For hygiene and sanitation facilities in Table 4.5, the result showed hand washbasins were not always readily available, with only 28% of the participants having access to one in the kitchen area (Q22).. Many of the respondents (90%) washed their hands in facilities used for other purposes (Q24), including reusing water within a receptacle used to wash utensils or plates (53%) (Q25). In over 80% of the premises, these facilities were not clean (Q23). Hot water was not available at any of the respondents' premises (Q26), and neither were paper towels nor other hand drying facilities (Q29). Only 26% of the respondents had soap and of these(Q27), just seven (2.6%) had bactericidal soap (Q28). Only 43.9% of the respondents were able to safely dispose of wastewater in such a way as to pose no risk of contamination (Q30). The toilet facilities used by the street food vendors were usually nearby communal facilities. Unlike in fixed restaurants, the vendors have no control over the availability and cleanliness of these facilities. Most of the respondents (77%) had nearby toilet facilities (Q31) and for over 70%, these were clean (Q32). However, many of the toilets (80%) lacked handwashing facilities (Q33) and none had hot water (Q34). Bactericidal soap (17%) and paper towels (7%) were rarely available (Q36 & Q37).

As would be expected, similar problems arose with sinks. Over 80% of the sample group had no sink for washing food or equipment (Q38), and none of the respondents had separate sinks for food and equipment. The facilities that were used for washing food and equipment (e.g. buckets and bowls) were often not clean (86.2 %) (Q40), and there was no hot water (Q42) or paper towels (Q45). Although over 40% of the respondents had access to detergents on site (Q43), none had disinfectants (Q44). The disposal of waste water was also a problem (Q46), as would be expected – the food business operators had to use the same facilities for disposing of waste water from hand washing as they did for water from equipment and food washing.

Table 4.5. Hygiene and sanitation facilities for food hygiene practice

Code	Observed facilities	The total response (%) *n=269*		
		Yes	No	NA
	Hand washing basin in food preparation area			
Q22	Hand washing basin available in the kitchen area	75(27.9)	194(72.1)	
Q23	Clean	51(19.0)	218(81.0)	
Q24	Facility only for hand washing	26(9.7)	243(90.3)	
Q25	Water source is not from reused water	127(47.2)	142(52.8)	
Q26	Hot water available	0(0)	269(100)	
Q27	Soap available	70(26.0)	199(74.0)	
Q28	Bactericidal soap available	7(2.60)	262(97.4)	
Q29	Hand dryer/paper towels available	0(0)	269(100)	
Q30	Wastewater poses no contamination risk	151(56.1)	118(43.9)	
	Toilet			
Q31	Toilet located within a convenient distance	208(77.3)	61(22.7)	
Q32	Clean	187(69.5)	82(30.5)	
Q33	Hand washing basin available	54(20.0)	215(80.0)	
Q34	Hot water available	0	269(100)	
Q35	Soap available in the toilet/have their own	175(65.0)	94(35.0)	
Q36	Bactericidal soap available	46(17.1)	223(82.9)	
Q37	Hand dryer/ Paper towels available	18(7.0)	251(93.0)	
	Sink			
Q38	Available	51(19.0)	218(81.0)	
Q39	Separate sink available for washing food	0	269(100)	
Q40	Clean	37(13.8)	232(86.2)	
Q41	Water source not from reused water	46(17.1)	223(82.9)	
Q42	Hot water available	0	269(100)	
Q43	Detergents for washing utensils are available	114(42.4)	155(57.6)	
Q44	Disinfectants available	0(0)	269(100)	
Q45	Paper towels or air drying for clean equipment	0(0)	269(100)	
Q46	No risk of contamination from wastewater	111(41.3)	158(58.7)	
	Walls			
Q47	The materials are easy to clean	265(98.5)	4(1.5)	
Q48	No damage/holes	264(98.1)	5(1.9)	
	Waste			
Q49	Waste disposal bags or a waste container available	259(96.3)	10(3.7)	
Q50	Well stored and has a lid	41(15.2)	228(84.8)	
	Food packaging			
Q51	Disposable used	262(97.40)	7(2.60)	
	Temperature control			
Q52	Ice box or equivalent available	47(17.47)	1(0.37)	221(82.16)
Q53	Chilled food is kept below 8 ˚C	22(8.18)	26(9.67)	221(82.16)
Q54	Fridge thermometers available	0(0)	48(17.84)	221(82.16)
Q55	Records of temperature available	0(0)	269(100)	
	Additional, if necessary			
Q56	Covering any wound or burn with a bandage and using gloves		269(100)	

Temperature-controlled storage and display was problematic. None of the respondents who worked with high-risk food that needed temperature control (or sold ice) (48 of the total sample group) were in possession of a thermometer (Q54). Obviously, none of them were able to record temperatures since they had no thermometer (Q55). When checked using the interviewer's thermometer (Q53), it was found that only 46% of the group were storing food below 8 ^{o}C. This equates to 9.7 % of the total number of respondents as not all of the respondents handled food that required temperature control.

4.2.5 Correlations for Knowledge, Attitudes and Practices

As stated in Appendix I, this correlation used bivariate non-parametric analysis by Kruskal Wallis to describe relationship between variables.

Table 4.6. The relationship between socio-demographic characteristics and KAP

Variable category	Score			p-value		
	K (Mean ± SD)	A (Median)	P (Median)	K	A	P
Gender				0.002*	0.020*	0.000**
Male	6.25 ± 1.28	46.00	42.86			
Female	6.82 ± 1.09	48.00	46.94			
Age group (years)				0.003*	0.196	0.236
Teen (15–24)	5.93 ± 1.29	47.50	44.04			
Young (25–40)	6.50 ± 1.14	46.00	42.86			
Mature (41–60)	6.52 ± 1.30	48.00	44.90			
Elderly (> 60)	5.17 ± 0.98	45.00	42.47			
Education Level (years)				0.014*	0.510	0.249
≤ 6	6.06 ± 1.26	46.43	43.43			
9	6.47 ± 1.20	46.67	44.67			
≥ 12	6.56 ± 1.28	46.90	44.64			
Length of experience				0.202	0.223	0.032*
Less than 1 year	6.30 ± 1.39	48.00	44.90			
1–3 years	6.55 ± 1.19	48.00	46.90			
More than 3 - 5 years	6.33 ± 1.36	46.00	40.82			
More than 5 -10 years	6.67 ± 1.18	46.50	46.94			
More than 10 years	6.21 ± 1.22	46.00	42.86			
Trained						
Yes	6.78 ± 1.23	46.00	48.98	0.015*	0.263	0.000**
No	6.30 ± 1.25	47.00	42.86			

***p < 0.05; **p < 0.01**

There is a significant relationship between gender and KAP ($p < 0.05$), with females having a higher score than males across all three areas (KAP). Age group and education level have a significant relationship with knowledge (Table 4.6).

In Table 4.6, those of a productive age (young and mature) score higher than the other age groups. Those respondents with a higher education level appear to score more highly. However, in Table 4.6, the length of experience has a significantly lower correlation with practices ($p<0.05$). Training experience has a significant correlation ($p< 0.05$) with knowledge and practices. In addition, those with prior training have a higher score for knowledge and practices on food hygiene.

For confirming the strength of relationship between variables and see direction (negative or positive correlation), Spearman's rank correlation was used to analyse the data. The calculation confirmed strength relationship level ($p < 0.01$) between the knowledge-attitude (K-A), knowledge-practice (K-P) and attitude-practice (A-P) scores in the groups (Table 4.7). There were positive correlations between K-A (0.175), K-P (0.361) and A-P (0.289).

Table 4.7. Correlations for Knowledge, Attitudes and Practices

Variable(s)	Knowledge	Attitudes
Attitude	.175**	
Practice	.361**	.289**

** Correlation is significant at the $p < 0.01$ level (2-tailed).

4.3 Discussion

WHO stated that street-vended food has the potential to lead to significant public health problems due to food safety issues (WHO, 1996). Several studies have detailed outbreaks of food poisoning in food businesses due to bacterial contamination (Dawson et al., 2006, Dorozynski, 2000, Hennekinne et al., 2012). Good food safety practices are important in order to keep consumers safe from exposure to microbial hazards in food (WHO, 2000a). WHO has identified several potential sources of poor food hygiene practices among street food vendors. These include a lack of basic hygiene and sanitation facilities, the poor knowledge of food handlers in basic food hygiene practice, and a lack of inspections of street food businesses (WHO, 1996). The current study identified the existence of similar

issues in Bandung, Indonesia.

The majority of the respondents in this study were male. This contrasts with the populations of other studies conducted in Ho Chi Minh City, Vietnam (Samapundo et al., 2016), Malaysia (Rahman et al., 2012, Abdul-Mutalib et al., 2012) and Ghana (Akabanda et al., 2017), in which the majority of street food vendors studied were female. The proportion of workers below 40 and above 40 years age was near equal (53.6%), similar to the studies conducted in Ghana (Akabanda et al., 2017) and Vietnam (Samapundo et al., 2016). However, in Malaysia, street food workers appear to come from a younger age bracket (Rahman et al., 2012, Abdul-Mutalib et al., 2012). In common with other studies, most of the respondents had low education levels (65.1% below high school). This was similar to the conditions found in Vietnam (Samapundo et al., 2016), Ghana (Akabanda et al., 2017) and Malaysia (Abdul-Mutalib et al., 2012).

The present study examines the KAP of food hygiene among street food vendors in Bandung city. The data demonstrates that the food handlers in the sample group have overall adequate food hygiene knowledge, but they have inadequate knowledge in specific areas of temperature control and cross-contamination (Table 4.2). This finding is similar to that of a study in Turkey, where food handlers also scored poorly on questions about the requirements for food storage, temperature and cross-contamination (Baş et al., 2006). A study in Iran also confirmed the respondents has insufficient knowledge regarding the correct temperature for the storage and had positive attitudes, but they still have limitation in practice of food hygiene (Askarian et al., 2004). Poor temperature control and cross-contamination have long been identified as factors which contribute to the outbreak of food-borne illnesses (Bryan, 1978) with a lack of basic hygiene knowledge considered to be a major barrier to the effective application of food hygiene in small food businesses (Walker et al., 2003a).

This present study shows that although the food handlers have a positive attitude (median score = 44 out of possible 50), many do not have sufficient knowledge in particular areas; for example, 60 per cent believed that chewing, eating and smoking was acceptable during food preparation (Table 4.3). However, the respondent had high percentage in lack of

personal hygiene i.e. wear head cover, using apron and using disposable cloth or paper towels for wiping surface. It might be because the previous local training course that held did not underline the important of it. A study confirmed that work clothing (i.e. coat, apron) are important because it became easily contaminated need to change frequently and have proper laundering to reduce contamination(Todd et al., 2010c). *E .coli* 157 outbreaks because of misuse of cleaning cloths which might be lead cross-contamination between raw and cooked meat were investigated South Wales in 2005(Pennington, 2005).

The median score for practices in the sample group was 44 (maximum score possible = 100). This is a low score, demonstrating that the individuals in the group have the potential to make considerable improvements in their hygiene practices. Many of the non-compliance issues observed related to the lack of sanitation facilities. Over half of the premises did not keep their water storage tank clean (56 %), and plates were washed in reused water in a bucket (53 %). In addition, more than 50% of the respondents served food onsite using reusable tableware and cutlery. There was no running water or drainage. Poor cleanliness (19 %), low use of antibacterial soap (26 %) and no evidence of disinfectant in any premises were also significant areas of non-compliance. WHO states that a lack of food hygiene infrastructure and sanitation facilities can pose a risk of food-borne illness (WHO, 1996). The audit confirms that this is the situation presented by street food in Indonesia.

Only a small percentage of the sample group washed their hands using antibacterial soap in either the food preparation area (2.6%) or in a toilet facility (17 %). A previous study in Indonesia revealed poor hygiene practice among street food vendors compared to fixed-premises restaurants (Vollaard et al., 2004). This study also found that poor hand washing hygiene was characteristic of street vendors. Other studies have confirmed that hand washing is a simple and effective way to reduce the risk of food contamination by food-borne pathogens (Curtis and Cairncross, 2003, Todd et al., 2010b). The hygiene practices of food handlers are one of the five important risk factors for food-borne illness (Ross and Guzewich, 1999). Inadequate practice in the area of personal hygiene, such as hand washing, may contribute to food contamination. Asymptomatic carriers of non-typhoid *Salmonella*, *Shigella*, *Vibrio cholera* and enteric viruses pose minimal risks only if

good hand hygiene is properly practised (WHO 1989). Interventions that can prevent food-borne illness should be emphasised to those working in the street food trade, i.e. washing hands with soap and proper food handling hygiene (Vollaard et al., 2004).

A recent study in Malaysia identified a significant relationship between knowledge and practice (Tan et al., 2013). This study has also found a positive correlation between knowledge and practice in the Bandung participants, which suggests an opportunity to improve the hygiene practice of food handlers by enhancing their knowledge. Training can be chosen as a first step for improving the knowledge of food handlers. Training for food handlers has been shown to create long-term benefits for the food businesses and may be an appropriate strategy for improving food safety (Roger, 1994). Training, certification and experience have been shown to significantly affect the level of food safety knowledge of restaurant managers (Lynch, 2003), and a study by Choudhury et al. (2011) showed a significant change in food safety/hygiene KAP before and after training. Food handlers' knowledge increased from an average of 24.35% to 66.2%. Practices improved from 37.5% to 50.8% after training interventions (Choudhury et al., 2011). However, not all researchers have been able to demonstrate such a clear link between training and improved practices (Seaman & Eves, 2006), thus suggesting that a more complex approach may be needed.

Some of the more serious issues of non-compliance identified by the practice audit of the Bandung street food vendors relate to lack of infrastructure, rather than poor knowledge. Without improvements in access to clean water and drainage, and improvements in the cleanliness and provision of hand washing facilities in public toilets, food business operators will be unable to improve in these fundamental aspects, regardless of how positive their intentions or attitudes may be (Rennie, 1995). Improvements in infrastructure and additional training may improve the hygiene practices of some street food vendors, but the attitude results show that over 84% of the respondents were aware of the legal penalties associated with compromising customers' health. This suggests that a strategy that includes inspection, advice and enforcement may also be useful.

4.4 Conclusion

In conclusion, this present study has shown that the street food vendors from Bandung

who participated in this study generally have a good attitude but inadequate knowledge in several areas such as temperature control and cross-contamination. Their hygiene practices reflect this knowledge gap. An additional barrier to good hygiene practice is the lack of infrastructure, specifically the provision of clean water (including for hand washing), drainage and toilet facilities. A targeted intervention based on these gaps may improve hygiene levels among this group, which could in turn reduce the health risk posed to consumers by eating food from these vendors. The information on KAP among street food vendors collected in this study was used to set interventions in the next phase (Figure 3.2).

Chapter 5 - Microbiological contamination and its hygiene practices

5.1 Overview

This chapter reports the results of environmental sampling carried out in the street food vendor premises.

Previous studies have demonstrated that food from street premises had the highest contamination level of *E.Coli* compared to similar home-prepared foods and foods from hotels (Van Kampen et al., 1998). Lack of facilities and inadequate knowledge of hygiene may lead to improper food handling practices in street food vendors, such as storing cooked vegetables at ambient temperature for long periods. This can permit microbial growth causing high levels of contamination (Van Kampen et al., 1998). Other studies have identified lower hygiene audit scores in street food vendors compared to fixed food premises. The type of street food vendors influenced the results. Mobile food cart and stands tend to have lower scores than kiosk, food truck and restaurant. The restaurant has highest score in food hygiene (Trafialek et al., 2018).

This chapter discusses the level of microbiological contamination, identified by environmental sampling, and hygiene practices identified by the audit, and evaluates whether the Bandung street food vendors also present higher risk conditions as described in the published literature. The variable of cross contamination and its predictor factors (i.e. the type of food vendors) was considered.

5.2 RESULTS

5.2.1 Type of food

Table 5.1 summarises the many dish varieties of food sold in street food premises. These include dishes from meat, poultry, fishery and other types of foods. In this study, the type of food was classified based on the primary ingredient of dish. The foods may be sold as simple dishes or act as ingredients in complicated meals, which require preparation and storage. The complexity of preparation and many kinds of material used can influence the growth of pathogenic bacteria or act as sources of these organisms.

Table 5.1 Ready-to-eat street food menu sold in food premises

Fruit & Vegetable	**Mix food**
• Rujak (cut fruit with peanut sauce) • Various fruit juice • Fruit Soup (cut fruit with shaved ice and sweetened condensed milk) • Asinan buah (a pickled fruit) • Kolak (Fruit boiled in water with areca sugar syrup and coconut milk) • Lotek, Karedok, Gado-gado (Vegetable with peanut sauce and topings) • Asinan sayur (a pickled vegetable) • Keripik singkong (bite-size snack crackers made from cassava) • Potato Fries	• Lumpia basah (mix fry of egg and chopped vegetables i.e. bean sprout, bamboo shoots, served with sweet sauce shoots in fresh spring roll. • Seblak (mix fry of egg and macaroni, cheese, meat ball, etc) • Batagor/ Baso tahu (fried or steamed delicacies dressed made from tofu and dough of meat, fish mince with peanut sauce) • Gorengan (deep-fried snack from tapioca dough and deep-fried wheat flour with many kinds base ingredient such as tempeh, tofu, banana, vegetable, sweet potato etc.) • Ambokueh (tofu, meat, vegetable, rice flour, egg with special sauce)
Rice or rice flour based with any kind of dishes	**Pasta/Noodle/Flour**
• Uduk rice (steamed rice cooked in coconut milk dish with many kind traditional Betawi side fried dishes, crackers) • Rames rice (steamed rice with various dishes) • Yellow rice (steamed yellow rice with egg and other dishes, crackers) • Fried rice (steamed rice fried with egg, shredded chicken/ vegetable/seafood, crackers) • Gudeg rice (steam rice with many kinds of traditional Jogjakarta sweet dishes) • Chicken rice porridge • Sumsum porridge (cooking rice flour in coconut milk and served with brown sugar syrup) • Kupat tahu (ketupat[1] with steamed bean sprout and fried tofu in peanut sauce) • Lontong kari (curry meat in coconut milk with rice cake/ketupat, and crackers) • Lontong sayur (vegetable in coconut milk with rice cake/ketupat, shredded chayote, tempeh, tofu, hard-boiled egg, crackers)	• Lomie noodle (a thick noodle soup, combine with water spinach and seafood) • Macaroni, Mie Instant (Instant noodle) • Mie kocok (Noodle with thick soup combine with cow's trotters) • Mie bakso (Noodle soup combine with meatball) • Cilok/Cimol, Cilor, Kue cubit, Bandros, Cakue, Awug, Crepes, Pukis, Cakue (Fried/ steam/oven/boil sweet and savoury dessert dish made from flour) • Sweet Martabak (thick folded pancake with various taste i.e. cheese, chocolate, peanut, jams, banana, green tea) • Savoury Martabak (fried folded large spring roll consist with mixed egg, minced meat, green onion, garlic, onion) • Toast/ steam bread (various taste i.e. peanut, jams, chocolate, cheese) • Takoyaki (Japanese food)

[1] It is a rice cake, made from rice and is wrapped in young coconut leaves woven in a diamond shape, RIANTI, A., NOVENIA, A. E., CHRISTOPHER, A., LESTARI, D. & PARASSIH, E. K. 2018. Ketupat as traditional food of Indonesian culture. *Journal of Ethnic Foods,* 5**,** 4-9.

Table 5.1 Ready-to-eat street food menu sold in food premises (continued)

Fish, meat or poultry	Ice and beverage
• Satay (small cut in skewers of chicken/lamb/beef barbeque with sweet sauce) • Fried/BBQ chicken • Fried/BBQ fish • Bakso (Meatball/ fishball) • Pempek (fish ball/ fish cake with sweet spicy sauce) • Fried/Steam/BBQ seafood • Telur gulung (Egg dish based) • Chicken/Meat Soto (chicken/meat soup with rice/ rice cake/ketupat, and crackers) • Burger, hot dog • Sausage • Kebab	• Ice cream • Es campur (mixed ice which made from combination of shaved iced, coco pandan syrup, sweet condensed milk, young coconut flesh, black grass jelly, fermented cassava, jackfruit, avocado, basil seeds, arenga palm fruit, others topings) • Many various instant beverages ice (milkshakes, soda ice, iced tea) • Es kelapa muda (shaved iced, young coconut flesh, sugar syrup, sweet condensed milk) • Es cendol (a green pulpy dish of rice/sago flour worms with coconut milk and syrup of areca sugar. • Es pisang ijo (green banana ice made from banana covered by dough green coloured, accompanied by cooking sago flour, coconut milk and strawberry syrup)

From the survey the highest percentage of type of food sold in food premises was Pasta/Noodle/Flour group (26%) and followed by Fish, meat and poultry group (23%). While the lowest share was Fruit and vegetable group, seven percent approximately.

Table 5.2 Percentage share of type of food

Type of food	Frequency (%)
Fruit & Vegetable	18 (7)
Mix food	47 (17)
Rice or rice flour based with any kind of dishes	39 (14)
Pasta/Noodle/Flour	71 (26)
Fish, meat or poultry	62 (23)
Ice and beverage	32 (12)

5.2.2 Microbiology contamination

Contamination by *Enterobacteriaceae* on food contact surfaces was determined by Violet Red Bile Glucose (VBRG) agar using the Dip-slide kit as discussed in section 3.5.1.2.2. The data showed (Fig 5.1) that nearly all of the food premises (99.3%) tested positive for *Enterobacteriaceae*. Over one third (35.7%) had very heavy or heavy growth (40 -250 CFU/cm^2). Similarly, over one third (39.4%) had moderate (12 < x < 40 CFU)/cm^2). One quarter had less than 12 CFU/cm^2 (slight, very slight or negative).

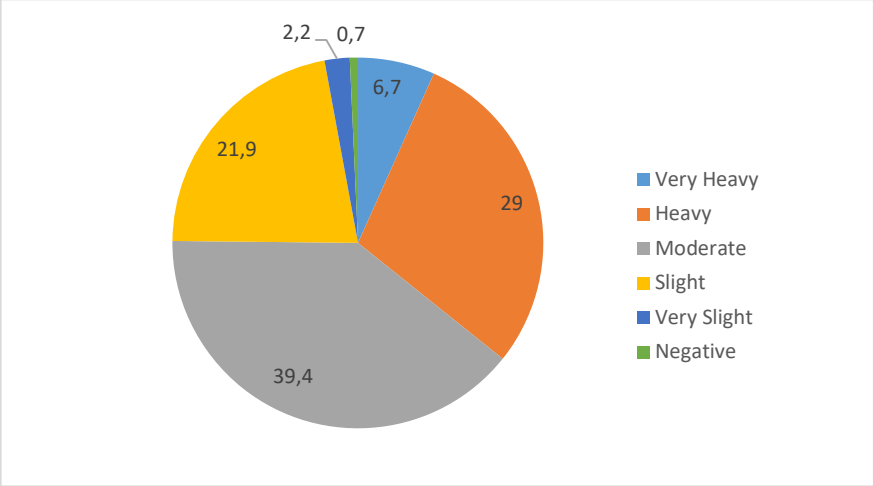


Figure 5.1 *Enterobacteriaceae* contamination level in food premises (%)

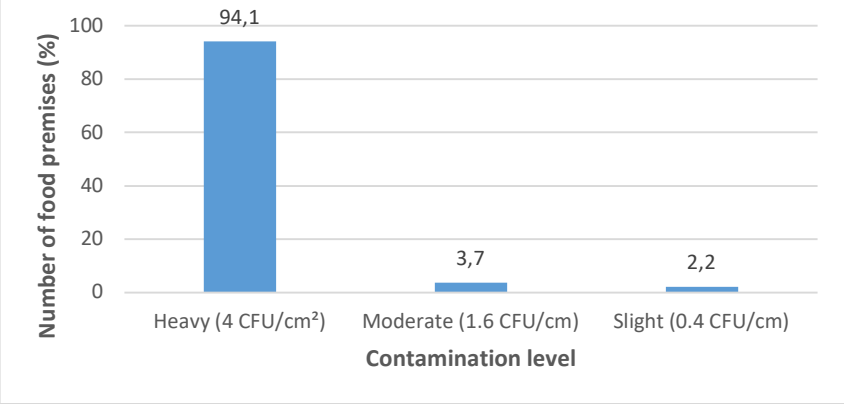


Figure 5.2 TVC contamination level in food premises

The present study showed that Total viable count (TVC) growth level in premises was also high (Fig 5.2). The majority of premises had a heavy (> 4 CFU/cm^2) level of contamination (94.1%).

According to Air Quality Life Index (AQLI) oleh *Energy Policy Institute at the University of Chicago* (EPIC), 80% of about 250 million of Indonesia population is expose by average pollution especially in urban city (Greenstone, 2019). It also confirmed the concentration of particulate matter ($PM_{2.5}$) was 23 μg/m^3 which fails meet WHO fine particulate matter standard (annual mean 10 μg/m^3) . T(Greenstone, 2019). The growth of TVC in food premises might be was influenced by dust, moisture from the atmosphere and the cleanness of surface. If food is contaminated by mould or spoilage bacteria these can which grow in food and cause deterioration. These conditions align with poor practice in food hygiene in reported in Chapter 4. As stated in section 4.2.4 the maximum possible audit score for food hygiene practices was 100.

Using univariate analysis, the level of food hygiene is described in Table 5.3. The food hygiene practice was categorized into three levels based on their score which was poor (<50), adequate (50-70) and excellent (>70).

Table 5.3 Share of food hygiene practice level

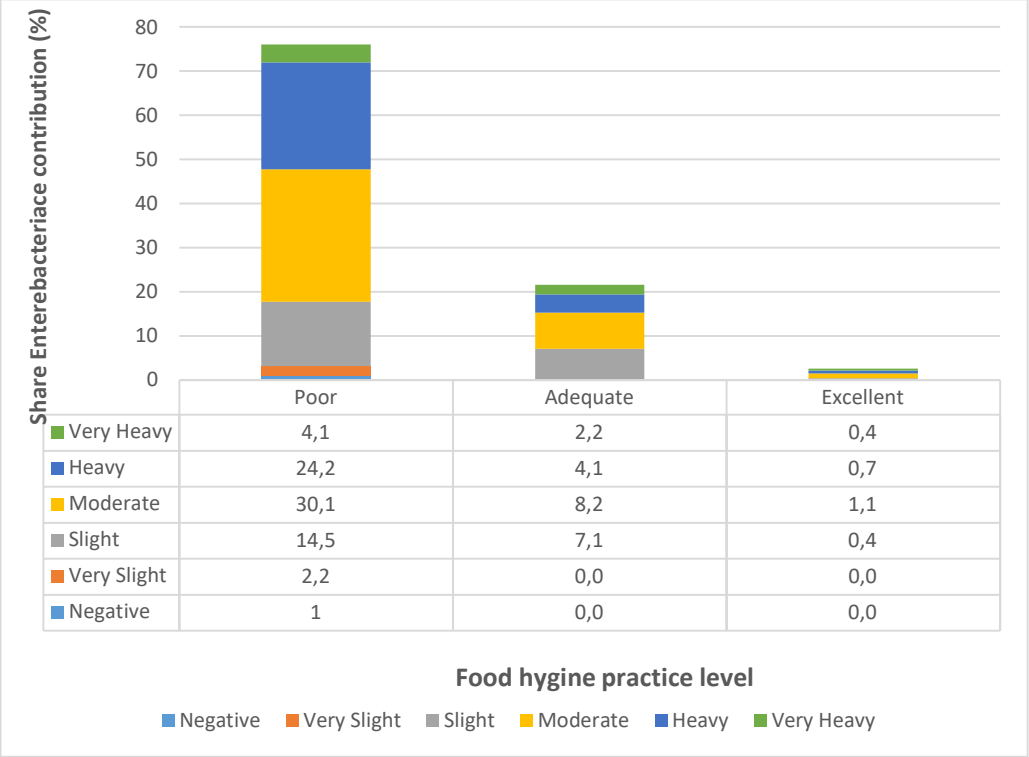
Food hygiene practices level	Frequency (%)
Poor	204 (75.8)
Adequate	58 (21.6)
Excellent	7(2.6)

Because of the type of sampling, for environmental sampling, the data gives broad categories and was used more as qualitative data to give an indication of cross contamination, rather than as quantitative data that could be correlated statistically.

The data in Figure 5.3 shows that premises in the poor hygiene practice group had the highest *Enterobacteriaceae* contamination. Premises scoring in the adequate or excellent

categories for food hygiene practices demonstrated lower rates of environmental contamination. Better food hygiene practise appears to minimize with the levels of *Enterobacteriaceae.*

The total share TVC contamination in poor hygiene practice also shared the most percentage share (75.8%) compares with both adequate and excellent group of food hygiene practice (Fig. 5.4).



	Poor	Adequate	Excellent
Very Heavy	4,1	2,2	0,4
Heavy	24,2	4,1	0,7
Moderate	30,1	8,2	1,1
Slight	14,5	7,1	0,4
Very Slight	2,2	0,0	0,0
Negative	1	0,0	0,0

Figure 5.3 *Enterobacteriaceae* contamination vs food hygiene practice level

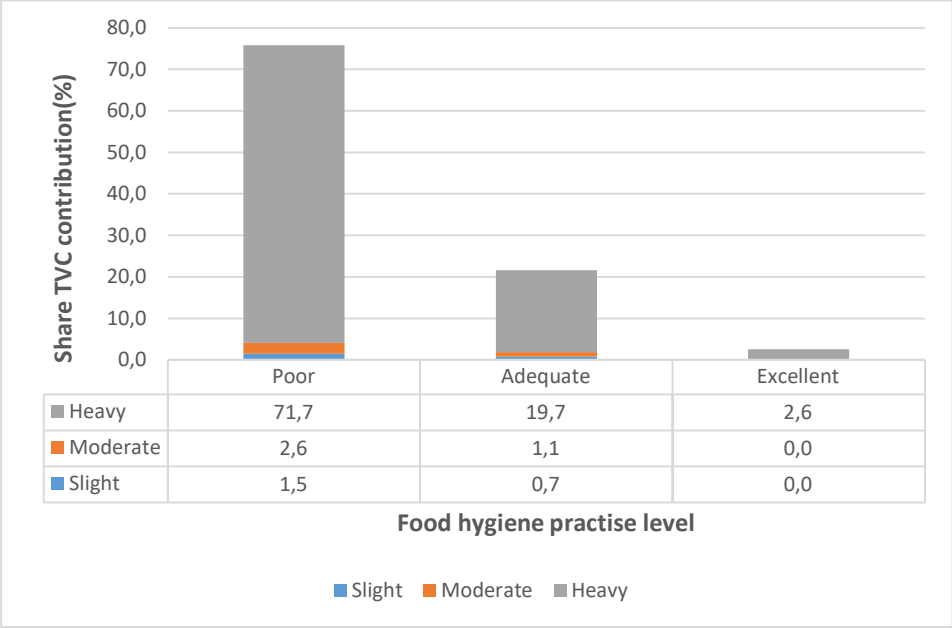


Figure 5.4 TVC Contamination vs food hygiene practice level

5.2.3 The food hygiene practice in food premises

5.2.3.1 Correlation between cross contamination and hygiene & sanitation facility

As explained in section 4.2.4, the food hygiene practices audit had two sections, the first was cross contamination and the second was hygiene and sanitation facilities. In Table 5.4, Spearman's rank correlation used to evaluate correlation between sections of audit sheet. The choice of data analysis is described in Appendix I.

Table 5.4 Correlations between cross contamination and hygiene sanitation facility

Variable(s)	Cross contamination	Hygiene facility
Cross contamination	-	1.000**

**. Correlation is significant at the 0.01 level (2-tailed).

The cross contamination had significant correlation with hygiene and sanitation facility (Table 5.4). It showed coefficient correlation was 1 which means perfect correlation between cross contamination and hygiene facility. It can be confirmed that hygiene sanitation facilities give positive support to cross contamination condition in food

premises. The lack of cross contamination has strong correlation with good hygiene and sanitation facilities condition.

5.2.3.2 Predictor factors of cross contamination

This sub chapter analysed the predictor factors of sections in practices hygiene sections (Cross contamination and hygiene sanitation facility).

By using Spearman correlation analysis, this study has evaluated correlation between practice hygiene sections and food vendors characteristics such as food service, near location, trade position, food handlers type, facility type and food types.

Table 5.5 Spearman correlation in practices hygiene variables based on food vendors characteristics

Practices hygiene	Food service	Near location	Trade position	Food handlers	Type of facilities	Type of food
Cross contamination	.178**	-.092	-.021	.116	.248**	.190**
Hygiene and sanitation	-.043	.031	.13	-.063	-.062	.085

**. Correlation is significant at the 0.01 level (2-tailed).

The result showed that onsite or take away (type of services), the type of facilities of food premises i.e. cart, tent, car/truck, and type of food that sold in food premises had significant relationship ($p<0.01$) with cross contamination on practices food hygiene (see Table 5.5). Even though those food service type, facilities type and food type showed significant relationship the strength of coefficient correlation remained weak between 0.1 - 0.3 (Akoglu, 2018).

In this section, the degree of compliance with cross contamination controls is analysed based on the results described in Table 4.4. With univariate analysis, the data distribution for cross contamination was tested. The cross-contamination section of the audit is classified into five sub sections: Personal hygiene (Q1-Q6), storage (Q7-Q11), pest control (Q12-Q13), utensils (Q14-Q17) and source of water (Q18-Q20) from score Q1 to Q20. In order to do equal treatment for all food premises, the calculation excluded Q16 in utensils sections because it looked at availability of separated chopping board in food premises, which was not needed by all food premises. The calculation also excluded score Q21

because it was only valid for ice and beverage group. The premises could score 0-19 in this section.

The data was tested for distribution and found to be normally distributed and in the acceptable range distribution, (-1, 1) for skewness and (-2, 2) for kurtosis Table 5.6.

Table 5.6 Univariate analysis of cross contamination sections

Cross contamination variable (max score)	Mean	Median	Mode	SD	Coef. of variation	Skewness coef	Kurtosis coef
Personal hygiene (6)	3.04	3	3	0.78	25.66	-0.16	0.88
Storage (5)	3.98	4	4	1.02	25.63	-0.88	0.11
Pest Control (2)	0.96	1	1	0.52	54.17	-0.05	0.68
Utensils (3)	2.22	2	2	0.64	28.83	-0.25	-0.69
Source of water (3)	2.14	2	3	0.83	38.79	-0.25	-1.50

The highest coefficient variation data was found in pest control section while personal hygiene and storage were the lowest.

This study also analysed factors which have been shown to be related with cross contamination practices and the compliance scores for five cross contamination sections of the audit. These factors include food services, location of vendors, type of facility, type of food sold, and location in the city, trade position, and type of food handlers. To carry out this evaluation the compliance score was standardised to one. One is the maximum possible compliance score from each cross-contamination variable showing the highest compliance of food hygiene practices. The results are shown in Figure 5.5.

Comparing the type of food services with compliance in cross contamination, the score shows that onsite service has a lower compliance score in utensil compared to take away services (Figure 5.5a). The onsite services vendors used their utensils for both serving and preparing food. Washing between use was not possible if the source of water and washing detergent was not available. In case of location, vendors that sold their food near traditional market obtained the weakest compliance score. Move or stay position for selling the street food or trade did not affect the premises cross contamination compliance score (Figure 5.5b).

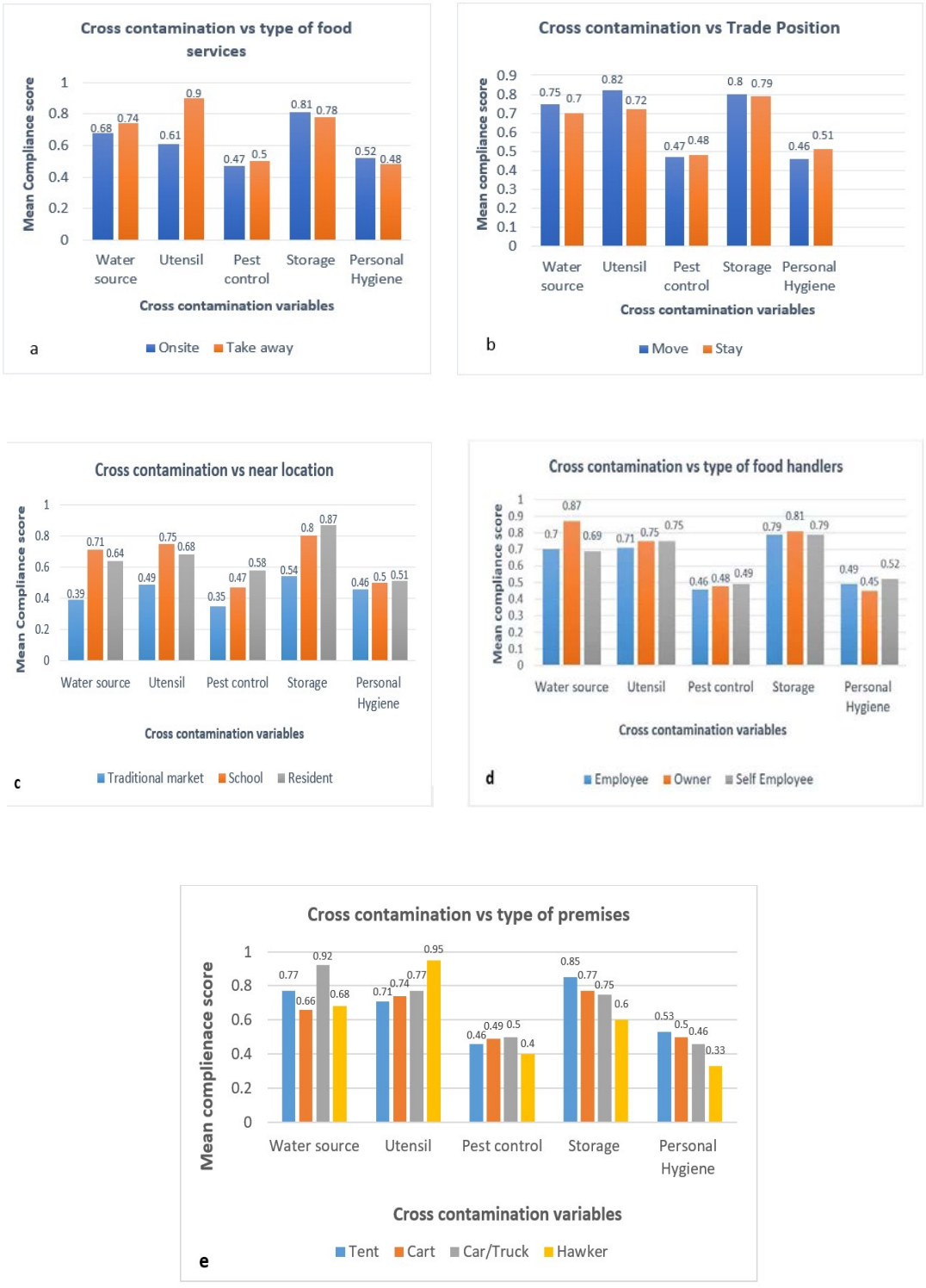


Figure 5.5 Mean compliance score of cross contamination variables related to street food vendors' characteristics; a – type of food service, b -trade position, c – near location, d – type of food handlers, e.– type of premises.

The limited access to facilities influenced the behaviour of food handlers in food hygiene practice, as they were unable to access water and sanitation (Figure 5.5c).

However, considering the type of food handlers showed that owners had a better score in compliance with source of water. While for pest control and personal hygiene, it seems all food handlers did not aware to address this issue (Figure 5.5d).

In type of premises, hawkers have the weakest score in every aspect of cross contamination variable except for utensil, water source (Figure 5.5e). This is because the hawker usually sold ready to eat food without any preparation, so their utensil was less used compared to food handlers in the tent or cart. However, Car/Truck has highest compliance score in source of water variable.

Bivariate analysis for factor characteristics (i.e. food services, its location, trade position, type of food handlers, and type of premises) that might influence the routine in food hygiene practice especially for avoiding cross contamination was observed by Spearman correlation to find factors of food vendors characteristics that might have a correlation with cross contamination.

Table 5.7 Spearman correlation on cross contamination variables based on food vendors characteristics

Cross contamination variables	Food service	Trade position	Near location	Food handlers	Type of premises
Personal hygiene	-.030	-.062	-.014	-.001	.095
Storage	-.031	.104	-.030	-.128*	-.056
Pest Control	-.017	.033	-.046	-.079	-.029
Utensil	-.031	.034	.001	-.116	-.017
Source of water	-.010	-.053	.097	.030	.007

* Correlation is significant at the 0.05 level (2-tailed).

The data showed there was no significant correlation between cross contamination variables and food vendor's characteristics except storage and type of food handlers showed low significant correlation (Table 5.7). Location plays important rule, the mean score for storage in traditional market has lower score compare to near resident and school (Figure 5.5 c)

5.3 Discussion

The high contamination levels in the premises for *Enterobacteriaceae* and TVC in this study indicates improper hygiene practices. *Enterobacteriaceae* family includes pathogens such as *Salmonella* and *Escherichia coli,* and the presence of this family in food premise is considered to show improper hygiene process in food preparation especially in ready to eat food(FSA, 2015, HPA, 2009). The high presence of the *Enterobacteriaceae* family may increase risk food borne illness. The World Health Organization identifies foodborne illness from ready-to-eat food supplied by street food vendors as a major public health problem because of the unhygienic conditions from preparation to service. The TVC contamination level in this study was similar to the contamination with the *Enterobacteriaceae* family. Apart from being indicators of poor hygiene and poor cleaning, the existence of non-pathogenic bacteria can affect presence of pathogens. *E. coli* O157:H7 apparently improved colonisation capability on a surface if other microorganisms were present (Verran J, 2001).

However, mostly premises with better food hygiene practices showed less contamination with *Enterobacteriaceae* (Fig 5.3) and TCV (Fig 5.4) in these results. A study in Malaysia confirmed positive *E.Coli* contamination was influenced by storage, manner of serving the food, the building construction of the food premises, hygiene sanitation and personal hygiene of food handlers(J Rohmah et al, 2018). Improper personal hygiene and lack of facilities to encourage hygiene and sanitation practice can lead to microbial contamination. The absence of hygiene facility support for cleaning activities influenced poor cleaning and poor hand washing practise that may lead to cross contamination of ready to eat food(Todd et al., 2010b, Todd et al., 2010a). Animals can also act as a vehicle for cross contamination if they are allowed contact with surfaces and equipment (Heredia and García, 2018). A study by Todd *et.al* (2007) confirmed that the following factors are all associated with incidence of food borne illness:

- infected worker who work with bare hand contact followed by failure to hand washing properly,
- insufficient of cleaning process or preparation equipment or utensil,
- cross contamination by contaminated of raw ingredients and

- temperature abuse(Todd et al., 2007).

A study by Rane (2011) defined that the major source contributing to microbial contamination was the place of preparation.

The lack of food hygiene practice in Indonesia also confirmed by others In a study of the implementation of food hygiene practice in food stalls serving on an Indonesian campus, the premises did not meet the requirements of the regulation (Hasyim, 2014). The study (Table 5.4) showed that there was a significant correlation between cross contamination and the hygiene and sanitation facilities. Other study also have shown that street vendor premises lack access to potable water, toilet and sanitation facilities and operate in poor hygienic conditions (Ghosh et al., 2007). Insufficient food handling, improper waste disposal, bacteria contamination from dirty dish washing water or other sources onto utensils, unclean and unauthorized food additives in raw materials, mishandling time and temperature of cooked foods and the lack of personal hygiene of vendors were all considered to contribute to poor quality and unsafe food (Rane, 2011). Inadequate personal hygiene such as poor hand washing, and lack of available sanitation may contribute to food contamination. Proper hand-washing with soap and drying are effective way to reduce microbial contamination (Curtis and Cairncross, 2003, Todd et al., 2010b).

In Figure 5.3 and Figure 5.4 showed that respondents who has poor practices hygiene has higher percentage of contamination (very heavy, heavy and moderate) on Enterobacteriaceae (58.4.1%) and (74.3%) TVC contamination rather than excellent group (2.2.% on Enterobacteriaceae and 2.6% on TVC). However, this study also found negative result for Enterobacteriaceae contamination in small percentage (1%) for respondent who has poor practices hygiene. It might be happened because of human error when conducting sampling or culture an agar or might be the agar did not work properly.

Other studies have observed that the delivery of good food hygiene practice can be influenced by several factors such as the type of food, type of food facility, type of vendors (employment) and location of the premises. Food vendors who sold in city which had good facilities showed high scores in hygiene equipment and food preparation management

(Trafialek et al., 2018). Food vendors in Bandung who sold their food near traditional market had the lowest cross contamination scores than other locations (Fig 5.5).

This may be because the environment of traditional market has no support to encourage good sanitation. In Indonesia, the traditional market has insufficient sanitation facilities (Tumbuan 2006). The WHO stated that the market should provide access for proper hygiene facilities and adequate basic infrastructure to promote sanitation such as toilets and hand washing(WHO, 2006).

The Spearman correlation results in Table 5.5 showed cross contamination has significant relationship with hygiene and sanitation facility. Water supply, sanitation, and hygiene and health are closely linked. Inadequate quantities or complete lack of safe water, lack of hygiene and sanitation facilities, and poor practise hygiene can cause diarrhoea which might lead consumers to die as a result of pathogenic organism in the food (Cairncross, 2006). Promotion of water supply, sanitation, hygiene and health was also the step for reducing child mortality rate that mention in one of Millennium Development Goals categorized (Bank, 2003).

A study by Trafialek (2018) evaluated the correlation between food hygiene sanitation practices and street food vendors characteristics such as type of facility, type of food, type of employee (number of employee) and its location.

In this study, Table 5.5, cross contamination showed significant correlation with food services, facility type, and food type. However, when the cross-contamination breakdown into several items (personal hygiene, storage, pest control, utensil and source of water), this study observed only storage which had significant relationship with type of food handlers (Table 5.7). Trafialek et.al (2018) confirmed that mobile cart street food vendor had lower compliance scores than kiosks, food trucks and restaurant for water supply, waste management (Trafialek et al., 2018). The data from Bandung street food vendors was similar in that hawkers and cart mobiles had the lowest score on source of water. Hawkers also had lower scores on personal hygiene and storage. In this study, self-employed and employee had similar score but when the food premises is run by the owner,

it has better score in source of water. Trafilaek et.al (2018) also showed that premises with one employee had lower scores than those with 2 or more employee.

This showed that hygiene and sanitation facility need to be addressed as the contributory factor for reducing microbiological contamination. There is high potential for reducing the risk of food borne disease by implementing a realistic approach such as providing safe water storage/supply, hand washing with soap, using disinfectant and sanitizing facilities. Hygiene education can play a role in ensuring correct implementation (Quick et al., 1999, Bank, 2003). These interventions should be a priority for public health policy to reduce and control the disease burden. The development of water and sanitation is also another intervention which needs high priority. Supporting hygiene facilities in street food trade should be emphasized for reducing potential risk of food illness (WHO, 1999, Vollaard et al., 2004). In addition, inexpensive interventions can be used such as education in hygiene practise, hygiene advertising, regulation and monitoring of water and sanitation (Alba et al., 2016).

5.4 Conclusion

This study has shown there was a high level of microbial contamination in many of the participating street food premises. The microbial contamination is influenced by street vendor practices. This result aligned with previous results (Chapter 4) which showed the limitation of the practices hygiene in both personal hygiene and sanitation facilities. The non-compliance of cross contamination has an association with the lack of hygiene and sanitation facilities (Table 5.4). Relevant interventions could reduce microbial contamination that results from improper practice in food hygiene. This may boost food handlers' performance in food hygiene practise. However, lack of hygiene and sanitation facilities cannot be addressed by food business itself. It can be solved by collaboration between food business, government and stakeholders. The result also showed that street vendors need support from local government in this area. The highest need of the street food vendors was having a proper place to trade with sustained facilities providing clean water and sanitation.

Chapter 6 - Evaluation of intervention training for food handlers

6.1 Overview

In Chapter 4, the results identified a lack of knowledge in particular areas of food safety and poor hygiene practice in a sample of 269 street food vendors in Bandung City, Indonesia. The poor food hygiene condition in food premises was also confirmed by the high bacterial contamination that was presented in Chapter 5.

This chapter evaluates the effect of bespoke food hygiene training on the knowledge, attitude and practise (KAP) and the microbial count of food contact surface in the street food vendors. The intervention used a theoretical and active learning approach, and the material of training was designed based on the results in Chapter 4.

The KAP of participants and microbial contamination after food hygiene training were evaluated and compared to the results gathered before the training. There were two groups of participants; the first group had already taken basic hygiene training before the intervention, the second had had none.

Food safety and health education of food handlers can be an effective strategy to reduce try and reduce suffering and economic losses caused by foodborne illness (WHO, 2000b, Seaman and Eves, 2006). Several studies have confirmed that training in food hygiene can improve knowledge, and attitude of food handlers who may then improve their food handling practise (Choudhury et al., 2011, Roger, 1994, Lynch, 2003, Lian Tan et al., 2013).

This chapter discusses whether there is any improvement after an intervention. The impact of the intervention and of previous training was evaluated by assessing the knowledge, attitude, and practices of the sample group before and after the intervention including microbiological contamination.

6.2 Research design

The research design plan is presented in Figure 6.1. The sample population of 269 street food vendors were recruited from the total number of vendors (272) in one district of Bandung City during August 2016. All participants were volunteers. All participants were visited during the period August 2016 – January 2017 (first period) and an evaluation made of their food hygiene knowledge, attitude, and practices to set a baseline (see Chapter 4, Table 4.1). The volunteers from the baseline study described in Chapter 4 were then divided into two groups. The first group (1) had already had some form of food hygiene training at the time of recruitment (n= 47) and the second group (2) (n=222) had no formal training. Each group was further subdivided. Group 1b (n=20) and 2b (n=25) were subjected to the bespoke training intervention (in Figure 6.1). The material of the training intervention is described in Appendix V and on the enclosed CD.

Groups 1a and 2a are taken from the group 1 and group 2 were not giving the intervention and acted as control groups. The six people did not joint in group 2a as a control (n=191). After the intervention (second period) which held in September 2017 – November 2017, the KAP and microbial sampling of food contact surface of the groups was re-evaluated.

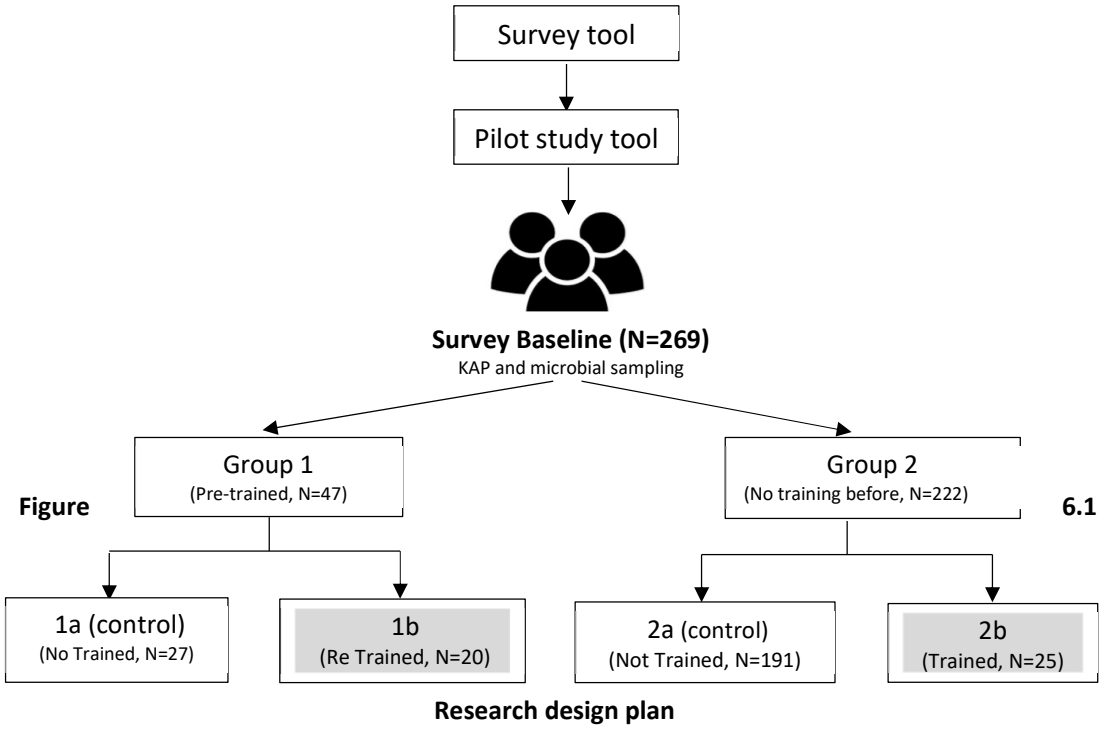


Figure 6.1 Research design plan

6.3. Result

6.3.1 Characteristics of Respondents

The characteristics of the control and trained (intervention) groups are shown in Table 6.1 and Table 6.2. In general, the groups were well matched, except for education level and age (Table 6.1 and Table 6.2). The respondents can be characterised as being mainly male, of mature age, full time workers and had $\geq$ 10 years' length of working business. The demographic of respondent was analysed by T-test bivariate analysis (Table 6.1 and Table 6.2).

Table 6.1 Demographic characteristics of respondents group 1

Category		N (%)		
		Control Group (N=27)	Trained Group (N=20)	p value
Gender	Male	19(70)	7(35)	0.460
	Female	8(30)	13(65)	
Age (year)	Teen (15-24)	2(7)	(-)	0.007**
	Young people (25-40)	11(41)	5(25)	
	Mature (41-60)	14(52)	15(75)	
Education Level (years)	$\leq$ 6	10(37)	1(5)	0.025*
	9	6(22)	4(20)	
	$\geq$ 12	11(41)	15(75)	
Having training	Having	27 (100)	20(100)	-
	No having	-	-	
Length of working	< 1 year	2(7)	1(5)	0.685
	1 - 3 years	3(11)	5(25)	
	3 years < x < 5 years	4(15)	1(5)	
	5 years < x < 10 years	7(26)	7(35)	
	$\geq$ 10 years	11(41)	6(30)	
Job type	Part time	-	-	-
	Full time	27(100)	20(100)	

Table 6.2 Demographic characteristics of respondents group 2

Category		N (%) Control Group (N=191)	Trained Group (N=25)	p value
Gender	Male	153(80)	21(84)	0.043
	Female	38(20)	4(16)	
Age (year)	Teen (15-24)	29(15)	11(44)	0.001**
	Young people (25-40)	78(40)	8(32)	
	Mature (41-60)	84(43)	6(24)	
Education Level (years)	≤ 6	61(32)	2(8)	0.028*
	9	73(38)	15(60)	
	≥ 12	58(30)	8(32)	
Having training	Having		25(100)	-
	No having	191 (100)	-	
Length of working	< 1 year	29(15)	10(40)	0.077
	1 - 3 years	32(17)	3(12)	
	3 years < x < 5 years	24(13)	3(12)	
	5 years < x < 10 years	36(19)	1(4)	
	≥ 10 years	70(36)	8(32)	
Job type	Part time	-	-	-
	Full time	191(100)	25(100)	

6.3.2 Comparison of KAP food handlers

The participants were divided into two different groups. The first group (Group 1) was the group who had been pre-trained by government or non-government organizations. The second group (Group 2) was the group who had no training before this intervention. Both groups were offered the same food hygiene training intervention as part of this study (Fig 6.1). Using Mann Whitney analysis, the findings demonstrate that those respondents who were originally trained and then also participated in the retraining (intervention) (group 1b) had higher scores in practise (median of 64) than the intervention group with no previous training (group 2b) (median practice score 47). However, the groups undergoing the intervention both exhibited the same final scores for knowledge (median score 9) and attitude (median score 47) (see Table.6.3). Comparing the post intervention scores (group 1 b and 2b) with those of the control groups (group 1a and 1b), indicates that the intervention training has a significant impact for all three aspects, KAP (see Table 6.3).

Overall food safety knowledge after training for both groups improved and was excellent, (Median 9 of 10). The respondents who already had received previous training (Group 1) had the highest score on practise (63.89), while the group that had not received any food hygiene training had lowest scores (42.85). Group 1b and Group 2b, both of which participated in the intervention had the same final median score for attitude, 47 out of 50.

Table 6.3 Comparison of median Knowledge, Attitude and Practise between control and intervention

Group	Variables	Control (a)		Intervention (b)		p-value
		Median	n	Median	n	
Group 1	Knowledge	7	27	9	20	0.001**
	Attitude	42	27	47	20	0.001**
	Practice	46.94	27	63.89	20	0.017*
Group 2	Knowledge	7	191	9	25	0.001**
	Attitude	44	191	47	25	0.001**
	Practice	42.85	191	46.94	25	0.0046*

* p < 0.05, ** p < 0.01, Mann Whitney test

Table 6.4, using Wilcoxson rank paired test, compares the KAP score in total for intervention groups (1b and 2b) and confirms the significant improvement (p < 0.01) of knowledge in both groups after having training. The attitude of respondents who had training also improved (p<0.01). This table also shows that those respondents who had pre-training (group 1) have better score in knowledge (7 out of 10) compared to those (Group 2) who did not already have training (6 out of 10).

Table 6.4 Comparison of median Knowledge, Attitude and Practise Before and after training for intervention group

Variables	Group 1b			Group 2b		
	Median	n	p-value	Median	n	p-value
Knowledge						
After	9	20	0.001**	9	25	0.001**
Before	7	20		6	25	
Different (%)	3(30)			3 (30)		
Attitude			0.001**			
After	47	20		47	25	0.001**
Before	44	20		44	25	
Different (%)	3(6)			3(6)		
Practice						
After	63.89	20	0.009*	46.94	25	0.056
Before	62.04	20		44.90	25	
Different (%)	1.85(2)			2.04(2)		

* p < 0.05, ** p < 0.01, Wilcoxson rank paired test

Even when both groups had received the intervention, group 1 had higher score (62.04) than group 2 (44.90) in hygiene practice. The data shows that having training repeated can result in improved hygiene practices. It was showed by significant relationship between practice and median score after before training ($p<0.05$).

In the baseline study respondents answered very poorly on aspects of temperature control (table 4.4). Based on Wilcoxson rank paired test, after the intervention, there was a significant difference in respondents answers regarding temperature ($p < 0.01$), and it was the main area of improvement in knowledge (see Table 6.5).

Table 6.5 Result of paired sample respondents'-test for correct answer on knowledge for pre-post food hygiene training for intervention group

Hygiene aspects	Group 1b n=20			Group 2b n=25		
	Before training (%), n = 20	After training (%),	p-value	Before training (%), n = 20	After training (%),	p-value
Temperature						
What is the correct temperature for chillier?	0(0)	20(100)	0.001**	0(0)	25(100)	0.001**
What is the correct temperature for the freezer?	3(15)	20(100)	0.001**	2(8)	25(100)	0.001**

* $p < 0.05$, ** $p < 0.01$, Wilcoxson rank paired test

Both intervention groups (1b and 2b) showed significant improvement in attitude ($p<0.01$). The main change in attitude was on use of safer materials and ingredient. Their response was shown in Table 6.6 (Wilcoxson rank paired test).

Table 6.6 Result of paired sample respondents'-test on positive response of attitude for pre-post food hygiene training for intervention group

Attitude	Group 1b, n=20			Group 2b, n=25		
	Positive response, n (%)[1]		p-value	Positive response, n (%)[1]		p-value
	Before	After		Before	After	
The use of safer material ingredient from approved/ trusted supplier is not necessary (reverse scored)	23(92)	25(100)	0.01*	1(5)	19(95)	0.001**

[1]Respondent were classified having positive attitude if they score response as 4,5 in 5 scale question
* $p < 0.05$, ** $p < 0.01$, Wilcoxson rank paired test

For food hygiene practise, observations were made about cross contamination including personal hygiene, food storage, pest control, utensil, and source of water, as well as hygiene and sanitation facilities (toilet, sink, and waste), using the same audit sheet as for the baseline study.

6.3.3 Microbiological evaluation of surfaces

The microbiological contamination on food contact surfaces can be used as an indicator of personal hygiene and cross contamination.

As shown in Figure 6.2, the contamination levels on food contact surfaces for *Enterobacteriaceae* and TVC in the premises after the intervention showed the same distribution.

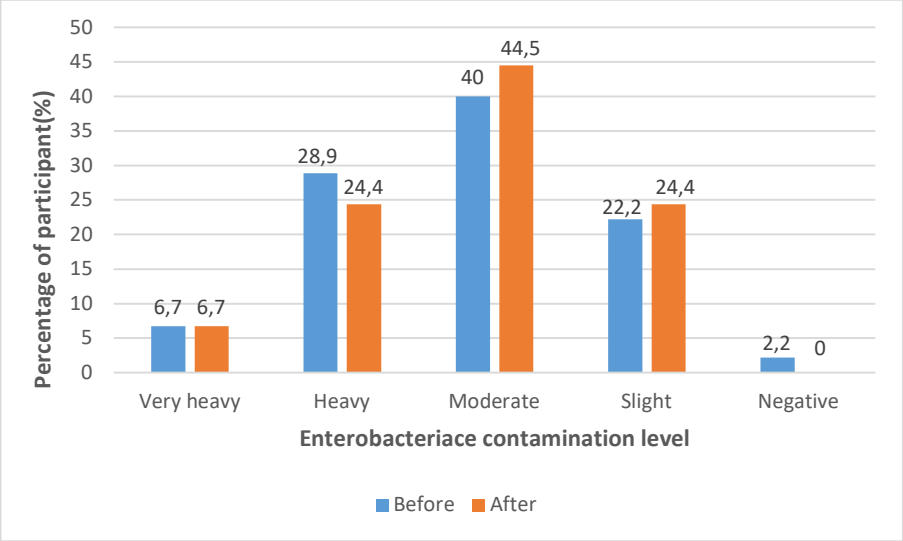


Figure 6.2 *Enterobacteriaceae* contamination level before and after intervention

In Figure 6.3, the results for TVC do not show the same distribution as the *Enterobacteriaceae* results. The decline of percentage contamination after intervention showed in heavy level from 86.7% to 73.3%. However, while *Enterobacteriaceae* are accepted indicators of poor hygiene and poor cleaning which increase the risk of cross contamination on ready to eat foods, the TVC is merely an indicator of the total number of

mesophilic bacteria which have been collected by the contact plate and do not indicate any particular risk for public health.

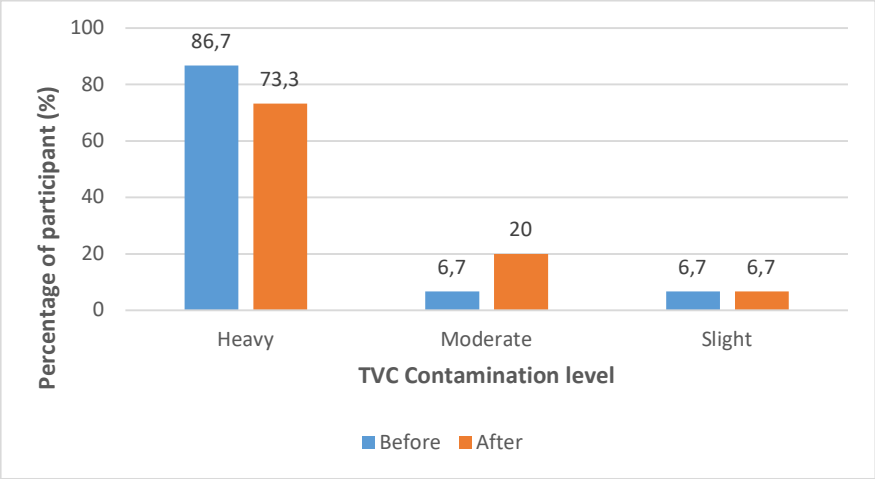


Figure 6.3 TVC contamination level before and after intervention

6.4 Discussion

Several studies report on the implementation of food handler training programs in various countries and discuss the implications (Ehiri et al., 1997, Ehiri and Morris, 1996, Campbell et al., 1998, Capunzo et al., 2005, Lynch, 2003, da Cunha et al., 2014). In this study, the results of the longitudinal study with the street food vendors in Bandung support the principle that conducting good training for food handlers can positively impact on hygiene, since its findings confirm that the groups receiving the training intervention had significant improvements in critical aspects. In UK and European countries food handlers are required by law (Regulation EC 852/2004) to be trained commensurate with their responsibilities (Seaman and Eves, 2006). In United Stated, adequate training for food handlers is considered essential for combating foodborne illness. The training is evaluated and standardized. Many of the States in US have turned to mandatory certification(Almanza, 2004). Food hygiene training plays an important role for promoting food safety.

The effectiveness of food hygiene training was confirmed in this study in Indonesia, where the KAP of the intervention groups (1b and 2b) showed significant improvement by comparison with the control groups (1a and 2a) as shown in Table 6.3 ($p < 0.01$ and $p <$

0.05 respectively). Periodical training is desirable for ensuring the food hygiene practise is implemented constantly. In this study, the training intervention was conducted by giving theoretical aspects in an accessible manner (using pictures, for example, as well as discussion) and practical demonstration.

Consistent with this study, the active learning method (training with behaviour modelling or hands-on demonstration) is considered to have better results than less active learning method or formal lectures (Frese, 1994). A study in Brazil showed that participants after training had improved knowledge but did not differ in attitude and practise. It also confirmed that food training only based on theoretical aspects is not correlated with improved attitude and practise. Training seems consistently to be an effective tool for improving knowledge(da Cunha et al., 2014). Rennie (1995) supported the idea that training may increase the knowledge level but a positive change in food handling behaviour does not always follow (Rennie, 1995). Another study in Korea also showed the significant improvement in knowledge after the training intervention but not improvements of practise (Park et al., 2010). Many authors mentioned the limited effectiveness of training and the need for the food hygiene training model and its delivery to bridge knowledge to attitude and practise as a fundamental part of an approach to food safety control (da Cunha et al., 2014, Seaman, 2010, Mortlock et al., 2000, Ehiri and Morris, 1996, Egan and et.al, 2007). The intervention used in this study was carefully designed to bridge this gap and the significant improvements in median scores of the target groups demonstrate its success.

In Table 6.4, the group who had intervention training (group b) showed improved knowledge, attitude practices score compared to the control (group a). The use of social cognition theory such as theory of planned behaviour and theory of reasoned action in designing interventions can help improve the efficacy of food hygiene training (Ajzen, 1991, Mullan and Wong, 2010, Seaman, 2010). A study by Soares et.al (2013) confirmed that food-training programs based on theoretical as well as practical activities assist food handlers to convert information into practice. The sources of training, certification, and experience were found to significantly affect the level of food safety knowledge (Lynch, 2003).

The score after and before training, in Table 6.5, confirmed the group who had more training have better result rather than group who just received one training session. The refresher course or retraining and long term reinforcement on good food handling behaviour has a positive influence on knowledge and practise of food handlers(Soon, 2012).

The microbial contamination results did not show as measurable an improvement after the intervention as the KAP. Although there was a smaller proportion of premises in the 'heavy' and "moderate" contamination category for *Enterobacteriaceae*, it was still nearly three quarters of the sample group (69%). This might be a limitation of the training intervention which did not focus on using disinfectants in the training material. Other researchers report that the success of microbiological reductions on food contact surfaces and utensils after food safety training and instruction was associated with practical lessons on using disinfection which let the handler put into practice the knowledge acquired in the theoretical part (Soares et al., 2013). This could be recommended as an additional short training intervention for the sample group.

The lack of hygiene and sanitation facilities also can contribute to this problem. One of essential requirements suggested by WHO was hygiene and sanitation facilities which provided a safe water source to allow proper cleaning activities (WHO, 2005, WHO, 1996). Good cleaning procedure, including a disinfectant function will help to reduce numbers of pathogen below dangerous level. In addition, the surface condition of contact material influences cleaning procedure and effectiveness.

A defective surface i.e. pores, pits, welds will trap material. The kind of food material will affect the growth of survival bacteria. The presence of non-pathogenic bacteria was found to support the pathogen, *E. coli O157:H7*, to better colonise a surface. This aspect should also be included in the training design, with practical lessons on how to clean the food premises and its impact on microbial tests should be provided (Verran J, 2001)

Although the refresher course or sustained periodical training has a good impact on food handlers, there are other factors influencing food handler's motivation that should be addressed to ensure better food safety compliance. A study in Brazil showed that Brazilian

legislation motivates food handlers to undergo training only for certification. Nonetheless, food safety laws should not only require certification but also enable the establishment of policies to monitor and ensure the adequacy of food services(da Cunha et al., 2014). A study in Scotland that investigated the efficacy of food hygiene training confirmed no significant improvements in pre-course knowledge on a number of crucial aspects of food safety were observed after training. Its findings highlight that the provision of information on its own does not always transform into positive attitudes and behaviours (Ehiri et al., 1997).

A study in the United Stated evaluated the food handlers training (FHT) by comparing rates of total and critical violations from routine inspection before and after the implementation of FHT programs. The result confirmed even though small changes occurred on food handlers' violations compare to a control group, the respondents who accomplished FHT had better inspection score than those without. The authors recommend improved training method and qualitative study should be developed (Averett et al., 2011).

Training cannot stand alone but as part of an overall infrastructure for effective food safety control (Ehiri et al., 1997). Motivation factors and food handlers beliefs should be investigated to aid the development and delivery of better food hygiene training methods (Seaman and Eves, 2006). A study in 2010 confirmed that characteristic on socio dempgraphic such as was a factor that influence their response to various type of motivations such as internal motivations, communication, reward-punishment, and resources to motivate food handlers(Ellis et al., 2010). Other study also confirmed the finding that food handler has several motivators (i.e. avoid cross contamination, not harming consumer, required by law) to do their food safety practice. However there was a barrier on their safe food handling practices such as lack of knowledge, no habit, did not have knowledge on consequence of following safe food handling practices. The finding suggested to promote a work place culture and management need to be aware the motivator and address the barrier(Arendt, 2015). A study in Spain confirmed the value of periodic visual supervision on hygienic practices and microbiological surveillance of surfaces which are high risk for cross-contamination. These actions can contribute valuable information for improving the knowledge, attitudes and practices of food handlers

(Garayoa et al., 2017). Various public health interventions have been suggested and can be implemented, such as routine inspection of food premises; applied food hygiene training for food handlers which may improve practise as well as knowledge; and increased public knowledge of food safety by selected community-based education programs. This may exert consumer pressure on food handlers to maintain high standards. (Campbell et al., 1998). The impact of these interventions is difficult to evaluate, as carrying out controlled studies in active food premises can be problematic. Although most counties carry out routine premises' inspections, the impact on food borne illness is difficult to establish, as is an appropriate inspection frequency. Robust research determining an ideal frequency is not available but Mathias et al (1995) suggest that the inspection interval for hospitality and catering should be no longer than a 12-month interval. They found this frequency could be linked to preventing the violation score from worsening (Mathias, 1995).

The result also showed that interventions did not have much any impact on the microbiological cleanness of surfaces, it could be caused by lack of hygiene and sanitation facilities because the result confirmed intervention can improve knowledge and atitude significantly while in practise the condition was seem unchanged or still has poor practice. A study in Brazil confirmed the improvement in hygiene sanitation facility such as use alcohol 70%, moving of lavatories location, the use of bactericide soap that combined with weekly monitoring and implemented of the internal program, were contributed the most to the reduction of the microbial contamination (Jesus et al., 2016).

In UK, the Food Standard Agency issued legislation, which specified the food safety requirements for food business operators to ensure compliance. The details are based on EU legislation as UK is still a member state and must implement the relevant regulations. However, the FSA, as the national competent authority, is ultimately responsible for ensuring compliance. There is compliance strategy from informal approach like education and advice/consultation for encouraging food business to comply and also law enforcement by prosecution or closure of the business if it was worst happening (Imminent risk to health). However, there are various barriers to compliance of food safety legislation in SME such as lack of motivation, lack of management system, lack of awareness and knowledge, lack of trust in inspectors, lack of time and money (Yapp and Fairman, 2006).

SMEs behaviour was driven by regulation requirements and business performance(Williamson et al., 2006). A previous study in 1995 also stated that legislative requirement, industrial standard compliance, environmental protection, insurance requirement and customer pressure were the main factors to motivate improvement in SME compliance (Hutchinson & Hutchinson, 1995 in Yapp and Fairman, 2006).

6.5 Conclusion

In conclusion, food hygiene training with demonstration is a satisfactory method for delivering knowledge which appears to also improve attitude and practice. The respondents who had this intervention (Group 1b and 2b) had better KAP than those who did not have the training. The refresher training or an update training is considered to help to maintain better performance. Group 1b, who had previous training and for whom the intervention was refresher training had the highest good practice score (median 64) of any group and a significantly higher practice score ($p< 0.05$) than the group with only a single training intervention (group 2b). Training is a part of food safety strategies that needs to be accompanied by other ways to improve and sustain food hygiene standards in small businesses such as street food vendors. This will also help for reducing the foodborne illness. The use of cleaning and disinfectant liquid is important to reduce microbial contamination and enhance the poor hygiene practise condition. Training specific to this aspect of compliance should be developed for the target group. The development of appropriate sanitation infrastructures (access to water, drainage and sanitation) should be considered to assist in reducing cross contamination.

Chapter 7 –Opportunity and Challenges on food safety in Indonesia: Government and stakeholders' perspectives

7.1 Overview

Ensuring effective compliance with rules and regulation is a vital aspect for forming a well-functioning society and belief in government. Regulatory enforcement plays an important role in public health and other essential public goals. Inspections are one of the most important ways to enforce regulations and to ensure regulatory compliance (OECD, 2014). Enforcement policy clarifies how food law is enforced by a food authority and gives consequences for non-compliance. The purpose of food control systems and enforcement is to ensure that food sold in the market is safe and meets with food law requirement. In this way, the government helps to protect public health. Qualitative study with inductive approach is a useful tool to evaluate the situation and offer evidence to give new insight for policy makers (Thomspon S, 2017).

To understand the conditions that created the findings in Chapter 4, 5, and 6, it is necessary to explore the performance of central government and local government for controlling food safety in Indonesia. It can be observed from the findings in chapter 4 that knowledge, attitude and practices of food handlers remained low. The poor practice was confirmed by high microbial contamination in food premises as defined in Chapter 5. The safety and quality of street food is a crucial problem, especially for microbiological contamination where poor preparation practices may increase the contamination levels (Rane, 2011). Moreover, the absence for hygiene and sanitation facilities was also identified.

It is hard to make major improvements in food hygiene practice using a single intervention without comprehensive support from food enforcement. This has proved to be the case in this study as demonstrated by the results of Chapter 6.

This chapter (chapter 7) explains particular governance processes in controlling food safety and sharing responsibilities within and between institutions in local government that are situated in Bandung city. It also explains about food law enforcement and its regulations.

The perspectives from stakeholders as a user (including community street vendors) will be described.

This chapter also emphasizes the issue of ready to eat street food consumed by pupils. This phenomenon is still happening today, and the risks remain uncontrolled.

7.2 Interview session

This qualitative part of the study aims to explore food safety control especially in ready to eat street food, to observe the situation faced by government and to recognise stakeholders' views on food hygiene in ready to eat street food vendors.

The participants of this study are listed in Table 3.5. The request letter was sent to health ministry, education ministry, central NADFC and related local institution both in city and provincial areas. In local institution, as stated in 3.5.2., the letter request needs also to have attached a letter research permit from BANGKESPOL. It was replied to by several offices and some of them who did not reply to the letter also decided to become involved in the research. They instructed subordinate or person in charge of this issue to follow up the request. After receiving the name and information such as phone number or building location, the researcher contacted or visited them to make an agreement to arrange the interview. This process needs long negotiation because the schedule might not match or the person feel they did not fit with the question or are not confident with the answer, maybe asking their colleague to provide the data or support them. In ministry of education rearrangement were made to get the person who was willing to join this study and then it needed rearrangement again. This study involves interviews with selected persons who represent their responsibility in organization. Twenty people participated in this study (see Table 7.1).

Each participant was directed by the institution as their representative except for the head of school and community street vendors. These were recommended by a related institution.

The interview was conducted in the participants' office except for the Provincial health office. This was held in hotel the first time, then it was continued in the office. Another meeting place was also arranged for head primary schools because the participant

schedule required it. The informed consent and agreement had been received before conducting interview. The researcher also asked to tape-record interview sessions and the interviewee has an opportunity to stop anytime.

The semi structure questionnaire for government and related institution covered the one main theme on the government work of controlling food safety. This breaks down into several open-ended questions: the general profile of interviewee, task and responsibilities, their program and the work process, performance work and its limitation. The participant freely can express their opinion or feelings and has the opportunity to ask any questions about the research or related research to the researcher. Follow up questions were improvised during interview session. The interview session time varied, the shortest session took 35 minutes and the longest one took 113 minutes. The difference of time might be happened related to their intersection and responsibility with scope of the study.

Table 7.1 List of interview participants

Institution	Interview Profile					Interview code
	Sex		Position			
	M	F	Staff	Echelon		
				3	4	
NADFC		2		1	1	1N, 2N
Branches of NADFC in Provincial level		1			1	3N
Ministry of Health		3	1	1	1	4H, 5H, 6H
Provincial health office		1		1		7H
Local health office	1				1	8H
Local Primary Health care		3	3			9H, 10H,11H
Local SME office	2		1		1	12S, 13S
Local spatial office	1				1	14S
Ministry of Education		1			1	15E
Provincial education office	1				1	16E
Local education office		1			1	17E
Local Head of primary school		2			2	18E,19E
Local community street vendors	1		-			20C

Regulations (Keegan VA, 2009, PP 38, 2007, PP 80, 2017, PP 28, 2004), joint decree of four ministries (Joint Decree of four ministries, 2014) and local major decree of Bandung city (Perwali Bandung 888, 2012, Perwali Bandung 571, 2014) describe the activities and responsibilities in food safety. In Table 7.2 summarises participant interaction and its process related food safety.

Table 7.2 Actors and its activities related food safety

Process	Actors Involved	Description Activities
Food safety in general	NADFC	Coordinator for food safety, giving training to local health, supporting for RTE food
	Ministry of Health as central government	Supporting national health activities including RTE food, establishing policy and regulation, supporting local health activities for financial, module and minimum service standard for health
	Ministry of Education	Supporting national activities in education especially for minimum service standard and accreditation including education facility and school management, related actor of school Health and Nutrition program
RTE Street food in local	Sanitarian in PHC	Giving advice and visiting consultation to all RTE street food and school canteen
	Local SME office	Facilitator for training and financial link support for street vendors.
	Local spatial office in Bandung city	Coordinator for local task force for street vendors regards to spatial design and intervention for design to facilitate the location
	Local education office in Bandung city and West java province	Supporting education activities for school health and nutrition program, regulator actor for minimum service standard in education
	Local Health office in Bandung city and West java province	Collaborating with local task force, supporting and monitoring primary health care
	Head school in Bandung city	Collaborating with regulator for implementing school health including food hygiene, managing school
	Community street vendors in Bandung city	Providing and sale the product including street foods

For assuring validity in this study, triangulation of data is achieved by combining transcript interview with information from other resources (i.e. published report, article, website, apps, and stickers) and quantitative data. In addition, the researcher also re-checked the interpretation with participants to ensure that it was correct.

7.3 Findings and discussion

As the interview and theme analysis was carried out, several issues emerged in controlling food safety especially for ready to eat street food. Government organisation changed from centralized to decentralized in 1999. This appears as a trigger issue for sharing responsibilities between central and local government, including food safety.

The interview results divided into two findings.

The first finding described the delivery of food controls at higher levels in both NADFC and MOH, and food safety control practice in Bandung cities. The study confirmed what they do (task, function and activities) related food safety and did not figure out the theme only described it. However, the theme was constructed to describe their obstacle related their task, function and activities to address the objective of research. As stated on 3.6.1, the theme was extracted by several steps. The first step was listening, transcribing, and reading the transcript. Then it was followed by understanding the context and captured the main content, set coding extract based on literature references and search pattern or themes across different interview.

It has been categorized using thematic analysis to code and classify (Braun and Clarke, 2006). Using a hybrid approach to data driven by inductive analysis the raw data from the interview transcript was coded by a deductive approach. The interviews were transcribed in Indonesian, then translated into English. By reading the transcripts, a common theme emerged, that of poor governance process. This was a common underlying problem identified by all interviewees. Using the steps of thematic analysis, coding groups and sub themes were identified from the transcripts. In this way the information from the interviews was used to address the research questions on food control. A lack of governance process was identified as a key issue. This can be seen from interviewee feedback that is given in tables 7.3,7.4, 7.5 and 7.6 and discussed in general in section

7.3.1.1. The issue is further evaluated from a local perspective (section 7.3.1.2), including additional barriers, specific to the delivery of food controls by local officers and identified from the interviews (Tables 7.8).

The second finding in 7.3.2 concerned stakeholders' perspective that relate to classical issues on ready to eat food in school and street vendors' perspectives itself.

The findings showed that hygiene and sanitation facilities in school are poor. The interview results indicate a possible misalignment between some parents support and the school management. The ability of head of school to protect their pupil appeared inconsistent because of institutional capability, for example school security, unclear guidance, and low resource support (summarised in Fig 7.7). These issues are discussed in detail in section 7.3.2.1.

From the result of community street vendors perspective, the study found that they have a high desire to improve their condition. The researcher recognized that they need government support for running their business. This means being included in its policy and clear enforcement. This study confirmed that they have a role in managing their community practice and how they find support for running their business. Section 7.3.2.2 considers this aspect in more detail.

7.3.1. Food safety control in practice

7.3.1.1 Food safety control in general

This sub chapter presents the findings and discussion on the food safety arrangement in NADFC and MOH. It is based on interviews from participants in central and provincial levels. It explains how MoH (Par 4H, 5H, 6H) and NADFC (by Par 1N, Par 2N, and Par 3N) delivers food safety control in general and especially for ready to eat food and home business industry.

Central NADFC work is based on government regulation (PP 28, 2004, PP 80, 2017) which focuses on processed food, workshop to industry, and supports the promotion of hygiene in the public and schools. Based on President Instruction (INPRES 3, 2017) about improving

effectivity of drug and food control, NADFC is responsible for coordinating all institutions on drug and food control.

Table 7.3 describes the tasks, function and activities of NADFC in food safety control and monitoring. In order to deliver controls, NADFC has competent personnel called food inspector (FI) and District food Inspector (DFI). NADFC control and monitor, conduct certification and testing, and carry out enforcement for processed food. In addition, they support a module for home business food (PIRT) certification and training for local health officers. They also do random sampling for PIRT and RTE. NADFC has a firm system to work based on target and evaluation of food. They carry out enforcement for food that does not meet the legal requirement by seize the food and prosecute the premises.

Table 7.3 Task, Function and Resource of NADFC

Code	Interview script	Description
3N	'…*What we do is a technical work.* ***We consent to processed*** *food i.e.: expired date, import and domestic product. We also* ***supported for control monitoring home business industry (PIRT)*** *that maybe in future can enhance their business and get MD certification from us*...'. We have ***an authority for conducting random sampling to all product including PIRT and ready to eat street food***, *we* ***will inform to related institution if we found contaminated product because they have a fully control of it****…****we facilitated it*** *because our vision is protecting public on drug and food, and enhance national competitiveness. We* ***usually taking sample one per year-based risk analysis****. Which one will be choose, and pick critical parameter…*'	Main responsibility to control and monitor processed food and also supporting local health on PIRT and RTE.
1N	*'…****We do control but still limited, not for all product****.* ***For ready to eat food and PIRT****, both* ***are responsibilities of local health****, we just see food safety in global,* ***we are focused on processed food…for ready to eat food in on behalf of local health ...'***	
1 N	*'To control and monitor food processed, we have* ***food inspector (FI) and District food Inspector (DFI).*** *DFI is for food inspector in district because* ***we in central need to be supported by resources in local but authority of DFI is limited by area****. The DFI and FI can carry out control and monitoring for medium and low risk in their own area but DFI was not allowed to do it for high risk.* ***FI has a three level, basic, junior and senior****.* ***There is a training curriculum and minimum experience requirement****. Training includes theory and practices.*	Main human resources for food safety is food inspector

Table 7.3 Task, Function and Activities of NADFC (continued)

Code	Interview script	Description
3N	*'…We **visited market, do awareness and check their product in the premises, we observed which one is priority based on risk analysis**. We **confirmed the faults by checking the premises** and **did laboratory testing.** We also **prosecuted food business** if we found miss food product (already expire, unregister etc.). We have **collaboration with police**. We have **trained our civil government employee with police skill and competence to investigate and prepare the file (P21)** and **transfer to district** attorney for trial court……'*	A firm system based on target
3N	*'…**We collected information from public/consumers by online or formal letter including complaint**. We will **follow it up**. We **do socialisation for home business industry, SME by inviting local health** or **local trade, stakeholders**. **We try to find a solution for food safety issue**…* *'…. We supported on **public training and improve community awareness we had a program called KIE which is abbreviation for communication, information and education programs, it is a prevention program**. One of the programs is called Desa Pangan Aman (safe food village). We **intervene with food handlers, street food, catering and or to household by collaborating with members of family welfare program (Pembinaan Kesejahteraan Keluarga/PKK**) …some of micro and small business also asking us for training as well…'*	Promote food safety and public communication.
3N	*'…**we received communities who came to us, they had initiative** and **want to have collaboration or having training from us**…we **tried to accommodate it**….'* *'…**We also do exhibitions in car free day, open consultation**, **open simple lab testing** by test kit, **we have mobile car** for supporting service activity in field...* *'...**We have module food safety awareness workshop** for stakeholders' maybe it is also put on our website as well, I am not sure. **We also have public warning to counter hoax and public can read** it*	
2N	*'…for food safety information in school **we have club POMPI**…**can be checked in our website**…. actually, **we already ask to psychology expert how to do behaviour change it is really hard to do because it need to improve their knowledge by awareness**…so **we need to do it more frequent**…''*	

Table 7.4 shows what kind of obstacle is faced by NADFC when they carry out their task and function related to food safety.

Table 7.4 Activities and Obstacle faced by NADFC on food safety control

Code	Interview script	Coding extract
3N	*'…. It is **hard to do** this because **some of them (street food vendors) change their product**, previously they sell ready to eat street food, when we come again they sold balloon.*	Difficulties on the type of street food
	*We conducted a village contest, some of them showed improvement. However, in market/ traditional market, we still found dangerous food additive or food fraud, the root cause is dangerous food. We cannot work alone, it **need collaboration between local health, local trade and industry local market office**…'*	Need collaboration between institution in local level
	We do not know the competencies of local health**; **has it already had accredited laboratory or really have a competent person**…. Actually, we did train for local government but **they moved the person who had been trained**, example from local health to another local office. **We have suggested** to Regional body for planning and development (BAPPEDA) in province that **they need to allocate the budget** for municipalities and districts **to conduct the training itself and just invite us as a trainer**…**but it is not worked…	Poor awareness of local health competency, lack of commitment of local health
	*'…. **we created module for workshop** but not available online yet. **The budget also a problem for allocating training program**....*	Lack of budget,
	*'…in **NADFC we have tiered level of food inspectors based on their competences**, we saw different **path of inspectors between NADFC and local government maintenance and recruited their inspectors**…'*	Different path of recruitment human resources
1N	*'…. **we had MoU with local government**…when the **head local government** (after 5 years depends on election result) **has changed** the commitment also changed. The new head of local government **had not the similar commitment as previous**…* *'… **control and monitoring for food safety involved many institutions**, for **cross sectoral we realized need to improve coordination and collaboration…**now for local product, in national level, **we focus and** **support first based on priority such as if it is an export product …**such as 'rendang' in South Sumatera… tourism in Bali**….** we worked together**…'***	Lack of commitment local government, lack of coordination cross sectoral
1N	*'…**we do not handle the registration of home food business**…**it is for local government maybe in local health or PTSP**. **We just support to do control and monitoring** …'*	Un integrated data system of food

Table 7.4 Activities and Obstacle faced by NADFC on food safety control (continued)

Code	Interview script	Coding extract
3N	'…***we are not a part of local government, sometimes collaboration is not smooth,*** *it is a cross sector, we tried to make good relationship by MoU…'*	Lack of collaboration
3N	*'…We have found three poisoning cases in primary school, we did collaborate with local education, local health. When the product is ready to eat street food, they (local health) do testing laboratory for confirming the source of contamination, we observed the label and packaging. Actually, we can do laboratory testing, but it is bit hard because* ***other officers (police) conduct wrong sampling procedure, open in room temperature and make the sample broken****, we cannot find the rest of sample or the sample has all eaten…'*	Lack of competent personal involve in food safety Wrong sampling and incompetence personal Lack of information system
1N	*'..****we come late to the food outbreak location for sampling****.. . we just received the information from local health…depends on our relationship with local….* ***sometimes lack of coordination because our friend in local health removed to other local office****…that* ***a trigger why we had obstacle in coordination because high turnover or personal movement in local health****...'*	

In order to deliver their function, NADFC recognized the problem in control and monitoring food safety that occurred in interview session such as the lack of budget, the lack of competence of related institutions including in local government, street vendor type of business, need to enhance collaboration and lack of commitment from local government. Data relating to PIRT is not well organized into one system but held in each local office.

NADFC until today has found difficulties to trace home food industries because it is the responsibility of local government; usually they asked for information manually by letter. It is hard to do control and monitoring because they only have limited access and it is not fully their responsibilities, but it is also local government responsibilities. Lack of one integrated data system between institutions and for consumer makes it difficult to find whether the home industries are actually registered or not. It is possible the food business just displays a made-up registration number to entice their customer. Because the customer can't check it on a national data base, they have no way to confirm the food business is registered.

When a food outbreak happens, obstacles are found because of lack of competent officers, lack of coordination and the lack of information system.

Before decentralisation was started and NADFC was established in year 2000, the MoH has important roles for food safety. After year 2000, based on Law 23/2014, the MoH was still supporting home business industry (PIRT) in control and monitoring. Local government (local health) issued product licence to home business industry and control post market product food and drink.

In MoH, there are two directorates responsible for food safety. The first is Directorate General of Public Health which is responsible for developing and implementing policy in public health. The Sub Directorate of Environmental Health in the Directorate General of Public Health has responsibilities for supporting on environmental health in general terms and also with relation to ready to eat food i.e. Hotel. Restaurants, café, catering and less small business ready to eat food and street food vendors.

The second is Directorate General of Pharmacy and Medical Device. One of responsibility of Directorate General of Pharmacy and Medical Device is for home business industry (PIRT). This statement is supported by presidential regulation number 35 in year 2015 about organization structure of Health Ministry.

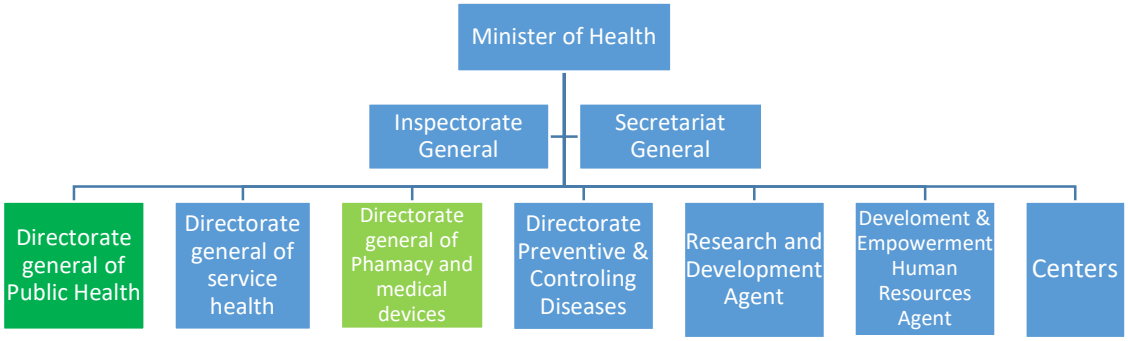


Figure 7.1 Organization structure of Ministry of Health (Perpres 35, 2015)

In this study, the researcher only interviewed the sub directorate of environment health, located in directorate general of public health MoH, and responsible for RTE street food.

Table 7.5 Task, Function and Resources of MoH

Code	Interview script	Description
4H	*'…our office is **taking care of ready to eat food** while **home business industry is placed in other directorate…pharmacy and medical devices**…'*	Main function for RTE and PIRT.
5H	*'In order to support local health, **we give contamination testing kits for primary health that always has update report on ready to eat food as an award** if they had good effort on commercial eating place (TPM). **Available if they requested,** (Local health) **we will consider,** we cannot give it to all primary health because **we have limited budget**'.*	Facilitating PHC on contamination testing kit
4H	*'We have **GERMAS PAS**, which is a mobile application. It is a **reward for ready to eat food or drink, catering, restaurant, café, drinking water refill that already certified (hygiene sanitation acceptance certificate**), and the public can find it.*	Facilitating information system for public information
6H	***we developed Germas PAS a mobile apps that for consumer awareness to choose the eating place that already had certificate**…..**it showed eating place near you max 60 km….**'*	
5H	*'….**we collected the data used Emonev**… they inputted to Emonev…for premises **that was responsibilities of local government authority**….local government has **one stop integrated services for endorsing permit commercial eating place** i.e. restaurant, café…..**but it was not connected to local health office**…or they already had hygiene environmental inspection but **they did not get the training yet**….**because of limitation training quota**…it is also a barrier for having hygiene sanitation acceptance certificate……'*	Evaluating and monitoring program

Directorate general of Public Health in MoH develops policy and provides material for conducting control and monitoring of ready to eat food.

Ministry of Health (MoH) and local government are sharing responsibilities in order to control and monitor food safety as stated in regulation and legislation (Law 23, 2014)

Based on the E-monev HSP data showed that less than half (41.88%) of the commercial eating-place (TPM) has registered between 2010-2017, with only approximately 18% of them (21,471) fulfilling hygiene requirement(MoH, 2018).

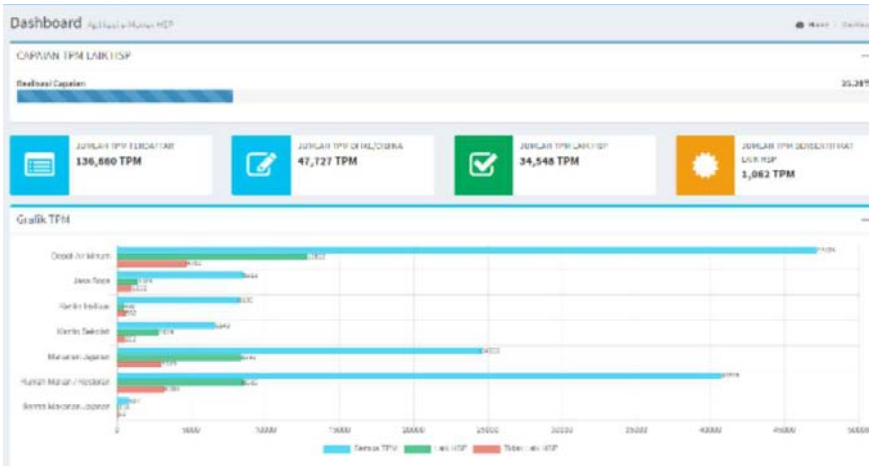


Figure 7.2 Emonev HSP of eating places and drinking water refill stationary[2]

Emonev HSP was started in 2014, the sanitarians in local health including primary health can input directly the data such as ready to eat street food place, restaurants, canteens, drinking water refill stations. Mobile apps, Germas PAS, can download in google play store since 2018.



Figure 7.3 Self-assessment report book [2]

As explained in section 2.8.2.2.2, commercial eating-places need to fulfil all requirements to have a hygiene sanitation acceptance certificate (sertifikat laik sehat).

[2] Source: Ministry of Health Presentation

Table 7.6 Activities and Obstacle faced by MoH on food safety control

Code	Interview script	Coding extract
4H	*'…In ideal condition our minimal target for Emonev HSP is 6% per year input on the system but in fact only 3% is input annually…there are possibilities why this happened,* ***first the sanitarian has not input the data*** *and* ***second all data is in PTSP (one integrated service office)*** *and* ***the data was not reported*** *to sanitarian or local health…*	Un inputted data by sanitarian and un integrated data system
4H	*'...In the Food Hygiene and Sanitation (HSP)* ***the number of the inspection is high but the number of certificates it was remained low*** *because the premises have not taken the training yet, we have limitation to provide the training for them...'* *The certificate will be given if the premises has full fill all requirements such us inspection, training, etc*	Training budget and provider limitation
5H	*'…in past when the government system was centralized* ***we had branch offices under our control but when decentralisation period was started, we do not have it [that power] now****,* *so it located directly in provincial local health. When we would like to implement MoH regulation at local level, it needs support by local government regulation (Perda****).***	• Change government system • Local government to adapt regulation
5H	***Only some of them, local city or district, has local regulation for ready to eat food****.* ***Right now, we are still drafting revision for ready to eat food regulation because nowadays the condition is different****, i.e. food franchise, food truck is growing as well…right now* ***we are still drafting for replacement government regulation PP 28 year 2004*** *about food safety, quality and nutrition…*	Need improve national regulation
5H	*'...for* ***control and monitoring ready to eat food, we are supported by local health officer,*** *for giving awareness and supervision of* ***ready to eat street food****, we have* ***Sanitarian in each local health , stationed in primary health****…* ***for commercial eating place such as restaurant, it needs to be licenced but for micro ready to eat food such as ready to eat street food licencing was not mandatory…but it is supervised and giving consultation about food hygiene. Premises are marked by labelled sticker…. the sticker depends on local government regulations, not yellow or green…can be red or yellow….****.'*	Different role for RTE street food business
6H	*it can be given to all premises that they* [local health sanitarian] *had visited based on the premises condition…. or they can be marked* with *it if the premises fulfil their requirements but for who did not they will not give it…****those was depends on local government regulations****…* *'*our regulations **should be adopted and supported** by local government regulation…'	Supporting from local regulation is needed for RTE street food business

Table 7.6 Activities and Obstacle faced by MoH on food safety control (continued)

Code	Interview script	Coding extract
5H	*'…if I read **minister decree** it talked **about supervise** but maybe **when it is adopted by local government regulation or legislation,** which one I do not know, **it can add for implementing enforcement or punishment**…*	Supporting from local regulation is needed for RTE street food business
4H	*'…**variable implementation of MoH decree in local** area but we already provided rapid test, **Emonev HSP report, report note** (it is a book for self-assessment-report by premises and checked by health officer every six month) …. **but we evaluated annually the program and BOK budget**. Actually, it **depends on priority of the local government**. If **the local is a tourism destination usually they are concerned about it** but for locals that have less economic impact they had other priority rather than food safety or culinary maters*	Varied implementation of MoH decree in local, depend on budget and local government priority
4H	*'…**in local government had classical problems in data and human resources…we have trained them, but they moved**…rolling to others office.'*	Lack of accountability, (personal movement intervention), lack of effective and efficient (data management)
7H	*'…**province trained local government, informed the program and supervised** but do not have **authorities to intervene in local government**…the spearheaded in local government is sanitarians...'* *When do not have individual training log system we just asked them personnel if they already had training or not*	
5H	*'…**in entry data for outbreak cases we showed that data was only input partly, not in detail or completely**, actually **we had informed this to 16 provinces**… I do not why…was there any food outbreak happened or not…or just not inputted…'*	
7H	*'…. actually, **we had obstacle from local government about the outbreak data**, we already **asked them by phone to recap the data**…**we put outbreak cases in our internal report, not put it in website or our annual local provincial report, we deliver it to central**….'but we put in our division report about outbreak cases in all West Java…we also putted in the our wall..'*	
4H	***'we do not have authorities to do sanction…. we are just civil servants who did not have authority as investigator or inspector…we should have trained first before do it…. when the outbreak cases happened, local government involved police to take the sample…or they collaborated with public order enforces unit (Satpol PP)…'***	Lack of human resource

Table 7.6 Activities Obstacle faced by MoH on food safety control (continued)

Code	Interview script	Coding extract
5H	*'…. **actually, sanitarian in primary health had many responsibilities…there is a person who are not sanitarians but they did sanitarians jobs. We had employee performance unit**, in a year they had work performance programmes…many kinds of it….one of programs is training, workshop, orientation, capacity building etc, **34 provinces had received the training programs, then provinces should train the local government officers using their local budget (APBD) including sanitarians** in primary health…'*	Lack of effective management
4H	*'…**for provinces that had adequate budget, usually, they recruited temporarily human resources**, for example DKI province, they **recruited diploma of environmental health, trained them** but the **problem is sanitarians do a lot of things** from waste, food, environmental health, water, etc so **they need to prioritize it** …in the morning they work in primary health then at noon they went to supervise or inspect….'*	Lack of human resource
4H	*'…the food handlers do not sell in their area…**but cross the city especially in urban areas** i.e. Depok and they sold in Jakarta… **it is hard*** [for local sanitarians] ***to collect the data**…and **to supervise for mobile food premises**….'*	Difficulties faced by resources
6H	*'…when we had a meeting, **we did object to NADFC**. If health ministry authority has a program, they should not make a similar program. **Schools got confused because there are two marked stickers**, because it had already clear in Law they [NADFC] are authorized on processed food, **we admitted that we had many things to do** food, medicine, health services, we need to prioritize. **When we cannot cover it [RTE food], they [NADFC] get in, help us. but it does not means giving marking and do environmental hygiene inspection**…**food handlers complain to us (I mean local health**…) **they should coordinate with local health** do not come directly to the place…**when they did random sampling. Local government is ok**…we want the coordination with local health'* We, MoH, has drafted new regulation and also agree by NADFC, to replace health minister decree 942, hopefully, it will help us…	Lack of collaboration and coordination Lack of effective management
7H	*'…**local government has talked to us about star program in schoo**l; they did not get confirmation from NADFC, if they have a good program**, it should be better if we collaborate**…'*	Lack of collaboration and coordination

In order to award the certificate, the local health officer will already have conducted an environmental hygiene inspection (IKL) of the premises. In Emonev HSP, the number of

premises with a hygiene sanitation acceptance certificate is less than the hygiene environment inspection number. The sanitarian in primary health should be inputting the location and type of commercial eating place to Emonev HSP as a real time data. However, the real time data in website showed the number of ready to eat food, catering and drinking water refill supply are still low, less than 3% per year and far from the target of 6% per year. It showed that they are unable to meet their targets. This appears due to poor resourcing, including personnel and equipment.

This finding indicated that training providers are needed to support the program. The government cannot provide enough resource to deliver their responsibility (lack of accountability) for training on hygiene sanitation. Partnership which should bring related actors to work together to improve the situation based on local government need has been recommended by several references (Matthews, 2014, Hutchinson, 1994, Richardson, 2005). These references recommended government should collaborate and create a partnership with training providers to solve the issue.

It can also be concluded there was lack of collaboration and coordination between central government/provincial government and between local governments. This study showed decentralisation authorized local health to manage their business. Decentralisation aims to improve public services, reduce poverty, enhance stakeholders' participation and accommodate public needs(Saito, 2008). However, the structure of local health and its practices needs to align with central health ministry. The central health ministry has divided food safety control into two directorates separating ready to eat food and home business industry (PIRT). This creates ineffective and inefficient food control system. The condition also showed lack of accountability of institution in food safety control implementation. Prior to decentralisation the regional and local offices were under the control of the Central Authority. Now, although the structure is the same, the regions and local offices are independent of central authority with regard to delivery of food safety controls. However, they must still report to the Central Authority. This condition can affect the efficiency and effectiveness of the governance process regarding competence of personnel, resources allocation and management system. Law 23/2014 article 232 stated that local government nomenclature, organisation guidance needs to consider guidance from ministry or

government institution that is in charge of the sector. In practice, improvement in local organization structure in food safety control is needed to reflect this requirement.

This study observed that central government gives authority to local government to have its own marking (label and sticker) for those premises that are supervised by local health inspectors. These inspectors are helped by sanitarians in primary health care. A lack of governance process in the organization of food control delivery, human resources and the competencies of those delivering controls and monitoring in health institutions was observed in this interview. The performance of management in local government is related with the level of trust and customer satisfaction (Beeri et al., 2019). Because of decentralization, the MoH did not have a control framework for monitoring the enforcement of food regulation in local authority when implementing the regulation.

Table 7.4 describes the lack of governance process such as lack of transparency for providing outbreak data information that is easy to access by public.

Based on the information received in interviewee sessions it appears that the data relating to food illness outbreaks is inconsistent. This is due to the reporting systems which are not centralised or streamlined. The local health reports may not be sent in real time to the provincial and national organisations, so there is poor agreement on the actual numbers in a given time. MoH receives notifications from the local offices via the provincial officers in an ad hoc manner, sometimes by telephone in real time, sometimes not. The MoH then publish data relating to outbreaks but this is not always consistent with the provincial data. The NADHC also gather outbreak data by directly contacting local and provincial officers. This can result in divergence in published data which is not helpful to consumers, government or officers. For example, data from Public Health Emergency Operating Centre (PHEOC) in West Java shows an increasing trend of outbreaks, from 16 in year 2016 (410 people ill), to 50 in year 2017 to 69 in year 2018 (Interview data table 7.4, participant 7H). The MOH data in health profile 2016 recorded 98 outbreak cases with 2556 cases of illness. It was not clear the cause of outbreak cases (Kementrian Kesehatan, 2017). The NADFC reported there was 17 food borne illness outbreaks with 914 cases of illness in West Java in 2016. This data was collected from news and from reports by local health in

PHEOC(BPOM, 2017a)

There is variance between the competencies required for professionals by the different organisations. In the health ministry decree (MoH, 2003b), sanitarians who have hygiene food sanitation certificate and a degree can do coaching and supervise ready to eat street food. Since 2013, other qualifications will also allow a person to work as a sanitarian (MoH, 2013b). The person must have an appropriate background, be registered with the environmental hygiene profession association and passed their test. Appropriate backgrounds include:

- health environment or
- environmental technology or
- sanitation technology or
- health education background

The NADFC creates a tiered level with its own scheme for food safety officers to maintain their competence. In addition, the NADFC have the capability of organization and its personal competencies mean that the officers can prosecute the premises if they find contraventions or faults in food safety. These interviews captured that sanitarians had many jobs, not only taking care of safety on ready to eat food. Obstacles for the delivery of controls include the lack of human resources with the correct competencies, especially for sanitarians, in local government. This makes it especially difficult when they need to deliver controls in ready to eat street food that is not permanently placed.

This intersect of jobs and the conflict of responsibilities was observed between NADFC and Health office. This can be created by unclear legislation which does not centralize one competent agency to deliver food control. In addition, the lack of several governance process factors can occur if there is no formal agreement on the sharing of responsibilities between multiple organisations (considered as lack of accountability).

Both of the competent authorities (NADFC and MOH) are aware of the intersect since the overlap of authorities and lack of collaboration between the MoH and NADFC was discussed by interviewees from both organisations (Table 7.5).

Sharing function and responsibilities between NADFC and MOH needs to be reviewed so that effective government performance can be based on the resources. The use of resources and an effective strategy which reflects the division of responsibilities needs to be the basis for setting up the quality of management which is crucial point for good government performance (Ingraham et al., 2003).

By thematic analysis, the activities of food safety control between MoH and NAFC in both central and provincial levels, also its obstacles to the governance process are described in Table 7.7.

Table 7.7 Theme analysis of food safety issue in main actors

Coding extract	Sub theme	Theme
Difficulties on the type of street food	Character of street food vendors	Street vendors characters
Need collaboration between institution in local level	Lack of collaboration and coordination	Lack of good governance process
Lack of coordination cross sectoral		
Lack of awareness of competency of local government	Lack of accountability of local government	
Lack of commitment of local government		
Un integrated data system		
High turnover of personnel		
Change government system and need local regulation to adapt		
Need support from local regulation		
Lack of information system	Lack of transparency, inability to set objectives and measure achievement	

Table 7.7 Theme analysis of food safety issue in main actors (continued)

Coding extract	Sub theme	Theme
Need to improve national regulation	Lack of accountability	Lack of good governance process
Lack of data input		
Varied implementation of MoH decree in local, depend on budget and local government priority		
Lack of effective management		
Lack of human resource		
Lack of budget		
Un integrated data system	Lack of efficient and effective process	
Wrong sampling and incompetent personal		
Different role for RTE street food business	Lack of responsive	
Limitation on training budget and provider	Lack of stakeholder participation	

The pattern of poor governance process in food safety control identified from the interview data is summarised below (Figure 7.4). Lack of accountability occurred in both local government and central government. The character of street vendors itself also contributed a barrier to the delivery of food safety controls.

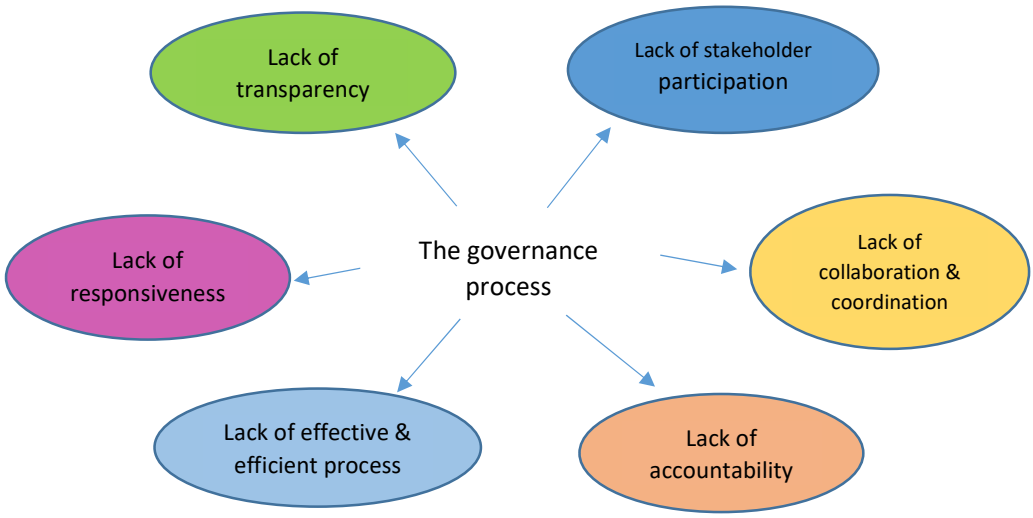


Figure 7.4 The lack of governance process

Good governance has key characteristics (UNESCAP, 1997) such as participation, consensus orientation, accountability, transparency, responsiveness, effectiveness and efficiency, equity, strategic vision, and rule of law that can support service delivery and enforce the rule(Fukuyama, 2013).

Labolo & Indrayani (2017) argue it is necessary to reform Indonesia bureaucracy. There were several reasons such as:

- budget for human resource is insufficient and not well controlled,
- budget cost for direct election of local leader has not aligned with good leadership result
- increasing number of bureaucratic organizations without planning and
- analysis that burden financing and recruitment without an effective and efficient measurement for supporting public services.

The bureaucratic catastrophe happened in both local and central government level. All aspects of government performance, including their capacity organization to carry out their task and function, needs to be reviewed. This should include all mechanisms and process, personal competence, facilities, infrastructure and organization structure in term for achieving efficiency in bureaucracy (Labolo, 2017).

Similarly, a recent study by Simangunsong & Hutasoit (2018) agree that bureaucratic reform is needed in Indonesia to reorganize government system. They suggest this should improve administration, facilities, and infrastructure, and improve collaboration between government sections. There should be development of partnerships of stakeholders to tackle issues and achieve goals in national development. There is also the need for information and communication technology to be used appropriately by professional bureaucrats for enhancing public services (Simangunsong & Hutasoit, 2018).

A political crisis due to regional conflict motivated Indonesia to implement decentralisation. The degree of development in terms of decentralisation was variable across Indonesia. Urban local governments tend to be small empires on their own (Firman, 2010). Decentralization also increased budgets and corruption and created uncertain

political conditions (Shah A, 2004). The dispute on good governance and decentralization needs to be analysed in comprehensive ways by using interconnected theories and practice to evaluate the outcome and the expected goals in provision of public services. (Nadeem M., 2016). A study in Indonesia (Roudo et al, 2018) showed that the decentralisation has not resulted in effective performance management that improved local public services. Roudo et al (2018) confirmed that the result of decentralisation on Minimum Service Standard did not align with effective performance management in local service delivery. Strong enforcement and effective incentives process were needed to achieve this improvement. However, the MSS did provide a framework in assisting central-local dialogue in public service delivery.

Intervention by redesign of authority relations, sharing responsibilities, improved communication and coordination, clear workflow, monitoring and control, and promoting mutual trust in the work environment are all acknowledged ways to address governance failure (Holzhacker R.L., 2016). This study confirmed that following decentralization central and local government need to address several concerns by to improve public service delivery. Clear regulation, effective and efficient design of local government structure to support good governance process, and satisfactory resource management for delivering public service are required. The statements made by interviewees and presented in tables 7.6. Show this applies especially in food safety control. Steps need to be taken to address these matters to reduce the public risk from foodborne illness.

7.3.1.2 Food safety control of street food in Bandung City

This section focuses on food safety control in local health government in Bandung city. Interviews were carried out with environmental health officers in the public health division and sanitarian in primary health. The perspective of other local officers who are involved in supporting the key actors (food officers) such as in the SME office, local spatial and design office, was also collected.

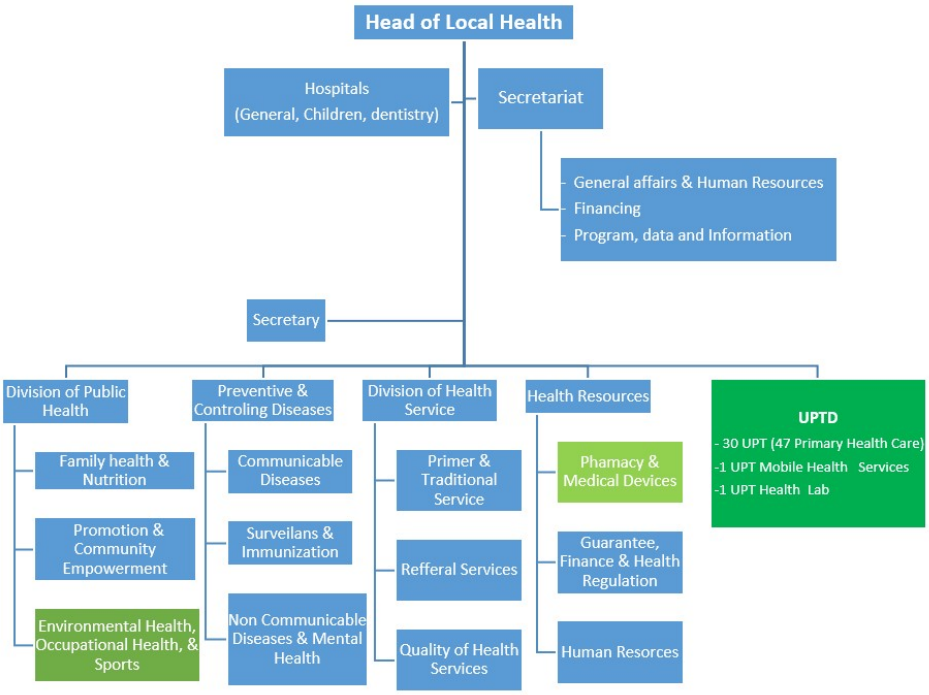


Figure 7.5 Structure organization of local health office in Bandung City

The responsibility for food safety control in home business industry (PIRT) and ready to eat food including street food was held by local health based on PP 28 in year 2004. The organization structure was mirroring central ministry (Ministry of Health) which was a central office before decentralization era. The local health organization structure placed officers for supporting food safety control in different divisions. The environmental health section under public health division conducts food safety control for ready to eat food. The sanitarians responsible for ready to eat food were positioned in environmental health section and in primary health care. Sanitarians in primary health care work based on area or technical unit (UPT). Bandung city, has 47 primary health care units, in 30 sub-district. Pharmacy & medical devices (Division of Health Resources) is responsible for certifying home business industry (PIRT). Home food industries (PIRT) food safety control is also the responsibility of the pharmacy and medical devices section.

In this study the interview session was participated in by local level representatives of environmental health section that are responsible for RTE in general, including street food, and sanitarians, as the main actors for supervising the RTE street food vendors.

Table 7.8 shows the activity of local health officials and sanitarians in delivering controls and monitor food safety including interventions.

Table 7.8 Food safety control RTE street food and its obstacle in local level

Code	Interview script	Coding extract
8H	'***the number of street vendors is huge, it was not mapped*** *yet,* ***we focused on ready to eat in school****, because it was vulnerable and need to be concern..because* ***many of outbreak cases was caused by it****…*	Not mapping street food vendors, and focus to RTE street food in school area
8H	*It was really hard to supervise, we see nutrition, contamination and its food process as well, we had tested that it [street food] contains borax, formalin and rhodamine…****we did random sampling..but it was very limited because of budget****..'*	Limited budget for random sampling (lack of accountability)
8H	***'We are supported by sanitarian in primary health care to supervise or give awareness to street food vendors****…because as we, environmental health officer, had another task and function, it was not only for ready to eat food…we just give them the training …for face to face coaching the sanitarian did it…based on area.'* *; for the home food industries actually controlling in different section…. but they did not have sanitarian in primary health so we the environment health officer support them...'*	Sanitarians as a main actor based on area for food inspector RTE street food (lack of human resources)
8H	***'We did label or u stickered to mark that the street food vendors already visited and coached by us, it was green and yellow strikers…the yellow one showed that they already visited and mentored but they did not fulfil the requirement****t ….usually they move..the street vendors which move like that usually cannot fulfil the requirement…it is also hard to find them in certain place…but the green one it had already fulfil it… in this sticker had four date because usually we visited per three month…we use assessment form in MoH decree no 942 year 2003, we do not register by registered number for each food premises…we cannot trace it as well'*	Only labelled stickers, did not register yet (lack of accountability)
8H	***…the training material and mentoring that was given was sufficient..****such as personal hygiene…****but we do not know the implementation…the RTE street food vendor will do it or not…depends on their willingness'***	Lack of efficient and effective implementation
8H	***'The instructor already has competency****…because they had* ***environmental health background or work experience*** *as a sanitarian…sanitarian is registered proven by letter of registered (Surat Tanda Register, STR) which* ***showed that they already pass competency test'****.*	Human resources competency

Table 7.8 Food safety control RTE street food and its obstacle in local level (continued)

Code	Interview script	Coding extract
8H	'*actually in manual report* ***we had an issue to recap the record at the real time and its details****… because the data that we received from primary health just number of food premises in central location, it was not of each food premises…also* ***we did not know the type of food premises such as stall or cart****,* ***we did not know as well is it stay or move****…****just a bulk of data -how many fulfil the requirement and how many not fulfil it****..'*	incomplete data (Lack of efficient and effective process)
8H	'***we do not have special hotline for consumer case complaint*** *but we had public relation for local health'*	customer communication feedback (Lack of accountability)
8H	***'We did just supervising and awareness because we cannot do enforcement, it was not our responsibilities****…it was* ***on municipal police (Satpol PP****)…in our regulation in MoH decree 942 year 2003, did* ***not state about sanction or punishment to stop the food business or stop to sale their product****…we cannot punish or stop them to trade, so* ***if we found a problem we informed to Satpol PP but they still did not have a local regulation to do it…****so what* ***we can do just oral warning****…it exception happen when outbreak cases happen…and* ***the victim reported to police…***	Incompetent to enforce (Lack of accountability)
8H	***'We admitted we are weak to do enforcement, it was different with NADFC when they found contravention of food safety that can risk the consumer they can do prosecution'*** ***'the regulation was not updated yet****…for example food truck…it cannot fit with MoH decree in 942 because they are mobile and sometimes it was franchise business, when we would like to refer 1098 it did not fit because it was not restaurant..including food hygiene regulation for hotel…it was not comply with today…'*	Lack of regulation (lack of accountability)
8H	*'Actually* ***we did not take microbiology sampling yet*** *because we believe that in observation we see they have high risk so the test lab it should be poor..****we just took limited sampling that presume it had low risk, then we see the correlation of it****….'* ***'Usually we did by our own****,* ***we had less collaborated with NADFC especially when the star program has stop,*** *in 2018 we were not involved in their program to foster the school…****but it does not continue today...'***	Budget limitation (lack of accountability)
8H	***we do incentive to food handlers by giving them mask or apron or gloves*** *as a stimulant so they can learn to use and practice well personal hygiene…but it was limited as well'*	Budget limitation (lack of accountability)

Table 7.8 Food safety control RTE street food and its obstacle in local level (continued)

Code	Interview script	Coding extract
8H	*'actually, **there was naughty street vendors. They already know about the hazardous substance but they still used it because they just think about margin return**. They did not think about the risk to consumers…in addition when **we suggested to improve their food premises they do not have enough money to enhance their condition**…**especially for personal hygiene cross contamination**...i.e. when the food handlers that have moveable food premises type we do not know how/ if they wash their hand properly after they go to the toilet'*	Naughty street vendors
8H	*'actually **the issue about street food vendors is there is a huge number and most of them not stay in one place**…**it was hard to us to do supervise and input the data**…**until today we did not use registration, they did not stay, we afraid they misused it, because it hard to** control, who will responsible if someday the outbreak happen because of the food…while if it had already registered but **the food premises did not discipline**…we afraid for the consequence…so we cannot do it now because the data it still perforated…*	Huge number, not staying in one location
8H	***'NADFC do verification to food in canteen school and do awareness because food additive and hazardous substance were on NADFC**…**when they have star program they asked us to collaborate…actually when talked about the program they did not have responsibility to monitor canteen…that our task actually**... their responsibility was for processed food…* *'When inspection in Ramadhan **we rarely do it to** ready to eat food…sometimes **we used to be involved and collaborate with NADFC** but mostly it was not integrated. We run by our own.'*	Lack of coordination and collaboration
8H	***'in order to relocate street food to central place (sentra) there should be coordination or collaboration between local institution**…i.e. making food premises that fulfil food safety or health requirement…because it was already stated in our MoH decree number 942 year 2003…**but in fact it was not happen…[the spatial office]just built it and did not coordinate with us**… actually sometimes the infrastructure **did not accommodate the hygiene and sanitation facilities standard** …i.e. there was not washing hand facilities or wash basin… so it has no synergy with local health…*we really hope to have close collaboration with other local sectors related ready to eat food'	Lack of collaboration and coordination
9H	***'our jobs not only supervised or visited the food premises but we also visited public facilities to check it all…we had four villages and I think I cannot cover all, so I need to do priority...'***	Allocation responsibility

Table 7.8 Food safety control on RTE street food and its obstacle in local level (continued)

Code	Interview script	Coding extract
10H, 11H	'***our task and function as sanitarian was to inpect the general place related to enviromental health such as sanitation, waste, air polution etc…including controling eating place (TPM) i.e. canteen, street food, water depot refil****…we have 2 sanitarian in this primary health..last year I cannot cover all of it because I just work alone '*	
9H	*We **save the data on our computer**, the local health collected the data from us but we give the **recapitulation information for all TPM and its number but not information detail.***	Un detail information of food premises
11 H	***'we give the number of food premises to local health, we do not have the detailed data such as type of food premises stall or cart or it detail with address number****… I knew the place…just put the location... we have it...'*	
10H	***'we have the data of eating place but it was not complete yet because the permit was not on village or sub-district office****..we had soft file data in our computer but street food was not linked yet…**MoH had the system but for water depot refill, canteen or central eating place..or restaurant*** *… '*	
10H	***'for the system it need Identity Card of Resident…and we have the issue of it…when we come they did not want to give it****…we need to input to website..we cannot input on the spot because the system was not on playstore...for street food they are mobile it was hard for us…but for stay street food maybe for food premises in school we can do it…'*	Unsupported system (lack of accountability)
11H	***'we had limited support..for equipment****. **I used my 'own laptop..and sometimes the connection internet WIFI was down that also the barrier..**also I think **we need different person to input the data for updating the data…we were busy** because we also **handle health promotion program and as treasurer program..'***	Lack of internet and equipment support (Lack of accountability)
10H	***'in Bandung we had already OSS, but one service system has not connected between other local, actually who keep the food home industries data…we cannot see it****….*	
11H	'***in regulation we sanitarian had task and function, when we were recruited there was orientation, it means we work together with senior, but it depends on the senior type*** **[ability and experience]** …***we are recruited based on our background education, having registered as environmental health officer, and also joint one day training and passed test by Indonesia Environmental Health Association*** *(HAKLI, Himpunan Ahli Kesehatan Lingkungan Indonesia)…*	Working system

Table 7.8 Food safety control on RTE street food and its obstacle in local level (continued)

Code	Interview script	Coding extract
9H	*Actually, we had **training** from provincial and ministry of health **but the material given by them is depends on the issue...***	Training system
10H	***We had followed the NADFC training about food technology process, microbiology contamination and its prevention**…. **We involve in assignment in west java province and they collaborate with local health**…**we give the awareness to public in villages about food safety and about the process** if they want to apply home food industries licence and how to register in NADFC…it was in 2017…and also we came to university student to do awareness…but when I was work in DKI province the training was given regularly including for general environmental health like noise'*	
9H	'***actually, when we do sampling to food premises, we found hazards, I had made letter to local health because the owner was not resident of Bandung city…we do not clear how to handle it, what is our responsibility and authority…and how to follow up the case'***	Lack of personnel competence
9H	***'when we come to home food industry we support for see their sanitation facilities..the NADFC also come….we think we are still not clear about coordination..the food business also ask why so many people with different institution come..also when we talked about street food vendors..'***	Intersection problem (lack of collaboration and coordination)
10H	***'Actually, sometimes public did not know that we sanitarian promote food safety and do mentoring on behalf primary health care'***	Promote food safety
10H	***'we have problems we would like to go to the traditional market we were invited together to do inspection with police, and head sub-district, but we do not know what is our authority…so we did not go… also what we have just qualitative tool'***	Lack of responsive, lack of personnel competence
9H	***'When outbreak happen the surveillance section do the sampling, we, environment health, come together, and we report to local health**…the sample deliver to local health laboratory..we had guidance of it'*	Outbreak report
9H	***'we had different design about it…but it still on two different labels sticker. But it did not put the date...'***	Own labelled sticker
10H	'*For street food vendors…they come to this city just for do their business or there was a resident of Bandung city but **they live in rent a place in shabby area**…the place was hard to say…**how they live can we say far from healthy life and how they can process food in health if the source has not sufficient.**….and **they sold to children in school ..the food cart condition also like that…actually we need coordination with school such as should be sold in canteen…having washing hand … waste disposal sufficient**…*	Practice street food vendors

Table 7.8 Food safety control on RTE street food and its obstacle in local level (continued)

Code	Interview script	Coding extract
10H	*'barrier in school,* ***when we found the head school was change because the policy also changed…when we supervised the food handlers in canteen****…sometimes* ***we found the place move..maybe in public school they had limited budget…they need place so they move the canteen…also for food hygiene and sanitation also was limited…for washing hand was use also for washing plate and glass…'***	Infrastructure barrier

Budget limitation was an issue when the local health officials need to do programs. Intersect of the institutions was also observed, similar with what was revealed in previous interviewees in central and provincial levels of MoH, including lack of collaboration and coordination. Lack of management information, including customer relationship, uncompleted and unintegrated data were the other factors raised as obstacles in delivering food safety control. Lack of legislation was indicated as a problem, including for food enforcement. The legislation needs to be enhanced to accommodate the current situation. The food handlers' behaviour and limited infrastructure to carry out good hygiene and sanitation processes also observed by interviewees as a barrier.

The interview data from the sanitarians confirms that there are problems with allocation of responsibility in the delivery of food controls. Gaps or overlaps in responsibility are indications of a poor or improperly implemented governance process(UNESCAP, 1997)

The data of food premises is not complete in terms of quantity and details. It was not integrated in one database. The implementation of apps also had several barriers.

Those issues raised in the interview sessions were also stated in annual local health reports. Registration of food premises ensures that officers in charge are aware of the food businesses and inspect them. However, many ready to eat street food vendors in Indonesia have not had supervision or been checked. Registration and mentoring of street food business is more problematic than for fixed premises because some of them are mobile and not easy to track (Bandung City Health Office, 2017).

A study in 2006 in Indonesia observed e-government implementation need support in the following ways:

a. from the executive and legislative sector as it is their political will,
b. engagement with local partners, especially on understanding technical problems,
c. professional capacity building
d. bureaucratic regulatory reform at local and national level(Steer L., 2006).

In 2014, one member of the Indonesian chamber of commerce stated that the licence process in Bekasi has not been integrated in the one stop services yet. It was not effective and overlapped. The government need to work together with efficient and effective process in local areas and improve interconnection with central government. The government regulation needs to support the public service process. The synchronization between departments is essential because sometimes the licence is delayed because of barriers from central departments (Hana O., 2014).

The implementation of a one stop service integrating system needs several factors to run successfully such as management commitment, culture and mind-set change, competency of personal and support from sufficient infrastructure (Wijayanti et al., 2013).

The findings showed that personal competence was not maintained in a standardized manner but relied on irregular training from health office and NADFC (including some collaboration work) to enrich their skill and competence.

This study also observed similar issues about food hygiene implementation, its control and monitoring, enforcement mechanism and unclear legislation.

As mentioned by central health, it was found that stickers which used by one primary health sanitarian had different design from the labelled sticker provided by environmental officer representative in local health (Please see Appendix IX). This indicates poor collaboration and it is very confusing for the food business operators and the consumers.

From table 7.8, we can observe that the local health level including sanitarians had similar problems in good governance process and good performance. In addition, regulation and authority was not clear enough to carry out their responsibilities to their own satisfaction.

After the decentralization, the local government has authority to develop policy and arrange their public service in food safety control and it was confirmed by participant in central level (Table 7.6, Par 5H). Participant in local level (Table 7.8, Par 8H) explained that they did not have power to do food enforcement because they did not have the regulation and capability yet both local and national level for conducting it.

Since 2000, Indonesia replaced the centralized system to decentralize resulting in several changed powers transferred in a wide range of responsibilities i.e. primary and middle level education, health, public works, agriculture, and other economic sectors policies including food safety system. Local government is responsible for ready to eat food and PIRT (home food industries). The results from these interviews confirmed the decentralization program in Indonesia had limitations in the area of food control. The programme required increasing capacity in subnational governments because the previous local government had not built their own capacity but had mainly functioned as implementing agencies of national policies and programs (Nasution A 2016). The increased capacity that was needed, including numbers of people and competency, does not seem to have happened to the degree required for satisfactory and complete delivery of food controls in the street food sector.

The change of governance system from centralization to decentralization created the need for local government to strengthen preparation of a regional development strategy including regulation and its resourcing. Regional decentralization represented multi-level governance that involved central, regional and local levels. The relationship effect between decentralization and improvement i.e. government efficiency and better governance is complex and not easy to establish or evaluate. In switching to multi-level governance, certain competences at national level need to transfer to sub national, or occasionally to public and private authorities(Ivan A & Cuglesan N, 2009). This obstacle has been identified in Table 7.8.

Decentralization or regional autonomy legislation in Indonesia was drafted in 1999(Law 22, 1999) and started to be implemented in 2001. Empowering sub national level or provincial levels were shaped without a well-developed transition and implementation strategy. The outcome of decentralization should manifest in improvement of public service delivery and participatory government for citizens. In the delivery of food control, the competence of local technical expertise is still problematic, and the local government still appears to deliver public services to minimum standards. Implementing better governance to achieve significant change is necessary. The decentralization of food control in Indonesia fails to meet successful decentralization in World Bank criteria. Lack of resources including finance for providing public service was one problem, but others include poor accountability and transparency mechanisms, and ineffective development of legal systems to facilitate decentralization (Green K, 2005).

The strengthening of local government is crucial to carry out an implementation policy. It must be supported by local regulation to improve public services. In addition, according to the interview information from local health officers and sanitarians they had inadequate budget to deliver their programs. In fact, after decentralization, the central health budget had an increased share from the income and expenditure national budget (APBN) but the allocation for local spending was less. The study in 2009 showed little increase in public funding for health because the budget was still made by Ministry of Health which had no performance accountability to district (Heywood and Harahap, 2009). This means that money could not be allocated according to work load or demand, even if central ministry desired to do so.

In Bandung, in 2011, there was a major decree that proposed the management of street vendors as an informal business sector which can use public facility in open or indoor area. It suggested each street vendor has a restricted location based on colour zone such as green, yellow and red. A special task force (Satgasus) was developed to support and manage street vendors (Perda Kota Bandung, 2011). In this task force, SME office and design and spatial office played essential roles as coordinator and secretariat of task force. For this reason, officers from these sections were also interviewed.

The SME office confirmed that they have their own objectives that differ from the local health office. They focus on capital fund, zero growth of street vendors and sustainability of street vendors business. They collaborate with the tourism office, design spatial office, municipal police unit under local government, and others relevant stakeholders to create the task force unit (Satgasus). Based on the interview, the SME office confirmed that the number of street vendors in Bandung city was 22,359. They claimed the information was from Research and Development local agency (Bapelitbang, 2015). From the data, it showed that food vendors comprised about 12,697 (56%). This data cannot be validated as there is no registration process for street food vendors. However, it is a very large number of potentially high-risk premises to control.

Table 7.9 Supporting street vendors and its obstacle in local level (support partners)

Code	Interview script	Coding extract
12S	'*We, in task force,* ***do not have the updated data about street vendors, it should be the sub-district input all information*** **of it**, *but I do know if it runs or not, now we used the data from Bapelitbang*	Lack of data (Lack of responsiveness from others partners)
13S	*'..****we facilitated****, or* ***conduct meeting between informal vendors or business owner with bank or others fund*** *or when the manufacture has CSR or profit for micro business…, the interest rate was vary, some of them small interest without collateral or should be a collateral….'*	Facilitation
12S	*'..****the informal sector has low financial literacy****…****we educated them, we help them*** *to* ***promote their place, and invite them in several events****….we concern to human resources, promotion and marketing…****one of material training we have was food hygiene we collaborate with local health we invite them to be our speaker in our event****…that* ***because we have a new staff move from local health, so it makes us collaborate smoothly****..''*	Provide training for finance and food hygiene (collaborate with local health) raining
13S	*'In fact,* ***we can see the different quality or hygiene between restaurant and street food, ideally it should be simila****r,* ***it need sanitation*** *etc. but* ***we had problems with overlapping or contradictive between regulations****…i.e. about pavement it has different view of it…the ministry of affairs stated that in pavement there a space for street vendors but in ministry public work the pavement only for pedestrian..because it was not for street vendors'*	Overlap regulations
12S	*'actually, in* ***local regulation the location zone arrangement is was not clear define*** *especially for yellow zone, it was not detail…'*	Unclear regulation

Table 7.9 Supporting street vendors and its obstacle in local level (support partners)

Code	Interview script	Coding extract
13S	*'technical **awareness for street vendors has not maximal yet, we admitted it**…we **collaborate with others local office…tourism..local health..spatial design…today there was a place like Malabar Garden that had discretion from major by decree**, so it has a water source, septic tank, and other hygiene sanitation facilitate such washing hand and washing basin for cleaning the plate or glass..'*	Based on major discretion
12S	*'actually, **we had budget limitation to educate them we just did roadshow**…we come to their place and invite them… **street vendors they work alone**…if they come to us **they will lose their income**...'*	Budget limitation
12S	*'we also **face culture mind-set we try to fostering them i.e. feng shui**….actually some of them was not really street vendors I means they had huge turn over…but they tend to avoid tax…so they did like street vendors even though they turnover really high…they do not want to change the food premises into better place…they afraid consumer will go because they think the price change…something like that. That's culture and behaviour hard to change'*	Behaviour of street vendors
13S	*the street vendors behaviour when they rejected to be enforced**…some of them acted as a physical victim by unconscious to attract their friend or as a reason to react**….'*	
12S	*'In order to solve this problem, **we need to think about their live hood and not annihilated their business**...'*	Supporting the live hood
14S	***we provided the design of display table or sanitation facility**….**the standard design has not followed the regulation in health ministry**…**to be honest we never see those things**…'*	Lack of collaboration coordination
	'actually, *the spirit of special task force **it was not about sustainability of street vendors but more on the city problem that need to be arrange how to facilitate the vendors and consumer**…to be relocate not far away from previous place….' 'we handle the case by case or case…if we followed our each institution role that maybe it cannot be done…**because the street vendors is informal sector**…**it was breaks roles**… if we facilitated them all…i.e. provide sanitation it means we legalised them to trade at that place…**but if the place pointed as tourism object and there was a major decree to be formal**…**maybe our requirement will be followed the regulation because it was legalized**……the problem comes up when we would like to arrange the existing street vendors… while in previous more than decades actually they had not been arranged yet they did not protest…we tried to enhance the image of location area'*	Only focus to enhance an image, because informal sector had not in city design (lack of accountability)

Table 7.9 Supporting street vendors and its obstacle in local level (support partners)

Code	Interview script	Coding extract
14S	'the ***spirit of special task force more for city planning****, we just set the design model…in example when* ***we had to relocate street food vendors in one-point area****…*	Relocate temporary (lack of responsiveness)
14S	*'****actually in our local regulation it stated that shopping centre was mandatory to provide place for small business and informal sector,*** *… and for certain area should provide minimal 10 %...that crazy if we talked about the business centre…how much money if we calculated into rupiah (IDR)* ***in previous that was not implemented…and today has not implemented well, we do not consider the minimal area… just provide at least they can use it****…'*	Regulation is not well implemented
	*'…****there was a case when private hospital refuse to accommodate the street vendors…which also supported by residents around them…I do not understand the history of red zone was giving for hospital…the hospital should be facilitated…they told us they already facilitated but in fact they just provided for expensive eating place or franchise…actually we had prepare it about two years but in final the residents also refuse****…there* ***a missed communication in socialisation to residents*** *and we did wrong strategy for dealing with the condition…we cleaned the area first because we want to manage it as our further step…it should not be like that..'*	Unfit regulation (lack of accountability)
	*'..****it was really hard to push the shopping centre for accommodate the street vendors****…for street vendors* ***we talked to them that they cannot let their employee to buy their meal in street food…they need to provide the place for it…****and we thankful* ***they agree even though they putted away in basement 5****…I do not know if the food premises or the food that sold was suit with food health regulation. I think the personal health of food handler doubtful…the place far away…'*	Incomplete regulation

The respondents also mentioned the character of street vendors when they face enforcement and stated their perspective about the street vendors livelihood.

Several barriers were identified by interviewees in this session. They include:

- the lack of regulation (unclearly defined and overlapping),
- limited budget and
- limited strategy for raising awareness.

The legal status of street food vendors can be unclear. In Law 22-year 2009 on traffic and road transport, it states that road closure can be used only for religious, state, sport and cultural activities. Carrying out activities that result in disruption of the function of the road (as in its use for street food vending) will be punished with a maximum imprisonment of 18 months or got fine sanction. However, in public works ministry decree 03/PRTM/2014 in year 2014 article 13, sub article 2, give interesting view of small business activities. It stated that utilization of pedestrian network infrastructure is permitted for the utilization of social and ecological functions in the form of cycling activities, social interactions, formal small business activities, outdoor exhibition activities, green lanes, and pedestrian facilities. The opportunity for small business activities is allowed but it should be formal or legal form. This means that street food vendors will be considered illegal according to Law 22-year 2009 but if they are able to register or become part of a legal business activity, the public works ministry decree 03/PRTM/2014 will permit them to trade, provided this is supported by local government regulation.

This uncertainty further impacts on the sanctions for noncompliance. Regional Safety regulation usually includes both prevention and or act-based intervention with monetary sanction. This method is also applied for public health issue including food safety. Prevention intervention is used by an authority to prevent or stop something, for example closing a business without a license. The safety regulation also applies after an act and the sanction or penalty size based on monetary penalty can be imposed for violation of regulatory requirements. The safety regulation answers the need for control of behavior and seems to take prevention rather than act based sanctions (Shavell, 1993). Macrory (2006) argued that any sanctions assisting enforcement to ensure food business compliance should be flexible and fair (Macrory, 2006). Other researchers also mentioned the most effective tool for enforcement may not always use monetary sanctions (Costich, 2013).

A study in Bandung city (Hermawati R, 2017) identified a rogue officer who provided information to street vendors on the time when the enforcement operation of unauthorized site will be conducted. Therefore, the street vendors pay this officer for

leaking information so they can avoid eviction or enforcement action. This situation would be controlled if there was official registration and authorised sites for street food vendors.

Some of them also have strategy to argue, provoke, and fight with the municipal police. Others cooperate by giving bribes, redeeming their sanctions and obeying the relocating program. However, it is not guaranteed they will stay in relocation place if their business was not running or they lose their customers. The study findings confirmed that dialogue and negotiation for fostering and management were preferred possible approach rather than eviction (Hermawati R, 2017).

The design and spatial office have function as coordinator for arranging the design and setting locations for the city. While for planning and information, the leading sector was in sub-district office.

The interviewees in this study commented that the design and spatial office were mainly focused on city planning arrangement at the expense of other issues such as hygiene and sanitation matters. The contents of the Health Regulations for food premises were not always considered in full. The street vendors as informal sector was handled case by case. The role of street food had not followed other related regulation yet. (Table 7.8 interviewee 14s) The local government had not well consulted the regulation to the stakeholders that made it hard to implement it smoothly. The regulation related to food hygiene was not considered as a requirement when the street food vendors were relocated. The local regulation already stated that shopping centre was mandated to provide place for small business and informal sectors. In addition for areas more than 2000 m^2 it was mandatory to provide minimum 10% for these type of businesses (Perda Kota Bandung, 2009). However, the local authority had not applied it as well as stated in regulation because they need to accommodate the shopping centre management or formal business that rejected the regulation. The strategy for supporting informal sectors needs to be developed by government in several ways such as promoting regulation, review the existing regulation, provide training on the content of the regulation (FAO, 2003). There needs to be local authority support for increasing collaboration and maintaining communication between stakeholders(FAO, 2003). This means that any new

or revised regulations should be fully consulted. Both formal and informal sectors should be treated equally as a part of food system. Informal sector needs to be recognize and supported by policy and regulation (Battersby et al., 2016). This is particularly important for street food vendors in order to protect the public health. The government need to address this issue with sufficient resources. A study in Makasar City, Indonesia, showed that street vendors issue could not be tackled by empowering the community, separated from bureaucracy system, unless they had support enough in having skill and competency to deal with the issue. The study also confirmed that ineffective local regulation and national regulation negatively impacted on empowering street vendors(Kasmad.et.al, 2018).

Using the theme analysis as describe in sub chapter 3.6.2, the researcher recognized barriers for implementing food safety control. In local government, the barriers were divided into internal and external factors. Based on the interviews conducted in local government to main actors and stakeholders as supporting partners, this study describes the main factors impacting on food safety control delivery in Figure 7.6.

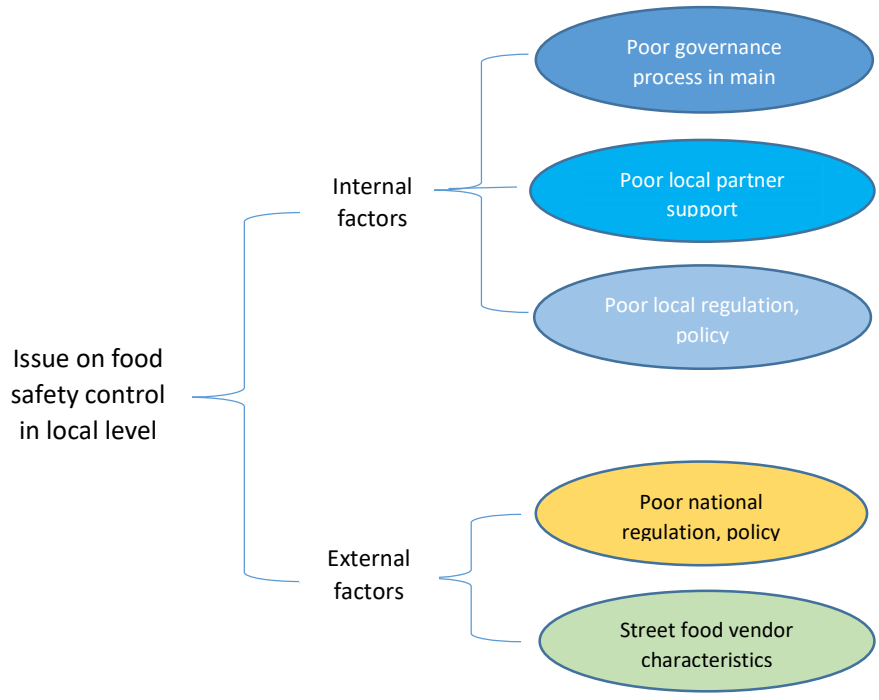


Figure 7.6 The cause of food safety control issue in local government

7.3.2 Food safety control in stakeholder perspective

7.3.2.1 Stakeholders perspective on ready to eat street food in school

This interview session involved several participants from local, provincial and central education offices. The perspective from head of schools and sanitarians also enrich these findings.

Local Education Authority in Bandung city has responsibility for non-formal education, pre-school, primary school and junior school while for high school was handle by provincial education office. The study asked for the perspective of respondents as school practitioners on the ready to eat issue in school and related issue such as healthy school program and also hygiene and sanitation facilities.

Based on the interview session in Table 7.10, several barriers to food safety in school can be identified. Inadequate regulation and its implementation, internal school management, lack of school infrastructure and lack of parent support were raised as factors that can influence the implementation food safety control in school.

Table 7.10 Stakeholders perspective on RTE food in school and its obstacle

Code	Interview script	Coding extract
17E	*'**we had program to give additional food to pupils …milk..until now we have letter decree that run by three ministries (health, education, and internal affairs**) to do collaboration for healthy school (Sekolah Sehat)…**we have different part..we, education, concern on learning and development process on pupil,** and health office can intervene how to physical health, healthy food and so on.. and internal affairs that relate to local government…. **how to accommodate the need and achieve goals become healthy school...**'*	Additional nutrition by giving food Limitation budget based on priority
15E	*'we **have nutrition program by giving financial support to local for breakfast at school'***	
	*'our program **was additional nutrition and supporting for canteen facilities** for primary school, but the budget limited so we need to **have priority based on the school condition'***	
17E	***'the indicator was based on minimum standard service..but the sufficient of it i.e. health toilet is relative….I means that depend on the budget ability that had by local government and so there was CSR for supporting it. Because infrastructure cost much...'***	Insufficient facilities and infrastructure for hygiene and sanitation

Table 7.10 Stakeholders perspective on RTE food in school and its obstacle(continued)

Code	Interview script	Coding extract
16E	*In education* ***we have accreditation system for school****, the accreditation based on score,* ***but mostly it was focused for learning and teaching activities****…and availability hygiene and facilities just a part of it…* *In education we have a supervisor to see the school activity in certain time but they seem did have not enough competence to do it...' and it was pointed to again teach and learn activity*	Accreditation audit system was focused to teach and learn (Practice of audit school system)
17E	***'actually, for revitalisation it cost a lot, we want to use the standard but it was not sufficient enough, so we have evaluation based on damage level…and we do priority scale, step by step, yeah maybe it takes time, long****'*	Priority program for facilities and Canteen is not include in it
15E	***Canteen is not included in achievement indicator on SPM (minimum service standard) in school. Classroom and library are priorities****. Maybe it is not library, only book corner, it is fine, at least the school has a place to read****.*	
16E	'***the school health program had limitation, most of the facilities for canteen cannot provide by school, the library or corner to read which included in minimal standard service cannot provide by some school...''***	
15E 13E	*'in three latest year* ***we support infrastructure for canteen and sanitation which was an output for school health program…. for basic sanitation we have SGDs target in 2020..but our budget was limited..the source was from National Expenditure Budget (APBN)…****we need* ***to have priority list which fulfil kind of criteria****, cannot give to all local, and* ***we do not know the budget will continually available or not****…'*	Limited budget
	'maybe for ***another additional infrastructure, the school need to think how communicate to parent committee or collaborate with CSR..***	Alter budget
18E	*'actually, when* ***I first move here the sanitation condition was worst, the water supply is limited and drought of water supply…we need to dig and add pump…in addition the number of toilets also limited…****one of them become a place for placed the damage goods.* ***I have talked to parent committee. It can help but need time to collect money because mostly of the parent was in low social economy strata*** *…low wage laborers or street vendors..hard to find the CSR..we are still struggling'*	Limitation facilities and Limitation support for it if the parent from low social level
19E	***'I have a similar problem with water supply but my parent committee helpful, they have sufficient budget to support us, so the problem can solve****…in previous we asked each children bring a bottle of water from school to deal with it..'*	Parent support for funding

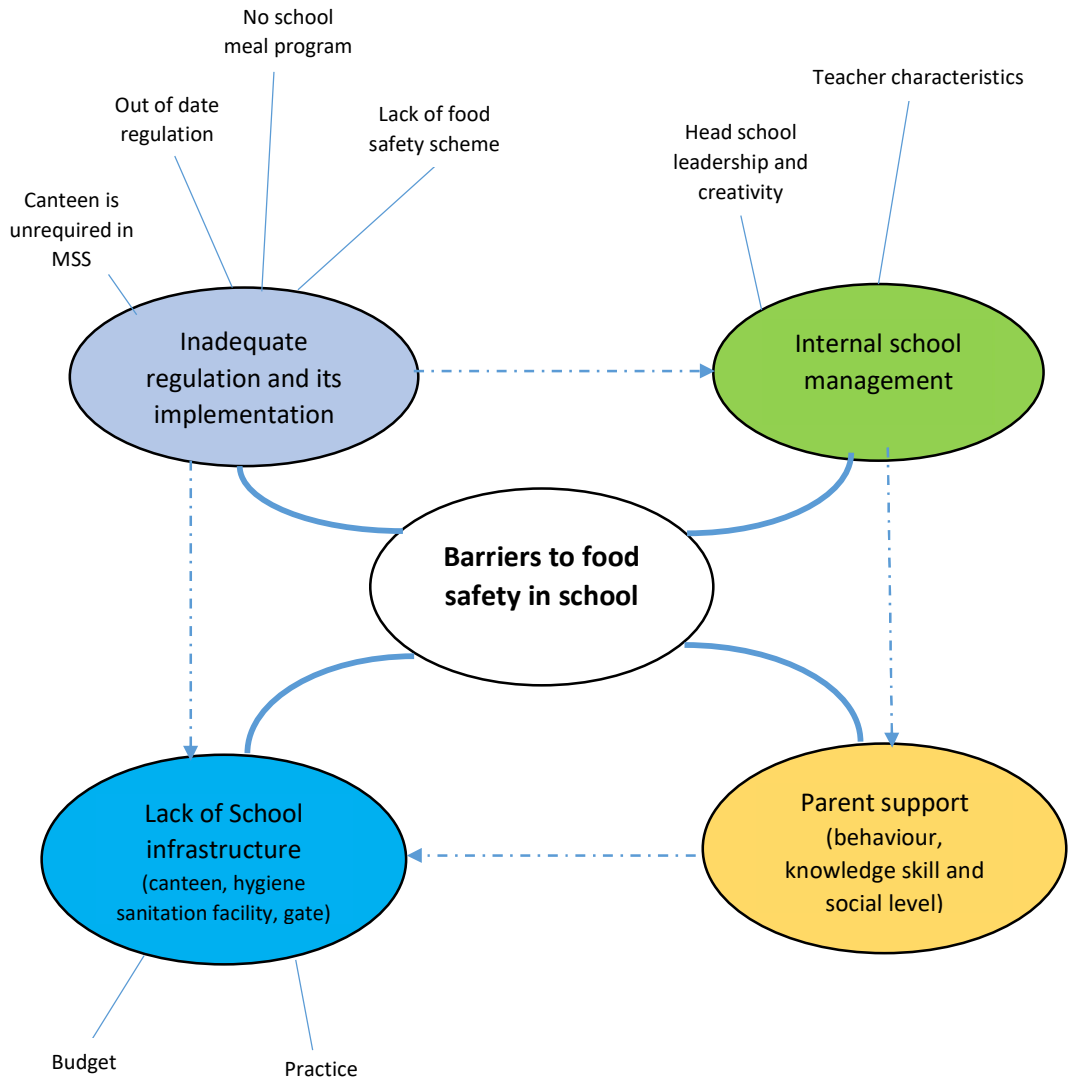
Table 7.10 Stakeholders perspective on RTE food in school and its obstacle(continued)

Code	Interview script	Coding extract
17E	*'**some of school let the food street vendors joint in canteen or let them in school not in front of school to make them can control by school and they do awareness as well**..that was a responsibility of head school '*	School policy
18E	***'we already asked the parent and pupil to bring meal** but **the problem is some of parent has not support for it they tend to choose give money to their children** and the worst was when the pupil is the grandson of the teacher and he did not have support from the family as well..other parents will compare it and disobey as well...'*	Parent support for pupil behaviour
15E	***As far I remembered, sanitation is not including Minimum Service Standard (MSS) as well; it is more for supporting study activities. I am not sure, I think, in instrument accreditation canteen and sanitation are include…actually we already informed that the material and item in infrastructure list has not suit with current condition…**we cannot revise it because it was not our authority it was on Badan Standar Nasional Pendidikan (National agency for standard education*	Sanitation is not including in minimum service standard Out of date of regulation
11 E	*'**but in fact the library in school that need for learning and teaching activities**…not all of school have it…so canteen I doubt it..**when we talk about canteen that appointed for health school.**.I watched the canteen provided food just simple but they do not considered that it can lead carries for pupil teeth and their personal hygiene when they received money and they did not clean their hand to serve the food '*	Less priority
12E	*'in school, **not all of it had canteen,** including Unit Kesehatan Sekolah (School health Services) room has not functioned optimal*	
18E	***…we do have canteen but the pupil still buy from street food vendors maybe the taste, the colour and the cheap price…**we have lock the door but we do not it consistently because we do not have resources to stay, I means security, the pupil sometime climbed up the wall..our wall has not really high enough, and the other reason why parent **do not bring their kid food because they do not think efficient. In addition, we have also barrier that teacher who teach here also had grandson who did not bring the meal…but buy from the street food as well...'***	No school meal program, Lack of internal school management, Practice limitation to control (wall too short) and parent support
17 E	***'Actually, it hard to do behaviour change,** especially when the teacher who take care their behaviour also exemplifies poor behaviour i.e. smoking in school area'*	Teacher characteristic

Table 7.10 Stakeholders perspective on RTE food in school and its obstacle (continued)

Code	Interview script	Coding extract
17E	***'Actually sometimes we feel worry when the food donation*** *i.e. milk come to the school…because t****here was a school had a case that pupil feel dizzy and nausea after they consumed it.****.all of food donation come to school and local health sometimes did not know about it…****maybe we need to anticipate how to deal with it or having mechanism and awareness' In previous, we had collaboration with NADFC, they do foster and awareness, if the canteen already had fulfilled hygiene so they will be had star award****. But I do not know about it today*.	Implementation food safety control and regulation
15E	*We* ***synergised with BPOM and environment health directorate in health ministry****. We* ***provided infrastructure to school and sent the data that schools that already supported by us to them. Then BPOM can intervene in management system by giving mentoring and socialised about healthy food to canteen in schools, which one that does not have additive,*** *how to serve and safe to consume by pupils...'*	
18E	***'we have the aid from the central education ministry for build canteen..but we have not visited by BPOM..we do not know about the guidance*** *actually we have visited by doctor in primary health for school health program in general i.e. teeth and health …but for only concerning food safety has not '*	Not visited about food safety only healthy school in general (lack of food safety scheme control)
9H	***'the NADFC come to school they already have list..we just come help if local health contact us to support them*** *some of head school stated that they need us to accompany for giving awareness to them'*	Help by request (lack of food safety scheme control)
17 E	*'****we do not do sanction for the street food vendors even though there are so many cases outbreak happen, maybe it needs regulation and collaboration…consistency****…*	No sanction (lack of food safety control scheme)
10 H	*'When the head school only* ***talk alone not accompany by us, they will not obey..hopefully after we talked to them..they changed…but we need to come again for checking making sure****….****the head school need consistency as well and it hard to change their behaviour '*	Head school leadership (lack of food safety scheme control)

Figure 7.7 summarises the main pattern of issues raised in the interviews.



Note:

-Caused by
-Can support

Figure 7.7 Barrier to food safety in school

In Indonesia pupils do not have school meal at lunch or breakfast provided from the school. School Health and Nutrition programme was released in 2003. It was revised and resulted in the School Health Policy and joint MoU between three ministries (MEC, Ministry of Internal Affairs, and Ministry of Religion) and MoH. The program was focused on water and

sanitation at school, *School Health Services* (UKS), assisting school feeding, and Health law and its services by Primary Health. In a study in 2009 the School Health and Nutrition Program recommended improving clear water and sufficient sanitation at all schools to improve hygiene and identified the need to enhance collaboration between sectors (Del Rosso JM & Arlianti R, 2009). Furthermore, in order to support pupils, President Instruction 1/2010 was launched a Program 'Pemberian Makanan Tambahan Anak Sekolah (PMT-AS)' by education ministry and two other ministries to improve nutrition for pupils in primary school.

From the interview sessions, it became clear that budget was an issue for development and infrastructure of hygiene and sanitation facilities. This study noticed that the function of the head of school in management was crucial. In Law Number 20-year 2005 article 51 covers School Based Management and requires management of the school through collaboration between head of school and stakeholders, including parent committee. The objective is enhancing the school performance. However, they found difficulties to change the condition. The internal school management and parent support to improve the condition was really needed.

In Indonesia the public state school does not have a school meal program. Not every school has a canteen to provide or sell the food to pupils. It is not included in the minimum service standard for basic education needs. In addition, the requirement for hygiene and sanitation facilities may not be met in all schools. In a study in 2014, in Probolinggo city, the top complaint in the survey related to the poor quality of the health school unit. Also the number of toilets was not sufficient and those which existed were in bad condition (Bachtiar, 2014). A study in 2017 observed that while 60% of schools had water supply and 68% had washing hand basin only 24% had both water and soap. Developing important policy and practice in Water, Sanitation and Hygiene (WASH) may help for improving hygiene and sanitation in school (Karon et al., 2017). The ministry education and culture decree (MEC, 2017) about criteria and primary school accreditation requirements lists facilities and infrastructure such as minimum area and buildings according to the number of pupils . There are also requirements on safety construction including sanitation i.e. toilet, safe water source, waste line and hand washing. Canteen also mentioned as basic

infrastructure in primary school. However, many schools lack basic hygiene facilities or canteens. This means that, unless the pupils bring food from home, they use street food vendors to acquire their meals during the school day.

The school which participated in this survey had released several policies to deal with safe food for pupils. The head of school asked pupils and parents to provide food from home because canteen was not sufficient. The canteen was unable to meet the food needs of the pupils with regard to nutrition, price or hygiene. The school also tried to manage the street food vendors. The interviewee mentioned the problems and how the school tried to manage it, but also identified the limitations. These included the need for related regulation, the development of a food safety scheme to support schools and infrastructure to assist implementation such as security around the school in the form of walls and gates which can be closed and secured.

A study conducted from 2006 to 2010 in six cities, including Bandung City, sampled street food. It showed 72.08% of samples were positive for contamination by hazardous material such as formalin, borax, or rhodamine and the over use of cyclamate and benzoate. In addition, 45 % from that sample were contaminated by a faecal indicator microorganism, *Escherichia coli*. It explained street foods should be considered as school meals that contribute nutrient and energy in pupils and pointed out several problems in food hygiene from preparation to quality of street food that pupils consume as school meal (during the school day). It also found limited coordination between NADFC and local government for promoting, control and monitoring the street food at school (Sahat P Manalu and Suudi, 2017). Another study, conducted in 2018, in North Sulawesi Indonesia, confirmed a significant relationship between diarrhoea prevalence and ready to eat food consumed by pupils at primary school. The observation found some of the pupils did not take a breakfast at home or bring packed meal from home to school. They had limited money from their parent and they bought ready to eat street food in front of school and around the school (Gultom M et.al, 2018). An earlier study also found ready to eat food that was sold in primary schools in Jakarta, Indonesia contained *E.Coli* (Puspitasari, 2013). These publications and the results reported in Chapter 5 (Figure 5.1) demonstrate that street food being accessed by school children in Indonesia can be of a poor standard microbiologically

and/or contain hazardous substances and that the problem is widespread. The responses from the interviewees confirm the schools are aware of the problems but have limited ability to control the problems.

The school practitioner described a collaboration program designed to provide safe food environment in schools. In 2013, NADFC had launched the guidance for safe meal for pupil including nutrition balance and food hygiene. However, not every school is familiar with this guidance or follows it (Table 7.9, participant 18E).

The food hygiene in a developed country such as UK have legal requirement that the schools must comply with such as the Food Safety and Hygiene (England) Regulations 2013. These implement EU legislation such as Regulation (EC) no. 852/2004 which specifies general hygiene details for food businesses which must also be followed in schools. The requirements include the need for the food business operator to register with the local authority and also to manage all food activities or issue in school. The legislation also required the person who handle the food must be supervised and trained for ensuring that food safe to consume. The delegated person who manage food in school such as parent or staff which prepare for school events need appropriate training or to follow guidance/ information from FSA for example Safer Food Better Business and Catering from Home Safely. The school also is audited by food inspectors. How the school meets the legal food standard is reflected in Food Hygiene Rating Scheme.

A study in Brazil (2013) showed that food safety assessment intervention by check list every three months in sixty-eight schools can improve food safety and promote changes in the attitude and practices of food handlers(da Cunha et al., 2013). A second study in Brazil (2014) reported poor behaviour of food handlers in handling food, lack of equipment and workplace limitation for proper food handling, lack of school infrastructure in hygiene and sanitation.

A risk perception study was conducted in Bangladesh, which showed the importance of training for food handlers. An evaluation of the training needs in the institution by the school community allowed them to be involved in health and safe food practices and improve the conditions (Machado et al., 2014).

The food practitioners in Korea found barriers for implementing food safety management performance included sanitation facilities and hygiene, and lack of equipment in school. The study also showed the need for support from school management (i.e. supervision and work collaboration as co-worker) and also from teachers (Lee KE 2005).

7.3.2.2 Street vendors' perspective

7.3.2.2.1 Government support needed by street vendors

In this sub section describes the result from the baseline survey (n=269) about what kind of support that has been done by government to food street vendors. (Fig.7.8).

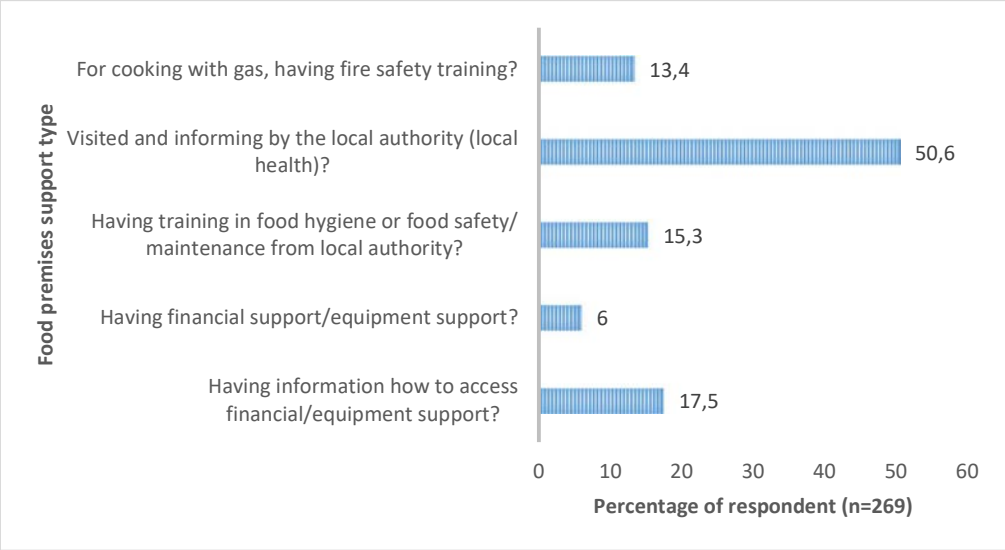


Figure 7.8 Percentage of respondent on governments support to food premises

From the results (Figure 7.8) confirmed only half (50.6%) of the sample group were visited and supervised by a local government officer (which conducted by sanitarians). This finding was also supported by Bandung annual report of local health, the supervision and educational approach by the primary health authority is not running optimally. Un-centralized food street vendors or hawkers that move and are untraceable was one of factors faced by sanitarian officers (inspectors) to supervise them (Bandung City Health Office, 2012).

The local health officer labels a street food premises with a sticker to show the premises has been supervised. There are two different colours, the yellow one is used for ready to eat street vendors that have been visited between one and three times. The green one is issued when the sanitarian considers they comply with hygiene requirements. However, during the baseline study (chapter 4) premises were observed displaying green stickers but which scored poorly on hygiene compliance. Examples of these stickers can be viewed in appendix VI. This result aligns with Health Minister Decree No 942/ 2003, a guidance and supervision for hygiene and sanitation, which stated food hygiene inspections for ready to eat food micro business including street food are carried out by local health. The decree also defined tutor requirements, material training and its evaluation (MoH, 2003b).

The socio-demographic data in Chapter 4, indicates that 17.5% of respondents have received training. Food business operators have training from government and non-government organizations. However, the training material delivered can be variable between government and non-government. In Figure 7.8, 15.3% of respondents had food safety training from local government. In Bandung city, the local authority (Department of Cooperative and Micro Small Medium Enterprise (SME) also have programs for giving training and supporting loans for Micro SME. The loan is available to Micro SME after they received training how to open the business. The local authority helps to bridge between Micro SME's and finance institutions or national banks to apply for additional financial support or credit for their business. However, only 17.5% of respondents knew how to access financial support/equipment support and only 6% of them had support for their facility.

In Figure 7.9 also showed the response from 269 food premises who participate in baseline survey. They asked to rank what kind of support they need from government.

In order to explore what kind of government support they would like to receive and in which order of importance, the respondents were offered three options to be ranked from 1 until 3, which 1 was the highest rank of aspiration.

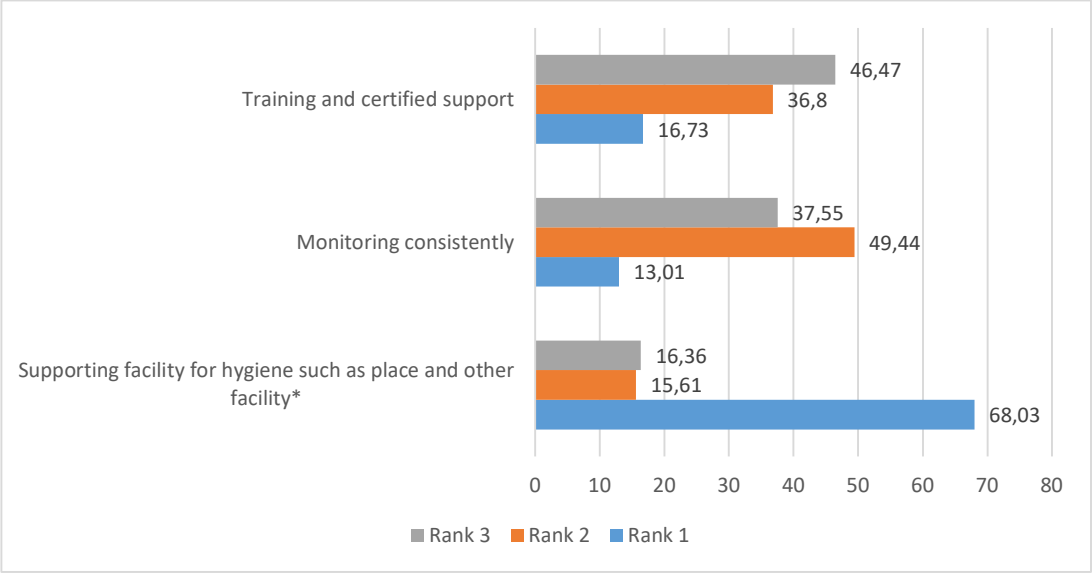


Figure 7.9 Rank of aspiration on what respondents needed from government

They asked to identify and rank three issue as the most important by most respondents. Two-three of respondents (68%) confirmed an appropriate place with hygiene and sanitation facilities was chosen as the most important (Figure 7.9). Surprisingly, 17 respondents (6.31%) of 68% also stated that they need not only appropriate place but also need financial support from government for supporting their business. Inspection or monitoring routinely were chosen as the second rank by 49.44%. The reason given was to make sure there was no non-compliant food sellers breaking down consumer trust or placing consumers health at risk. The last ranked was the need for certified food hygiene training and relevant training to improve their performance and compliance (46.47%). These form part of the strategies suggested by the WHO to improve street food safety (WHO, 1996) and are supported by the food business operators themselves.

7.3.2.2.2 Street vendors' community perspective

As part of the qualitative study a representative of a street vendor's community was interviewed to gain their perspective. In this session, the researcher asked one of the head of community street vendors how they established their community, what kind of government support existed and what kind of obstacles were faced. They were invited to share any kind of experience as street vendors. The local SME offices identified and share

two contact persons of street vendors community. However, this study only has one participant who has a RTE street food cooperation project with SME offices in Malabar Garden while the other one is a street vendors community in many kinds of product. This study chooses only one participant to focus on RTE street food. In Bandung city, on October 2018, Food Street Valkenet Malabar was launched as one of the street food destinations in Bandung city(SindoNews.com, 2018). It is a pilot project that arrange a central point for RTE street vendors to sale in appropriate place by doing collaboration between SME local office, community street vendor and sponsor.

The interview session was held in Food street valkenet Malabar. The researcher also viewed the activities of food street vendors. The participant is a leader of street vendors community coded as 20C, namely 'Forum PKL Juara'. In this session, the participant discussed the history of establishment the community street vendors and explained street vendors' activities and its problems. In table 7.11. and table 7.12, the data of interview was study captured the description extract it but not transform into code because it was only have one participant. The result was figured in Table 7.11 described respondent perspective on government support and their role.

Table 7.11 Food street vendors community perspective on government support and their role

Interview Script	Description
*'…**in previous I was a trader in street vendors** but my product is not food… **I saw many kinds of problems we have face as street vendors**…**I quit…back then I was a 'preman'**…**most of urban citizen in Indonesia do not have a good income or they want to have additional income they go trade to vendors**….'*	Negative perspective from citizen (marginal feeling)
*'…**when we tried to improve street food vendors** in this garden, I **came to local government asking their advice and permit, find the corporate social responsibility** from food industries to support us and collaborate with us…. this tent, hygiene and sanitation facilities **supported by them** but we need to collaborate for selling or use their product…*	Initiative to improve their business and have government & stakeholders support for surviving their business (support for surviving their

Table 7.11 Food street vendors community perspective on government support and their role (continued)

Interview Script	Description
. ***after we got the budget I came to local government again consulting the design, water supply, electricity****…. however,* ***the budget was not enough to cover what we planned for hygiene and sanitation facility*** *i.e. the number of wash basin for washing…we reduce it…'*	business, location and hygiene facility)
'*…. we need support,* ***we cannot fight over street pavement or compete with big business i.e. store, mall, hotel, supermarket****. They have money and have legal support, permit place…****please help to fight…fight for clear regulation… for poor people who living in urban****… '*	Willingness to have legal recognition
'…maybe ***they hate me, because I reduced the practices, in previous maybe street vendors give to each member of Satpol PP, but now we just gave them less****…****the illegal levies should be gone****...'* *' ….****in previous there a tent had be confiscated, I tried to take care*** *of it,* ***when I come it already gone and used by others may be sold it….I tried to ask who in charge about it and ask why it was gone, but they said there is not letter to process the cart, I was confused….it was awful****…the cart price is 30 billion IDR (1600 GBP), we need to reform and the bad guys need to rolling out…'* *'…****it is a reformation era****…****we need to revise our Law and regulations****….to have sided to public need…'*	Avoid authorities play naughty, motivation to change condition (Need clear enforcement regulation)
'…. ***sometimes we are needed 100%***...but ***also they did really fast to forget us****…****now we are needed because of elections or local elections****…'*	Use as political tool
*'…. **actually, the number of street food vendors can be stable**… I mean* ***not increased rapidly if the government control it and not give them a place to trade****…*	Clear government regulation

The participant shared the story how he started this community. He was previously a street gangster who rule an area in Bandung city. A preman is a member of an Indonesian street gang. Usually they patronized an area and street vendors must contribute security money. Citizen are very negative about them because of their activities related criminality and violence.

He mentioned about his initial contact to government and other stakeholders asking for information and support. It showed that he had leadership and motivation for having better condition in the street vendors' community in Bandung city by influencing the establishment. He also argues they need support from government for surviving their life and its business.

This session found interesting facts that bribery practices by municipal police unit (Satpol PP) and other actors has occurred. He realized a bad person potentially plays a role here. It showed that they need legal recognition for reducing illegal process.

The participant stated that the numbers of street food vendors could be addressed by several circumstances. One issue is the existence of rogue officers in local government who are not equitable in their treatment of the vendors. These officers are often referred to as the intellectual mafia because they understand the processes and legal procedures and they play with their legal role.

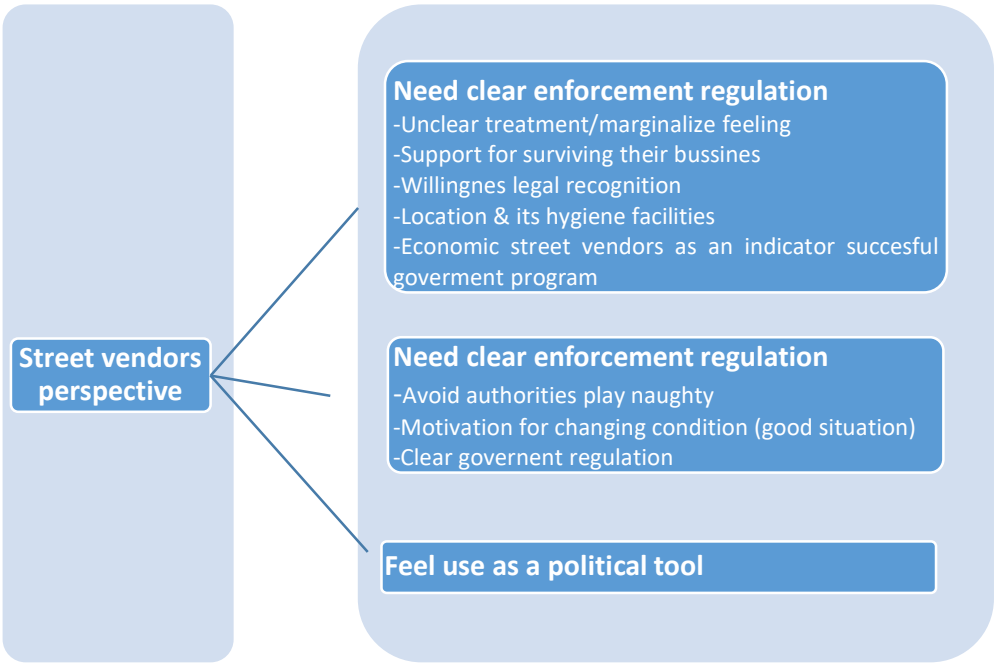


Figure 7.10 Street vendors community perspective

In the interview, the participant described what they did to improve their condition was to find support independently. Table 7.12 showed that they have their own role for managing their community.

The participant stated that this community of street vendors recruited a street thug. Today this leader has good leadership model and has management to run this community. The aim is to influence other 'premans' and groups of traders to use this model, keeping it running in a professional way and out of bad culture.

Table 7.12 Food street vendors community role

Interview Script	Description
'…in this forum ***also serviced savings and loan*** *to* ***our member for avoiding them to loan sharks****…because* ***they do not have easy access to finance*** *support i.e. bank…'*	Financial arrangement
'….. ***I recruited them to enhance their status****…they need to change their life from 'preman' into better one….* ***we do not want them labelled as a scumbag****…****they always treat differently especially when we have tattoo****…****in this forum we try to unite for better life and share benefit to public and government…so the public can respect us*** *…* ***we do not drink and use drug anymore****…****I called them to create and support our city****…''.*	Discipline their member
*'…****when I asked them, they felt happy because the income or customers has increased after we improved this place****….****and they can come to talk and asking help about their financial problems****...'*	Unformal way to communicate
we have an own system to control our area…we do not let the new comer permanent tent or mobile cart stay*…we do limitations for them…****they can stay usually pay to someone maybe to intellectual mafia****, I do not want to blame anyone here…'*	Own consideration to let street vendors trade in their area
*'…****I initiated to gather this community****, I was coordinator in several points in Bandung city****….****so I can observe the street vendors****, in Indonesia* ***I think the system still belongs to gangster who dominate the vendors or area…in Bandung****…****I know it is not good****, when I converted my religion…****I do not want to do it again****….****so I developed this community I come and communicate to government****…and* ***looking for collaboration with food industry***	- Asking support from government - Looking collaboration with stakeholder

Figure 7.11, shows how the vendors manage their community and how they find support.



Figure 7.11 The community street vendors' role

The street vendors community activities such as centralized food street, arranging appropriate place, saving and loans was claimed to give positive benefit to members.

The street vendors livelihood reported several problems i.e. low-level harassment (bribes, non-official municipal police practices or seizing goods or money for personal consumption, sex harassment), sanctions because of unauthorized space, expulsion and insecurity vending site. However, the street vendors also help in the reduction of poverty (Roever, 2016) and difficulties of finding job in formal sector. Those experiencing challenging conditions need government support by reform of legislation, transparency of regulation and its implementation followed by policy and practice regarding street vendors i.e. govern public space to support their business (Roever & Skinner, 2016).

Various countries have different strategies to handle the street vendors issue. As a country that faces urbanization, in 2009, India National Policy on urban street vendors was launched in order to support environment and improve livelihood of street vendors by developing a master plan that recognizes the contribution of street vendors in urban areas to urban poverty alleviation. Furthermore, registration and identity cards were issued in

several cities (Sinha, 2011). India also tried to provide and maintain sanitation facilities for street food in public space.

In Singapore, a licence of food street vendors was implemented with several requirements. This can be applied for by permanent residence or Singaporean Citizens of a certain age. The food premises need to follow the design and layout that stated in Code of Practices on Environmental Health. The licence for trading on pavements also can be issued through a transparent and simple registration system. Street food premises was mostly centralized supported by basic hygiene and sanitation facilities such as safe water source, toilet, and electricity. The type of stalls was managed by the national environment agency. There are two types, the first was rented to hawker (42%) and the second by hardship scheme (58%) which offered to poor, unemployed or with financial difficulties. In addition, in 1994 the stall ownership also offers potential to own the place. Grading score system and assessment-based audit was conducted to ensure the implementation of food hygiene regulation. This included a penalizing system (for noncompliance). The food premises should display their grading certificate to help the public choose their preference of food stalls (NEA, 2014).

Based on an informal sector survey in two provinces in Indonesia in 2009, the informal employment was an essential part of the labour market which provides more than 80% of the employment. In rural area the informal employment was higher than urban area. The study also estimated that other provinces has similar condition that informal employment sector is prevalence in most Indonesian provinces (ADB & BPS-Statistics Indonesia, 2011).

In the UK, there is a professional association for mobile caterers, The Nationwide Caterers Association (NCASS). Among other facilities, NCASS provides a platform for Inspectors to access information about its members and share observations and requests. Although this only covers businesses who have opted to join the Association it does provide useful information for inspectors regarding trading locations, registration address and food type for this sector.

This platform mechanism through association as in UK can be adopted by local street food vendors' community elsewhere. It simplifies sharing information and knowledge of street food vendors.

7.4 Conclusion

This study used inductive approach of thematic analysis. Based on interview the study observed the problem of a lack of good governance process especially the lack of clarity for the role of main actors in regulation. The issue becomes greater when it was implemented in local levels due to lack of accountability and poor integration. The local office tends to have its own goals to solve problems. The issue of outbreak case trends is an example of the government performance in recent time. As the place which contributed to the second rank of outbreak cases, schools had not had enough supporting elements to protect the pupil in food safety matters.

In addition, the street vendors need government recognition to support their livelihood. Clear regulation and communication between sectors need to be enhanced. The local government should have a blue print about street vendors' livelihood, especially street food vendors. This sector should be recognized and treated as a benefit to support local income.

Further study for measuring government performance in food safety is recommended and it can help to improve the good governance process in food safety control.

The significant weakness of lack of government accountability needs to be reviewed to address challenges such as a transformation program and devolution in public service delivery. The complexity issue and role overlap need to be tackled to provide effective public service. A new model framework for effective strategic business planning and management should be designed for responding to those challenges (NAO, 2016)

Chapter 8 – The efficacy of food law enforcement in UK: Food inspector perspective

8.1 Overview

The FSA works with all local councils to enforce food law throughout the UK. FSA provides guidance and frameworks for local authorities to help ensure consistent enforcement of relevant food hygiene law and animal feed, including Codes of Practise, Framework Agreements and Practise Guidance. Local authorities employ and authorise inspectors.

Food inspectors carry out regular food safety inspection in all food businesses. The purpose of inspections is to ensure food is safe to eat and to check that premises comply with food law Regulation (EC) No. 852/2004 and the Food Safety and Hygiene (England) Regulations 2013 for hygiene and safety regulation.

This chapter describes food inspector perspective on food safety and hygiene legislation and regulation in UK, including efficacy and consistency of training and guidance.

Yap and Fairman (2006) showed several factors influenced food safety compliance of small and medium food business. Lack of knowledge and understanding of food business on rules, lack of trust to inspector and legislative requirement, lack of time, lack of motivation and money of food handlers were barriers to compliance in small-medium enterprise (Yapp and Fairman, 2006).

8.2 Finding and discussion

8.2.1. Socio-demographic of respondent

Table 8.1 Socio-demographic of respondent

	Variable category	Number	%
Work status	Full time	49	79.1
	Part time	11	17.7
	Others	2	3.2
Age group (years old)	21-30	1	1.6
	31-40	7	11.3
	41-50	31	50
	51-60	22	35.5
	> 60	1	1.6
Education background	MSc Environmental Health	12	19.4
	MSc Food safety	3	4.8
	PGDip Food Hygiene, Safety & Management	1	1.6
	BSc Environmental Health	16	25.8
	Diploma in Environmental Health	1	1.6
	Higher certificate in food control	17	27.4
	Higher certificate in food premises inspection	27	43.6
	Trading standard qualification	1	1.6
	Others	5	8.1
Working as food inspector (years)	< 2	2	3.2
	2 -5	5	8.1
	5-10	5	8.1
	>10	50	80.6
Working area	West Midland	23	37.1
	East Midland	4	6.5
	East of England	2	3.2
	London	2	3.2
	South East	11	17.7
	South West	3	4.8
	Yorkshire & the Humber	5	8.1
	North West	5	8.1
	North East	2	3.2
	Wales	5	8.1

The survey was sent to 211 local authority enforcement officers. Sixty-two replied giving a response rate of 29%. Over three quarters of respondents (79.1%) work full time and most of them (80.6%) have more than 10 years' experience. This is reflected in the age groups which are dominated by 41-50 (50%) and age group 51-60 (35.5%).

Most of respondent (43.6%) has higher certificate in food premises inspection as their education background. While only one of them had trading standard qualification. This reflects the method used to contact the officers, which was based on a list of alumni studying at the University of Birmingham. The majority of alumni had taken the Higher Certificate in Food Premises Inspection. The Trading Standards qualification has only been offered at UoB for three years while the Higher Certificate in Food Premises Inspection has been running for 20 years.

Some respondents had other education background, including law degree, PhD in microbiology, BSc in Biology, research master (Eng). Some respondents were still training to have food control certificate, which is a recent upgrade to the Higher Certificate in Food Premises Inspection. The percentage number of education background out of 100% that means several of them tend two have more than one education background.

In addition, respondents who participate in this survey mostly work in West Midland (37.1%) and South East (17.7%).

8.2.2 Legislation and Regulation

UK has several food hygiene legislations i.e. Food Safety Act 1990, Food Safety and Hygiene (England) Regulations 2013 or national equivalent that act as a base legislation for food safety enforcement. While as an EU member until today UK also implemented several of EC hygiene legislations for food safety i.e. Regulation 852/2004, regulation 853/2004, Regulation 178/2002.

The first question asked respondent of food safety and hygiene for recognizing their perspective using two legislations (national and European). It described they opinion when they used and read it for supporting their work in food safety practices.

In Figure 8.1, the data showed the decrease of number of respondents from 62 to 48 for some questions. The highest response showed that respondent agree that the legislation is consistent, EU (63%) and UK (64.6%). In addition, comparing responses on EU and UK legislation, most respondents agree that the legislation covers all main issues in the food hygiene enforcement (58-60%). However, less than half consider the legislation is straightforward to apply (45%) and less than one-third that it was easy to understand (31-

32%). A very low percentage considered the legislation is easy to understand by the FBO (8%). More respondents considered that UK legislation is fit for purpose (43.8%), easy for enforcement officer to understand (58.3%), and clearly worded (54.2%) compared to EU legislation.

The respondent also provided comments explaining their opinions regarding the FBO difficulties in understanding the legislation such as *'**FBO's from micro businesses don't find legislation requirements easy to understand**'* (Par UK2), *'I do think it's **too complicated for businesses to understand**' (*Par UK4), *'Feel a lot of FBOs would **not understand wording'*** (Par UK6).

The respondent showed they need time to read when they used the legislation.

*'It is **frustrating that it is sometimes necessary to read several pieces of legislation together** as one piece refers to another*' (Par UK3)

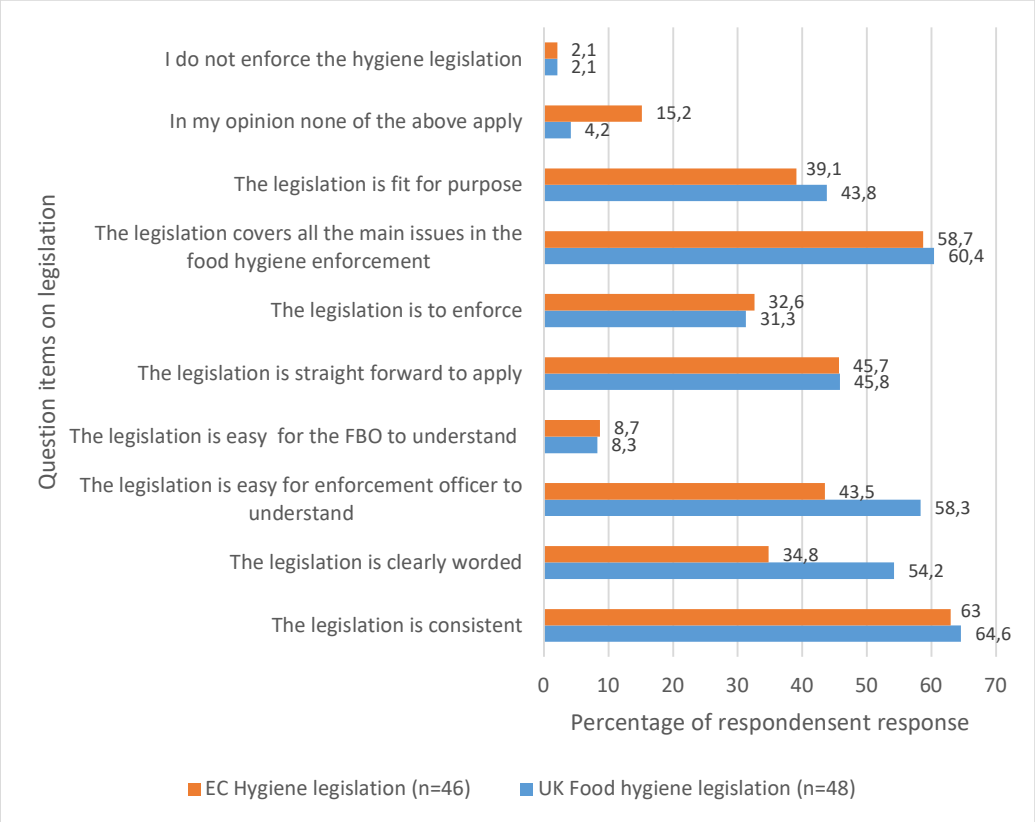


Figure 8.1 Respondents perspective on UK Food Hygiene legislation and EC Hygiene legislation

The respondent also confirmed that not all aspect had already covered by legislation.

'*Many aspects of food hygiene/safety* ***not sufficiently covered in legislation****. Also, would like* ***more powers such a RAN for non-approved premises****.* ***Licensing type of regime for new businesses should be considered***' (Par UK1)

'I think it covers main issues but not all, ***I think there are still gaps that none of the legislation covers****'* (Par UK5).

However, the respondent also showed that UK legislation is easy to implement.

'The Official Feed and Food Regs (for imported food) make it easier to control suspected food *i.e. detaining food if you have suspicion'* (Par UK6).

The finding showed the UK has two-input legislation with standards applied which is EU and UK. Legislation is the government or parliament's statement on what is unacceptable and acceptable on existing boundaries that need to be followed by food businesses. A national standard is the clear defined parameter that is needed to meet that minimum limit(Jukes, 1993). In consequence for a complex regulation, it requires technical expertise to implement and enforce it (Jukes, 1993). However, the benefit of harmonization of legislation is that it can improve competitiveness and reduce the trade barrier between UK and EU legislation.

The function of good governance in the public sector is to confirm that all units always do their tasks consistently. This needs strong commitment to ethical values, willingness to follow the legislation and functioning with integrity and openness(IFAC, 2014)

UK has Food standards legislation for example Food Information Regulation 2014, Nutrition & Health Claim Regulation 2007, Chocolate & Cocoa Product Regulations 2003 Some of these, such as the Food Information Regulation 2014, are based on EU requirements e.g. Regulation (EU) 1169/2011 on the provision of food information to consumers.

Following question was about food standard legislation which also used by respondent as their reference on food safety control.

In Figure 8.2, the respondent confirmed similar response that both EU and UK legislation covers all the main issue in the highest standard on food enforcement (17%) and the legislation is clearly worded (15%). More than half the respondent did not enforce the EU food standards legislation (56.5%). The respondent agree that UK food standard legislation is more consistent (23.4%), easier for enforcement officer to understand (12 .8%), easier to understand by FBO (4.3%), and more straightforward to apply (14.9%) by comparison to the EU standards requirements.

However, respondent viewed that EU food standard legislation was fit for purpose rather than UK food standard legislation (13%).

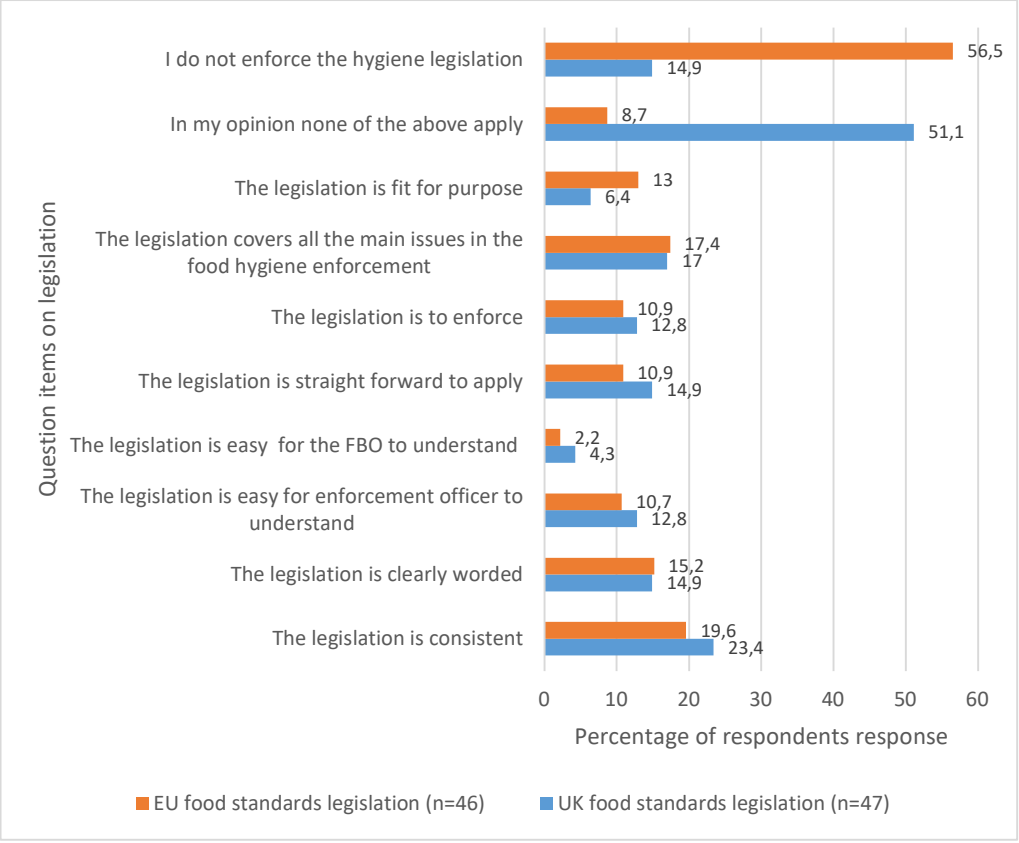


Figure 8.2 Respondents perspective on UK Food standard legislation and EU food standard legislation

The respondents made the following comments to clarify why they consider the food standard legislation is not really clear and difficult to understand which may lead miss interpretation especially for FBO.

'*In general, yes, however* ***some points not fully clear on requirements so can make it difficult to understand fully without reading guidance or past court judgements or discussing on knowledge hub*** *or with FSA, Defra etc.'* (Par UK2)

'Words such as 'adequate', 'suitable' and 'sufficient' ***can lead to inconsistencies in interpretation'*** (Par UK3).

'The ***frustration*** *I have is* ***trying to find the definition****'* (Par UK4).

Most of respondents (91.5%) was agree that their organization carried out training consistently for food inspectors (Figure 8.3).

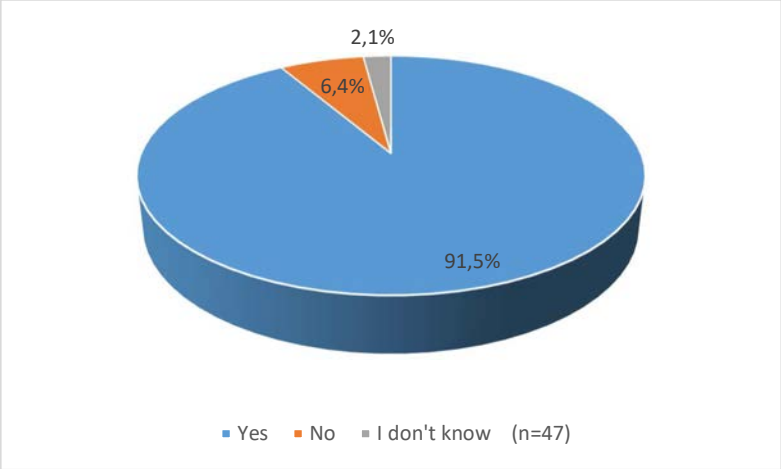


Figure 8.3 The organization carried out training consistently for inspectors

The number of respondents who answered the following questions was thirty-four persons.

The majority of respondents, 30 persons (88.2%) confirmed that training is given annually. The rest person (21.8%) stated that if requested by FSA consistency and one of them added it could not be done yet because of work pressure. The frequencies varied, on average it held one until three times a year. Usually the training occurred in the beginning of the years

between January and February (reflecting the end of the financial year when surplus money mostly be available) and the end of the years between September and December. In addition, some of them answered they try to run an at least one exercise at each team meeting or held every two months.

The majority respondents agreed that training outcomes improved consistency and enforcement between officers in local authority i.e. the brand standard scoring, concerns over allergen enforcement. It can also change some internal procedures. The respondents identified there was still need for clarity from the FSA on wording (in national consistency exercise) in relation to gaps in records. Two of the respondents (6%) defined that there is no change after training.

The majority of respondents agree that training is useful in improving the delivery control as it clarifies that the team are applying the same interpretation for a consistent approach. However, five of respondents (16%) feel that it is not useful for improving the delivery control and cannot be determine yet, but it help the consistency or too some extent. One of them added that he did not actually get the feedback.

Most of the training was carried out in-house and external agent carried out the training only three of them (8.8%). Most of them did exercises (i.e. consistency exercise) produced by FSA and upload it to FSA website.

Local authorities play a key role in enforcing food law supported by Food Safety Officers and Environmental Health Officers. The food inspector is the main actor that represents the local authority and must be qualified, skilled, experienced, and with sufficient competency to carry out their job. Food authorities are responsible to ensure this before they authorise the officer to perform their work. Additional training and experience may be needed to address their competence to take food law enforcement actions (FSA, 2000).

There was *E. coli* O157 outbreak in South Wales in September 2005 because of food hygiene failures at the premises of John Tudor and Son, a catering butcher business that provided cooked meat to schools. It was the second largest in UK, made 157 people ill, mostly children, of whom, sadly, one of them, Mason Jones, aged five, died. The outbreak was so extensive because 44 schools used John Tudor and Son as a supplier. A vacuum

packaging machine, used to package both cooked and raw meats, was identified as the probable cause of contamination with the pathogen. The report showed that EHOs inspection did not assess the business's management of food safety and there was insufficient focus on Hazard Analysis Critical Control Point (HACCP) approach. Officers did not highlight the poor working practise in the premises even though an indication was found of inconsistent keeping of essential records, the problem was not addressed. The learning point here is that inspectors should have adequate skill and knowledge and it must base their inspection on auditing the premises HACCP plan (Pennington, 2005). It exactly agrees with Powel (2013) who argued that observation judgment and consistency of the auditor or inspector drives the effectiveness of the audit and inspection(Powell et al., 2013).

8.2.3 Guidance and its enforcement (powers, action and sanction)

Respondents were asked for their recognition and opinion on several guidance documents which support their task and function. The majority of the respondents (90%) showed positive response about risk rating, judging non-compliance and course of action guidance. However, their recognition on enforcement procedure was lower (82.8%) than other guidance (Table 8.2), but still high.

Table 8.2 Recognition on types of guidance

	Recognition on types of guidance	Response, n (%)		
		Yes	No	I do not know
1)	Are you aware of guidance on how to rate food premises with regard to delivery of controls? (n=30)	27(90)	3(10)	0(0)
2)	Is there any guidance on how to judge non-compliance with food legislation (n=29)	26(89.7)	0(0)	3(10.3)
3)	Is there any guidance on how to select the course of action when non-compliance is identified? (n=29)	27(93.1)	0(0)	2(6.9)
4)	Is there any guidance on the procedures to follow when taking enforcement action? (n=29)	24(82.8)	1(3.4)	4(13.8)

FSA encourages all involved in the food supply chain, from farmers to retailers, should improve food handling practice and follow food enforcement guidance to ensure their product or services obey the provisions that stated in Food Safety legislation (Loader

and Hobbs, 1999). FSA provided guidance for food safety inspections and enforcement that are used by local authority to enforce law in food business including the EC regulations and directives(FSA, 2010, FSAI, 2018).

Table 8.3 Likert scale of usefulness guidance

Respondents opinion of usefulness guidance	Weighted average	Total Response (%), Likert Scale (5)				
		Completely useless				Extremely useful
		1	2	3	4	5
1) How useful risk rating guidance (n=28)	3.3	3.6	7.2	17.9	32.4	39.3
2) How useful guidance for judging non-compliance with food legislation (n=26)	4	0	3.9	26.9	34.6	34.6
3) How useful the guidance for how to select the course of action (n=25)	3.8	0	8	28	40	24
4) How useful the guidance of procedures for enforcement action (n=23)	4	0	0	30.4	39.1	30.4

The respondents were to rate how useful they found the guidance using a Likert scale. The participants who gave positive response for Likert scale both scale four and five was similar in risk rating guidance (71.7%), judging non-compliance (69.2%), and the guidance of procedures for enforcement action (69.5%). However, some of them showed poor response (scale 1 and 2) for risk rating guidance (10.8%).

The guidance for judging non-compliance with food legislation and the guidance of procedures for enforcement action had the highest average weight (4) of usefulness while risk rating guidance and was the lowest average weight (3.3).

When they were asked about the provider of risk rating premises almost all (96.3%) of the respondents correctly answered FSA (COP and brand standard). However, one of them also mentioned the Directorate General for health food and safety (DG SANCO) besides FSA in risk rating premises. About 92.6% of respondent stated FSA (COP and brand standard) for providing guidance for judging the non-compliance. In addition, the one of respondent mentioned an association (British Hospitality Catering Guide) and another one stated DG SANCO for judging the non-compliance. Almost of all respondents (96.3%), agree that FSA that provided the guidance to select the course action and of procedures for enforcement

action. One respondent also still stated DG SANCO and added about in-house enforcement policies.

Respondents also mentioned Code of Practice, Brand Standard, Regulatory Information and Management System (RIAMS) that provided by FSA.

Table 8.4 Likert scale of carry out appropriate action when identified non-compliance

Respondents opinion of usefulness guidance	Weighted average	Total Response (%), Likert Scale (5)				
		Very difficult				Very easy
		1	2	3	4	5
1) How easy to carry out appropriate enforcement action when you identified non-compliance (n=26)	4.0	0	7.7	11.5	50	30.7

By Likert scale in Table 8.4, the half of respondent agree how easy and very easy it is to carry out appropriate action when they had identified non-compliance of food (50%). One third of them found that to do it was very easy (30.7%).

When they need help or support for carrying out enforcement, most of them (83.3%) will ask internal colleagues, senior and their line manager. Two of them stated they will ask the liaisons group contact and FSA depending on the case that they have encountered.

Table 8.5 Likert scale of enfoncement action on non-compliance

	Dealing with non-compliance and its sanction	Response, n (%)		
		Yes	No	I do not know
1)	Do you feel you have sufficient powers to deal with non-compliance in the food industry? (n=29)	18(90)	10(34.5)	1(3.5)
2)	Do you think the sanction currently provided by UK food legislation are appropriate for addressing non-compliance? (n=26)	15(57.7)	11(42.3)	0(0)
3)	Do you think sanction currently provided by the UK food legislation are sufficiently flexible to cover the common non-compliance in food? (n=25)	15(60)	10(40)	0(0)
4)	Do you think sanction available for non-compliance with food legislation are effective in improving FBO compliance? (n=26)	12(46.1)	13(50)	1(3.9)
5)	When a food business is successfully prosecuted, do you feel sanction awarded by court are transparent? (n=25)	20(80)	20(5)	0(0)
6)	When a food business is successfully prosecuted, do you feel sanction awarded by court are consistent? (n=24)	6(25)	18(75)	0(0)
7)	Is there clear guidance for the courts on sanctions to be used in food safety prosecutions? (n=27)	17(63)	3(11.1)	7(25.9)
8)	Do you feel the sanctions awarded by the court after successful prosecution are effective in protecting public health? (n=27)	12(44.4)	7(25.9)	8(29.6)

From Table 8.5, the majority of respondents felt they had sufficient power to deal with non-compliance in the food industry (90%). However, some of them feel there are additional powers that would be useful for their work i.e. Remedial Action Notices (RANs), Fixed Penalty Notices, and on the spot fines. They also found difficulties to stop people operating food business i.e. follow EC 852/04 and other grey areas included food supplement and medicines. With the following question, they suggested several things to improve their work effectiveness and efficiency, such as:

1) Legislation and regulation i.e. bring back some provision of FLR 1996 i.e. if food has passed its use by date it was an absolute offence,
2) Guidance and its enforcement
    - national recognized EHO enforcement web site used to raise knowledge on guidance or legislation (discussions, forums, campaigns, queries, awareness) and also external training not in-house training
    - support from legal department (i.e. legal team judges to be more knowledgeable on food law)
    - stronger powers to enforce against food businesses who fail to register
    - financial penalties, RANS for some situation and standard notice
    - clearer guidance with scenarios
    - More support from FSA i.e. the new FSA website with controlled access to the guidance for enforcement officers is quite cumbersome
    - Standard procedures which could be adopted by all authorities

3) Management of enforcement

    - management system and inspection solution based on technology to assist consistency and prioritising based on risk also real time business report following inspections. Nationally drafted template notices.
    - more resources i.e. staff
    - all the guidance being available in the same place and easily accessible
    - Increase in number and types of inter and intra local authority consistency exercises; and sharing experiences

- access to quality low cost training events dealing particularly with enforcement i.e. legal skills training
- Improved IT system locally i.e. paperless

Half of the respondents confirmed that sanctions, provided by UK food legislation are appropriate for addressing the non-compliance (57.7%). However, they considered that sanction is not an appropriate way of encouraging compliance. Some of them felt that sanctions were too soft or were disheartened by low fines after putting together a lengthy prosecution file. One of them thought easier sanctions (i.e. not involving prosecution) should be available for minor offences i.e. not registering as a food business, or not displaying FHRS sticker. They considered licencing; RANS and Fixed Penalty Notice (FPN) would be effective ways to tackle it.

More than half the respondents thought the sanctions currently provided by the UK food legislation are sufficiently flexible to cover the common non-compliance in food business (60%). They commented that warning letters and notices are not always taken seriously by FBO, so FPNs may help and RANS could be used effectively for non-approved premises. In addition, they mentioned the debate as to whether the rating scheme is one of the sanctions, as this is often all the FBO focuses on. They suggested stronger powers were needed against business who fail register and more detail on imminent risk/ closure would be useful.

Respondents stated that FBO showed various responses or reactions when they were to be prosecuted. Some of them were unhappy but accepted it. It depends upon the FBO, generally they reluctantly accept it when inspector explained the reasoning behind the action. They tried to cooperative and do what is required to be compliant in the hope the case will be dropped. However, some of them was badly react, angry and defensive.

The respondents agree that in general the sanction awarded by the court are transparent (80%).

One of respondent confirmed that he found the front page of newspaper showed news of a business that had been prosecuted and received a £5000 fine. Other business that did not have hot water and were generally very poor but had fine less than £1000 was on page 16 in the paper.

However, others respondent commented it was variance between magistrates and courts. Another respondent added, ***'Variance between magistrates and courts, for a number of offences they may not attach fines to all or do not always appear to put the biggest fine on highest risk'*** (Par 8).

Interestingly, one of respondent added that payment of the fine that is always done before payment of costs to the local authority so very often they '***do not get our costs back'*** (Par 13).

More than two third of respondent agree that sanctioning is inconsistent (75%). One respondent confirmed that he had two identical prosecution but the fine was different, the first one got fine £150, the other one £1500. It depends on the magistrate and court. Most of respondent (11 person) who response to this question agree on variation of sanction. Another respondent commented that the courts follow the sentencing guidelines to improve consistency, but the guidelines are not always clear, there is a level of ambiguity. Only one said that the sanction was fair enough.

However, almost two third (63%). confirmed that the guidance is clear for the court on sanctions to be used in prosecution.

Several of enforcement tools and actions have significant effect for implementing public health policy including food policy. One of the enforcement tools is penalty. Monetary sanctions may not always be the most effective tool to support the law enforcement(Costich, 2013). This argument also supported by Macrory (2006) that sanctions help to ensure that businesses not following the regulation (which is violating the life and rights of consumers) will get consequences but sanctions need to flexible and a fair response to regulatory non-compliance (Macrory, 2006).

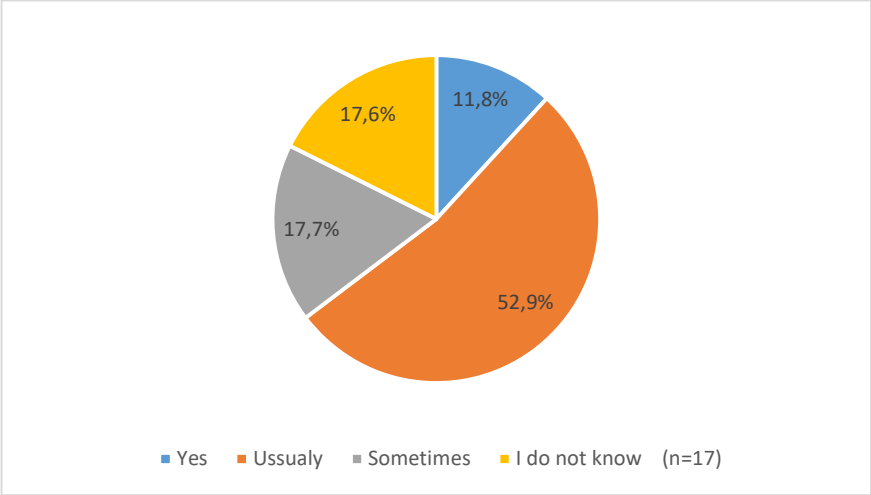


Figure 8.4 Respondent opinion on guidance of enforcement action has correctly followed

From Figure 8.4, two third of respondents (64.7%) confirmed that they used the guidance and consider usually correctly followed.

In Figure 8.5, almost of half respondents confirmed that in their area they did not have a particular lawyer who specialized in food legislation for handling cases (48.2%). Only 29.6% of respondent showed that they did have the particular lawyer. Others also commented food prosecution case are infrequent and law practitioners tend to be generalist in environmental health issue.

*'LA solicitors **tend to be generalist and as food prosecutions are fairly uncommon making them aware of the legislative requirements is an important** part of the enforcement officers' role'* (Par 7)

*'We have a solicitor who covers **all aspects of Environmental Health and Licensing**'* (Par 4)

*'**Lawyers tend to do a whole range of environmental health work**'* (Par 6)

However, over half did not feel the sanctions awarded by the court after prosecution are effective in protecting public health (55.6%). The respondents commented that publicity on the case that might encourage them for improving food business (Figure 8.6).

*'It can **depend on the publicity the case gets**. Negative publicity can encourage a bigger effort by the FBO to comply in future and also drive customers away from a business'* (Par 8)

*'The **publicity around prosecutions also helps'*** **(**Par 10)

*'..more the **resulting publicity** though'* (Par 11)

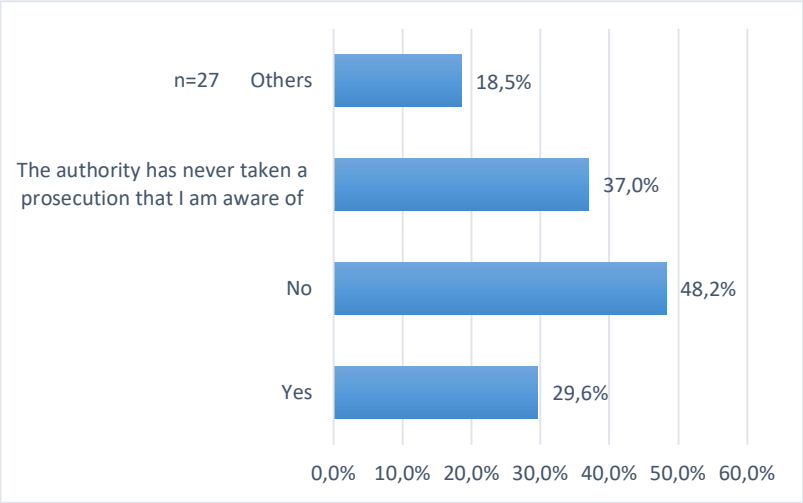


Figure 8.5 Having lawyer who specialised in food legislation to handle the case

Others has different comment about it that depends on FBO and education.

*'**Pragmatism** and **education** are **usually more effective**'* (Par 9)

*'Depends **on the FBO**'* (Par 4)

They added that sanctions could influence the food business operator in protecting public health but was not always successful.

'*with on the whole, occasionally **it doesn't make any difference to their behaviour***' (Par 6)

'*in that **individual situation***' (Par 2)

They also suggested several sanctions that could improve FBO compliance and or protect public health such as:

a) mandatory display of food rating (FHRS) stickers,

b) *bespoke one-to-one training specific to their work activities,*

c) *licensing and fixed penalty notices (FPN), including FPN for minor offences to deal with matters quickly such as not registering food business*

d) *Charges for service of notices may help to concentrate the FBO's mind before it gets to prosecution that is costly for the Authority and the cost of the notice is probably less than the loss of revenue from bad publicity from a prosecution.*

e) *Probation periods of continued compliance*

f) *RANs for non-approved premises*

g) *FSA national publicity or register of HINs and prosecutions*

8.2.4 Work environment, management of enforcement

Table 8.6 summarises the responses which relate to the work environment for officers. Fair treatment (absence of bullying and inequality) was the most important aspect identified as work satisfaction factor (81.5% responded at scale 5, with average weight 4.7). The second was good management (74.1% on scale 5, with average weighted 4.6), followed by good manageable workloads (69.2% on scale 5, with average weight 4.5).

Table 8.6 Likert Scale on factors affecting work satisfaction

Factors affecting work satisfaction (n=27)	Weighted average	Total Response (%), Likert Scale (5)				
		Very unimportant				Very important
		1	2	3	4	5
a) Good work environment (building, equipment)	4	0	3.7	25.9	37.0	33.3
b) Work operating procedure (clear, objective and support to deliver)	4.4	3.7	3.7	0	29.6	62.9
c) Fair treatment (absence of bullying and inequality)	4.7	3.7	0	3.7	11.1	81.5
d) Satisfactory salary	4.3	3.7	0	3.7	48.2	44.4
e) Personal development, training and evaluation	4.4	3.7	0	11.1	18.5	66.7
f) Sharing responsibilities, collaboration between officers	4.3	3.7	0	11.1	29.6	55.6
g) Manageable work loads	4.5	3.9	0	7.7	19.2	69.2
h) Promotion and carer development	4	3.7	7.4	11.1	37.0	40.7
i) Good management	4.6	3.7	0	3.7	18.5	74.1

Work operating procedure (clear, objective and support to deliver) and personal development, training and evaluation were the second layer that were identified by the respondents for having work satisfaction (average weighted 4.4).

More than a half respondent agrees sharing responsibilities and collaboration between officers is very important (55.6%)

Work satisfaction refers to the context of enjoyment that is felt by the employee in their work place (Fogarty, 1994). Job satisfaction also can be described as a combination of various aspects of the psychological and environmental atmosphere that causes a person to feel satisfied or like their job (Hoppock, 1935). The finding showed up five aspects on working environment condition. The theory of organisational justice established how the employee judges policies and or practices about fairness(Greenberg, 1987). Positive outcome such as reduced conflict, customer satisfaction, job performance improvement was shown when an employee recognized fair practices in their workplace (Cropanzano, 2007). This finding on fair treatment is also supported by a study in the USA which described that fairness in an organization has a positive effect in professional job involvement and a negative influence on employee turnover(Hasan S., 2012). Work satisfaction has several determinants such as working environment and good relationships with management (Gazioglu and Tansel, 2006), while workload, if it is not manageable, can lead to work stressors that influence employee well-being (Bowling et al., 2015). These can make it difficult for employees to be satisfied with their role.

Interestingly, satisfactory salary was not in the five highest orders in this survey (44.4% on scale 5, average weighted 4.4). Work officer performance might be influenced by several factors such as; salary satisfaction (when it affects job involvement), work inspiration, employee performance and motivation. Shahzad *et.al.* (2011) claimed salary satisfaction boosted motivation and proved as a path design to increase the job satisfaction level of employees (Shahzad et al., 2011). Good work environment encourages employees to contribute positively and help them in personal growth and development thus motivating them to accomplish their objectives and organisation goals (Raziq and Maulabakhsh, 2015).

Promotion and career development were the bottom two of work satisfaction factors (40.7% on scale 5, average weighted 4). Promotion usually an important aspect for an employee that can be used by employer as a reward for highly productive workers.

Good infrastructure and work environment (building, equipment) was the last factor chosen by respondents as a very important factor of work satisfaction (33.3%, average weighted 4).

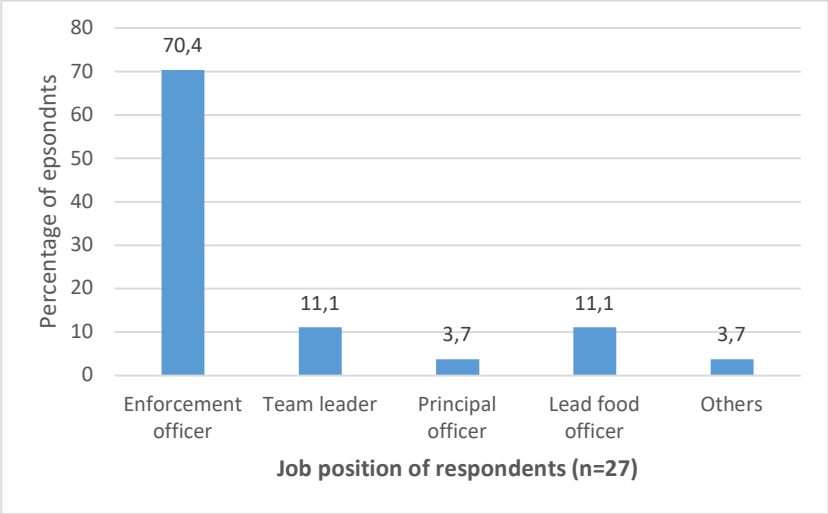


Figure 8.6 Job position in food safety

In Figure 8.6, the majority of respondents were enforcement officers (70.4%) while the second most numerous were team leaders and lead food officer (11.11%).

Five of six person commented on how to confirm a food business is registered described that they used a database to check it and liaise with technical support staff.

Figure 8.7 shows that half the respondents did not think food business registration was effective (50%) while only 16.5% confirmed that it was effective.

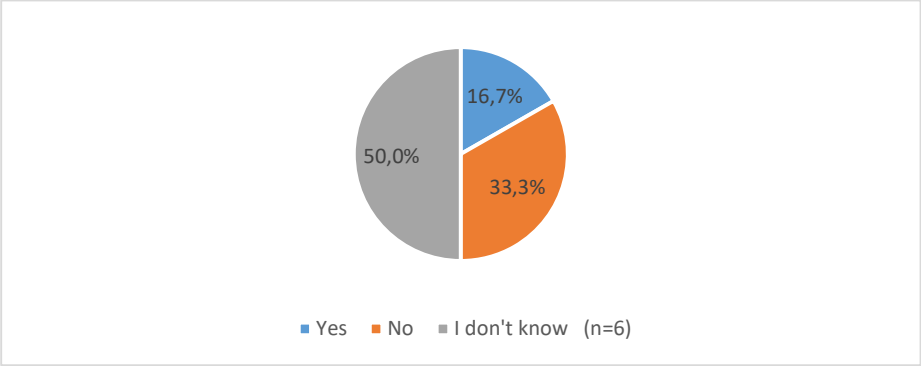


Figure 8.7 Effectiveness of food business registration

They suggested several actions to improve its value such as:

a) giving a fine for non-registration and licensing before a business opens would be more effective

b) more information about the type of food, processes used etc. being included on the food premises registration form.

c) educate prospective business owners about legal requirement to register and introduce a substantial penalty fine to deter them from operating without registration

d) giving free advice to encourage new businesses to contact LA

e) food authority should have more time to actively look for new businesses.

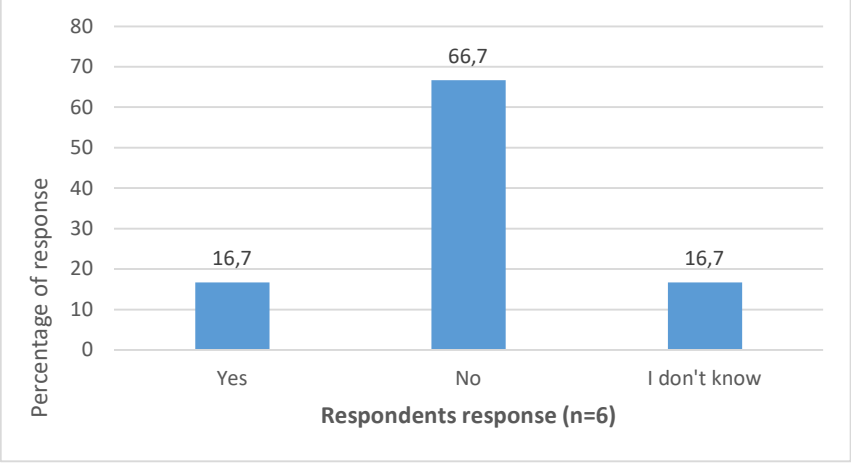


Figure 8.8 Sufficient resources to deliver official controls

In Figure 8.8, the two third of respondent confirmed that they feel the resource was not sufficient to deliver official controls (66.7%).

In Figure 8.9, they indicated several elements on the shortfall. The highest element on the shortfall was insufficient people to carry out inspections (80%). The second element was a lack of support from senior management (40%). The quality of the relationship between manager and employees is an essential factor for achieving organizational outcomes(Farr-Wharton and Brunetto, 2007).

One fifth of respondents stated that insufficient people to deliver other controls such as sampling, insufficient money to cover delivery, lack of expertise and lack opportunity to update knowledge were the other elements of the shortfall.

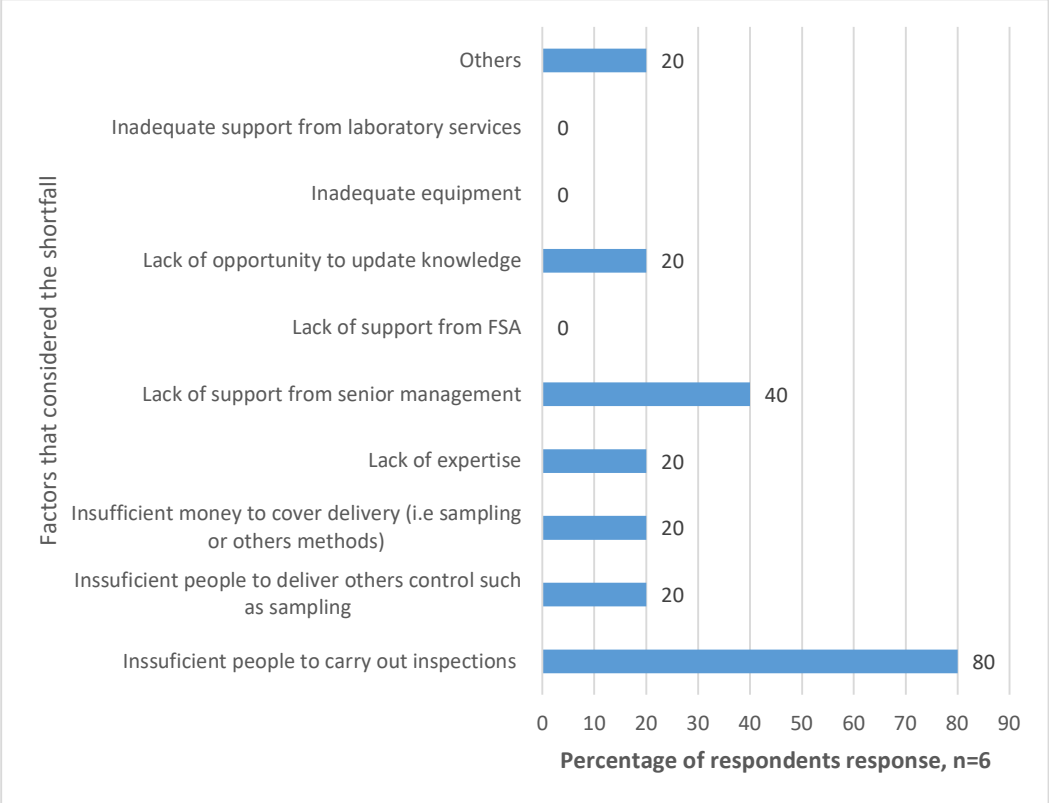


Figure 8.9 Factors that considered the shortfall

One of respondent commented that the dearth of inspectors has affected the inspection programme.

The following question asked how they determined the number of person hours needed for delivery of controls. One of four responded that they can determined it by looking performance data or looking at demand on the service also that officers log the time it takes to complete official controls which is used to compute the number of person hours. One of respondent mentioned about the ratio number of FTE that was aligned with budget availability. One another did not sure about this but confirmed that they were understaffed.

A food operation manager in a local authority stated publicly recently that the food business number is becoming greater while the officer numbers are reducing. It is becoming difficult to achieve the target number of inspections (British Broadcasting Corporation, 2018).

A minimum level of staffing for providing a comprehensive service delivered in line with the current Food Law Code of Practice need to be defined. The gap between the calculation of what is necessary and that available of a FTE staff member should be addressed by local authority(FSA, 2017a).

However, the report showed that levels of training and support provided including the ways in which competence is ensured and maintained were not sufficient even though the numbers of environmental health practitioners has increased for enforcing food standards legislation across England and Wales(FSA, 2017b).

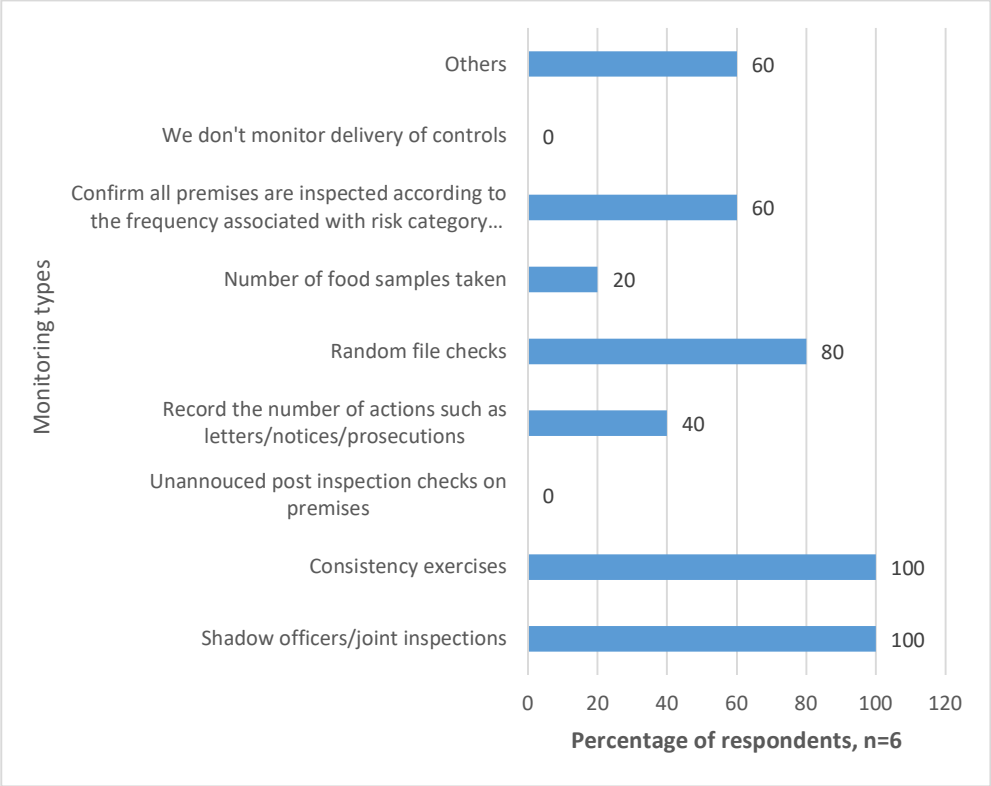


Figure 8.10 Monitoring the delivery of officials control

In Figure 8.10, monitoring of the delivery of official controls has several techniques. All respondents (n=6) confirmed that they did consistency exercise and shadow officers/joint inspections (100%). Random file check was the other way chosen to do monitor it (80%). Almost two third of respondent confirmed all premises are inspected according to the frequency associated with risk category according Food Law COP. One of respondents specified that there was little monitoring of delivery of controls due to lack of time and resources to do so. Another respondent mentioned carrying out regular one to one meeting with food officers and updating the FSA competency forms. This helps inform the officer's personal development plan. In addition, they conducted regular meetings to discuss about several things i.e. new FBOs/processes /guidance etc. and sharing information with the rest of the team.

The other respondent mentioned verification checks of completed inspections.

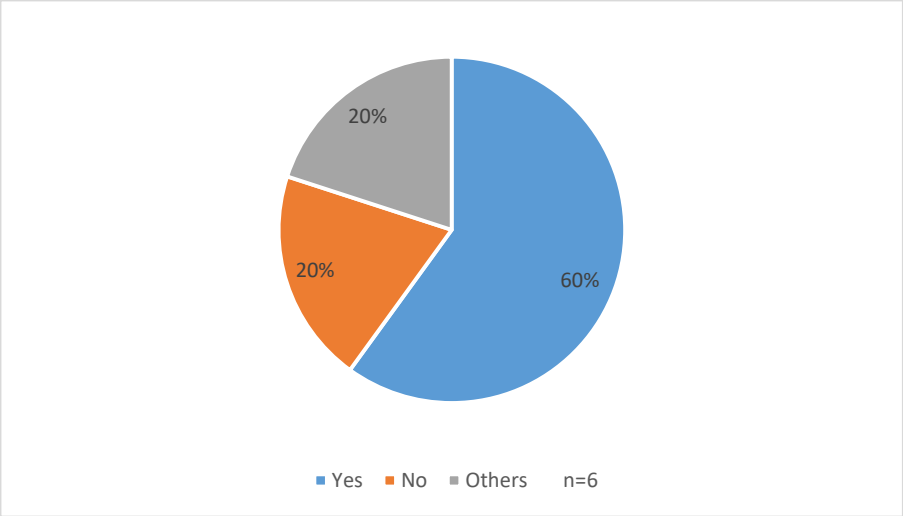


Figure 8.11 Having electronic system for monitoring the delivery of food controls

Figure 8.11 shows that almost two third of respondents are supported by an electronic system for monitoring the delivery control of food business (60%). One respondent also mentioned the Local Authority Enforcement Monitoring System (LAEMS).

Fundamental food legislation, code of practice and its agreement between FSA and local authority has an important role in the inspections. Consistency of inspection process followed by EHOs affects the end result. The local authority and FSA need to measure which factors affect the delivery and effectiveness of official food controls. A previous study showed that small medium business have lack of trust in inspectors (Yapp and Fairman, 2006).

Recently in 2017, FSA has developed a draft National Inspection Strategy (NIS) standard which it provided as a guideline for local authority to do their work consistently and with a clear strategy. Regulating our Future (ROF) program was also released in 2017 as a new regulatory model for food safety regulation in UK. It offers an opportunity for companies to demonstrate their compliance through own checks. This can include third party audit, sampling and HACCP monitoring and validation. One objective is to free up inspector resource for non-compliant businesses by reducing the contact with those who can show compliance through their own records.

8.2.4 FSA Audit

The proportion of respondents who had experience of an FSA audit was 66.7% (n=6) (Figure 8.12)

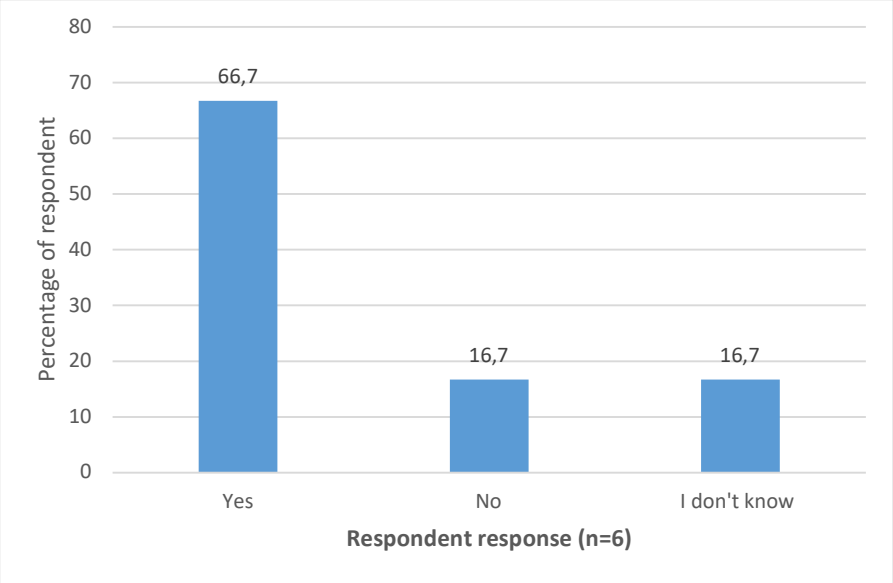


Figure 8.12 Having experience an FSA audit

From the responses, it showed how local authority prepare for the FSA audit. This included preparing and auditing food premises files and ensuring that pre-audit questionnaire was completed. They honestly said some did hurried procedure writing where they saw gaps.

Other respondents stated that they reviewed and updated procedures, internal checks on records, carried on as normal process.

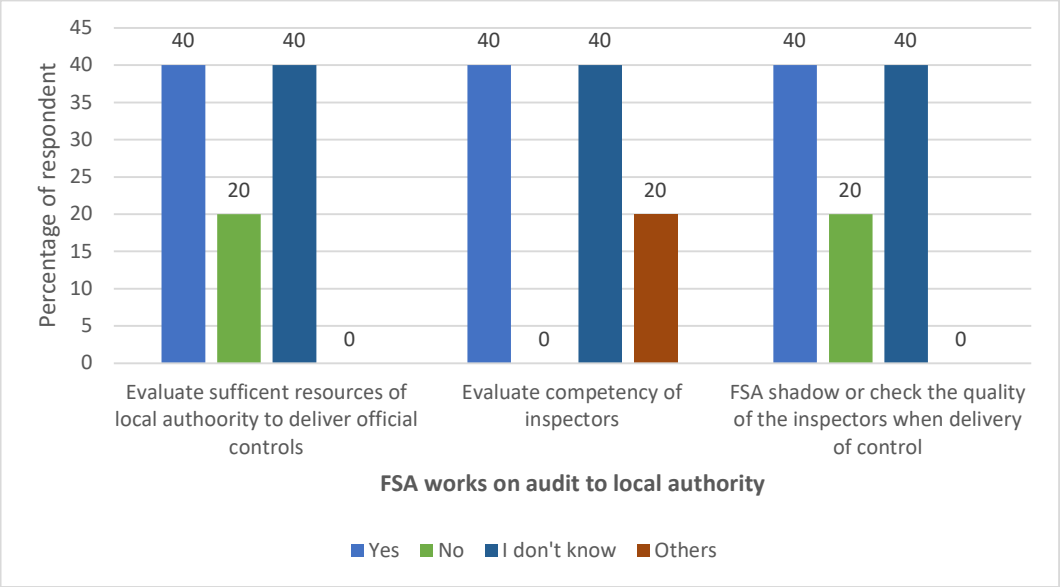


Figure 8.13 How FSA works on audit to local authority

In Figure 8.13, less than half of the respondent agree that FSA evaluated if there were sufficient resources to deliver official controls (40%), evaluate competency of inspectors (40%) and shadow or check the quality to the inspectors' delivery of controls (40%).

While the other 40 % of respondents did not know, whether FSA audit had addressed three aspect above.

Morin (2011) argued the audit system should be used not only for corrective action to be taken and for continual improve of institution. In addition, how they act to correct or handle their non-conformity (NC) by action plan should be evaluated, meaning, is it adequate to address the root causes or it was just to fix something at the time and maybe it will be happening in the future. Corrective action and preventive action (CAPA) by root causes analysis investigation is needed to verify the findings and action in audit process is sufficient to prevent similar NC in the future. Inadequate audit methodology and lack of knowledge of the auditor to identify correct remedial action influence the audit outcome. The value of an audit to the auditee relies on auditor performance, and its usefulness to organization performance(Morin, 2001).

In Figure 8.14, most respondents (75%) agree that FSA audit outcomes are useful for enhancing work programmes.

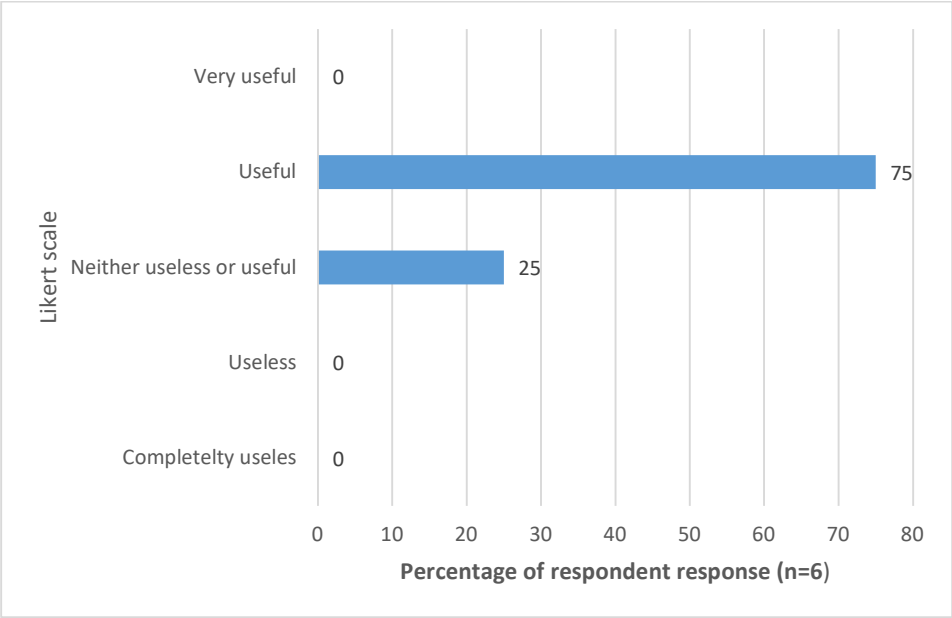


Figure 8.14 Likert Scale on outcomes of FSA audit for enhancing official works in food law enforcement in local authority

Pennington (2005) recommended FSA should include an assessment of the food inspection process taken by local authority as a part of audit scheme (Pennington, 2005). The report showed that EHOs inspection could be insufficient and miss problems. The audit system conducted by FSA was only system based and did not examine the technique of an effective inspection or whether the correct enforcement actions had been taken. Furthermore, 1.5 year before the outbreak, the FSA has been to audit the LA responsible for inspecting John Tudor and sons. The audit feedback was not sent immediately to LA, it took 16 months approximately.

8.3 Conclusion

The survey response provides a useful information regards legislation, guidance, food law enforcement, work satisfaction and management the enforcement including FSA audit in food enforcement practitioner in UK.

The responses figured several points that are important in the delivery of food controls. Clear guidance which can be consistently implemented is necessary for reducing ambiguity and lack of trust by food business operators. A standardised sanction including amount of fine which reflects the non-compliance is needed. Management of enforcement including competency and skill of food enforcement practitioner should be sufficient for delivering the food control. In addition, recognizing work satisfaction factors will assist human resources to ensure maximum value from employees.

Chapter 9 – Conclusions and Recommendations

9.1 Overview

This chapter summarizes study findings which concluded from chapter 4 to chapter 8. The purpose of the study was to observe ready to street food vendors hygiene practices by assessing KAP food handlers, observing KAP intervention and investigating actors and stakeholders view to confirm and to understand controls and obstacles on the food safety practice in Indonesia. Some data from UK enforcement officers was gathered for comparison. The study provided insight for policy makers and stakeholders in food safety control especially ready to eat street food by identifying further research areas that might give value to food hygiene implementation.

9.2 Conclusion

9.2.1 KAP food handlers

The first objective of study collected baseline data on the KAP food handlers of ready to eat street food in Bandung city. The study observed that 60% of food handlers had adequate food hygiene knowledge, 20% had excellent levels and the remaining 20% had an inadequate level. The participants demonstrated a positive attitude (median score 44, with a score range from 10 to a maximum possible score of 50 points) but lack of good practise. This suggests they had adequate knowledge and good awareness in food hygiene, but had not implemented it in practices.

This study confirmed other findings that implementing food hygiene practices does not necessarily follow knowledge and attitude. The observation audit in practices confirmed the absence of food hygiene and sanitation facilities was a major non-conformity issue. This creates a serious lack of support for food hygiene practices.

This study also evaluated the correlation between knowledge, attitude and practice.

There was found to be a correlation between socio-demographic characteristics with KAP. This study observed a significant relationship for three predictor factors with knowledge: age group, education level, and gender ($p < 0.05$). In addition, females had a higher score than males across all three areas (KAP).

Knowledge had a significant correlation with training experience ($p<0.05$), while training with practice had a stronger correlation ($p<0.01$).

This study also confirmed that knowledge had strong correlation with attitude ($p<0.01$and practice ($p<0.01$)

9.2.2 Microbial contamination on food surface contact

The second objective was to investigate the microbial contamination in premises. The results showed microorganism contamination in the study group was not significantly different compared to other studies in Indonesia. The microbial contamination for *Enterobacteriaceae* was still high in premises with 99.3% of premises testing positive. Three quarters of the premises demonstrated very heavy, heavy or moderate levels of contamination. For Total viable count (TVC) 94.1% of premises food premises had heavy growth.

The practices audit showed that cross contamination score had a significant correlation with hygiene sanitation facilities ($p<0.01$). This suggests that improving food hygiene cannot happen without infrastructure development to support hygiene practice.

The food premises with onsite service had lower compliance score on cross contamination compared to takeaway take away, specifically in the utensil section. This is caused by the onsite service using non-disposable tableware not supported with enough hygiene and sanitation facilities to clean between use. Consequently, it led to non-conformity in cross contamination score.

9.2.3 KAP Intervention

This study also found the impact of a bespoke intervention on the food handlers KAP has less significant impact on practices of food hygiene than on knowledge and attitude. The knowledge and attitude scores changed after intervention. Median knowledge score rose from 7 prior to training to 9 after it ($p<0.01$) and the median attitude score of 44 before training rose to 47 afterwards ($p<0.01$). However, in practices only a slight change (score before 62%, after 63.9%) was observed, which was not significant ($p>0.05$). This was also

reflected by microbial contamination that remained high in the premises. Training stand alone does not appear to improve practice of food hygiene in street food vendors.

9.2.4 Opportunity and challenges for food safety control in Indonesia

The evaluation of the food safety control showed a lack of governance process and government performance. The existing legislation and its policy need to address the goals of decentralization such as improving public service delivery and accountability in local government. The overlap of shared responsibility at central level, lack of good governance process and lack of government performance showed in every level. Local government had not sufficient capability to deliver the food safety controls and monitoring in street food vendors.

The ready to eat food is categorized as the informal sector. As a consequence, controls have not evolved as in the formal sector such as PIRT, hotel, café and restaurant. The formal sector has legalized procedures with nominated control responsibility. This condition cannot be tackled in comprehensive way by local government because it does not have the legislation umbrella. A review of legislation is crucial to establish responsibility and coherent controls in the informal sector, especially street food vendors.

9.2.5 Stakeholders views on food safety control practices

9.2.5.1 Stakeholders on RTE in school

The lack of infrastructure, including a basic facility such as a canteen, as was observed. This condition happens because of the lack of budget. The government priority was on teaching and learning activities. The school management is not always running well which is influenced by leadership of head of school.

There is a standardized model or policy in schools to deal with food safety issue. This is handed to head of school for implementation. However, they lack support for fulfilling the infrastructure facilities. This includes teaching and learning as well as hygiene and sanitation facilities.

9.2.5.2 Street vendors community

The street vendors especially street food need recognition from government for doing their business. Their aspiration needs to be addressed by local government and support provided to help them achieve their live hood.

9.2.6 Food practitioner perspective on food enforcement in UK

The result showed that implementing legislation has several issues. Guidance on the interpretation of the legislation is important in the consistent and effective delivery of controls. Internal and external monitoring, such as audits from the national authority is also an important aspect of ensuring consistent delivery of controls. Resourcing matters were identified as barriers to delivery of controls and the nature and type of sanctions were also considered areas where improvement could be made.

Respondents felt the legislation was very difficult for food business operators to understand. This can act as a barrier to compliance, especially where the sector is not highly educated.

A good environment and good management system to organize the work place is essential for supporting food practitioners in conducting their task of food safety control and monitoring.

Standardizing the delivery of controls, including monitoring, guidance and resourcing can help to achieve the goals in protecting human health.

9.3 Recommendations

This study recommends positive support and collaboration between food businesses, government, consumers and stakeholders for addressing public health through food safety especially in street food vendors' business environment. Based on the study, the research proposed the following:

(1) Improving food safety control

Effective, consistent and appropriate hygiene monitoring is essential for enhancing food hygiene levels in ready to eat food businesses. Publishing the hygiene rating of premises can give information about hygiene practices and help customers to choose which

premises is suitable according to their personal consideration. In addition, it also pressures the premises to improve their hygiene premises. This can only be carried out effectively if there is proper organisation and legislation to support the process (see also 2 below), including properly trained inspectors working within a legitimate and consistent legal framework.

An intervention strategy to improve food safety compliance cannot be effective and efficient if it only delivers knowledge by fostering and giving training awareness. Training and supervision need to be supported by ensuring implementation of food hygiene through formal enforcement including licensing. This can improve conformity of food hygiene(Smith et al., 2002, Smith, 2016). Those improvements need to be supported by capable institutions and adequate numbers of sufficiently skilled and competent personnel. In general, the improving legislation and mechanism need to design for supporting good performance especially for food safety control in ready to eat street food.

(2) Improving good governance process and good government including regulation in bottom and upper levels

The change of government system from centralisation to decentralisation needs to be followed by several changes. The strengthening of local government is the essential key to deliver public services. The regulation needs to accommodate the goals on food safety in the local area especially street food.

This study recommends a review of government regulation PP 28/2004, which created and organised the National Agency of Drug and Food Control (NADFC) and defined shared ministry responsibilities to enforce food safety in the food business. Consideration could be given to having only one competent authority or to reducing the gaps and overlap of existing officials. Either option could contribute to improving the efficiency and effectiveness of food control including its enforcement.

MoH already uses an appropriate model in family welfare which could be adapted and enlarged. MoH had an access to local communities since 1970s when Women's Family Welfare Movement (PKK) was launched. The volunteers in PKK contributed to 'posyandu'

that is a community initiative services which participated in health promotion and preventive activities. The volunteers or health cadres were trained by village midwives and/or other primary health to support family health and nutrition activities in the community. This included several programs such as immunization program, pregnant mother, family planning, child nutrition(WHO, 2017). Those resources can be used by MOH to address foodborne illness outbreak cases in household. This is the highest source of outbreak cases in Indonesia for decades. Empowering health cadres in villages by enhancing their knowledge of food safety in households can be done as a modest strategic plan. NADFC can give the material training and training for the trainer, so the curriculum, knowledge and skill will be standard.

Recently, NADFC has been strengthening as a coordinator of food safety(INPRES 3, 2017). This regulation could be used wisely for improvement in government organization and policy, both in central structure and local government levels. If the position of the NADFC for food safety is strengthened it may help to avoid dualism in regulations and practises in food control at national level. The government regulation in 2004 affirmed shared responsibility for food safety control. The establishment of NADFC from the Directorate Environmental Health of MoH in 2000 for food safety control at national level has been insufficient. Following the president regulation (PP 80, 2017), NADFC decree in 2017 provided a strategic plan for 2015-2019. This stated the need for strengthening the institution as a food safety coordinator at national level. It is recommended that the NADFC needs to strengthen the position for food enforcement and outbreak investigation. This should reflect each institutions resources, geography and expertise. NADHC could take enforcement responsibility for street food and home business. The barriers to this would be that the NADFC has limited resources and insufficient local representation. Restructuring of local government to accommodate the need for good governance and strengthening the process including food safety enforcement need to be considered in the future.

Currently the data on outbreak cases caused by households has not decreased but is still the highest, followed by those caused by street food. The MOH focus should retain responsibility for reducing outbreak in household by improving promoting food hygiene intervention and its evaluation.

(3) Strengthening of local government, collaboration between sectors and stakeholder participation to improve food hygiene standards

In general, this study identified the need for strengthening local government in the areas of good governance process and government performance. Food safety and hygiene regulation in controlling and monitoring need to improve and easy to implement by local institution.

In order to enhance food safety in food business, the local government need to standardized and supervise under NADFC as coordinator and a main competent authority in food safety control by mutual agreement, ideally by MOU or legislation. This will ensure the equal competence of food inspectors and standard practice in food safety in national level. As stated in government regulation, controlling small medium food business such as home industries, ready-to-eat street food, café, restaurant and low cost eating-places is supported by local health authorities in every district (PP 38, 2007). NADFC can design framework agreement with local health in district and province in accordance to enhance mechanism on control and monitoring ready to eat food and home industry product.

This study recommends improvement of competency of personnel and capability of local government in food safety control. The NADFC should develop standard requirements for personal competence on food safety and food enforcement which would apply to officers delivering controls at all levels. The supervision of local health officer's food safety performance can then be audited using firm guidelines and transparent communication. Clear communication and coordination strategy between sectors in local government needs to be supported technically by an appropriate application-based system which is easy to use, especially for inputting data and monitoring progress.

The results of food enforcement in UK should be used as a 'lesson learnt' to identify points needing to be addressed in the delivery of food controls in Indonesia, particularly for street food vendors. The need for consistency and clear guidance that helps to reduce confusion has been pointed out by practitioners in food enforcement. It serves to enhance the trust from food business. An enforcement scheme using fixed fines and sanctions need to be standardised and reflect the non-compliance types. The capability of an institution as a

regulator to deliver enforcement relies on sufficient management and supporting environment for delivering the food controls.

A mutual approach between local institutions in sharing responsibilities should be identified as a goal to protect human health and urban street food live hood. Successful co-operation between local institutions will enhance local income including local employment as well as improving food business compliance and protecting public health. This recommendation, of enhancing regulation and governance process to develop and control food safety effectively should be taken by local government. In addition, strengthening collaboration or partnership with stakeholders to tackle the issue on food safety i.e. training provider that recognize and certified by competent authority, safe food in school.

(4) Hygiene sanitation facilities and livelihood of street vendors

The poor practise in food hygiene seems influenced by poor habit and lack of public sanitary support. Improving this situation by providing hygiene and sanitation facilities (i.e. toilet, safe water access, washing hand facilities) for supporting the street food business can reduce risk of microbial contamination and protect consumer health.

Improving public facilities can be done by collaboration between stakeholders. Policy for supporting street food vendors livelihood can be considered based on mutual benefits such as impact on tourism and local income which can help to reduce urban poverty.

Ultimately it may be necessary to change informal sectors such as street food vending, to formal sectors. Implementing registration and licencing of street food vendors in one integrated system by arranging the specific place and mandatory requirement that need to be followed by food business.

This would allow access to support which could improve their lively hood by responding to their needs. Creating trust, clear communication when negotiating issues and collaborating in partnership with other stakeholders can solve problems when there is engagement on both sides to mutual benefit.

9.4 Limitations

This study only took samples on the food surface contact or utensil. No swabs were carried out on the respondent's hands. Hand surface swabs can demonstrate effective hand washing.

The intervention study was based on volunteers and their situation. This meant that, the participant number in the groups were unable to be matched because only a small number of the participants had pre-training. However, the result showed similar outcomes compared with other researchers and the variation in group size was accommodated by the statistical tests.

As pathogens and *Enterobacteriaceae* are not uniformly distributed, and have a variety of sources, a single intervention may not demonstrate a reduction in premises contamination, especially when there is a large variation in the types of food served in the premises.

The qualitative research explains the bottleneck between institutions for coordinating and implementing the food safety system in street food vendors. However, the study did not require interview participants should have minimum experience in the field. The participants were just identified by their function and responsibility to represent their institution. Researcher effort was concentrated for ensuring the interview went well, covering all aims with no hesitation from participants.

The same limitation of analysis which applies to all qualitative studies occurs with this study in that the data analysis for coding and theme construction was done by one researcher and only discussed with supervisor. Hopefully, this data analysis provided consistency even though there were limited perspectives from other related expertise.

This study did not interview the officers which relate to home food industries because they were outside the focus of ready to eat street food. The additional information from home food business inspectors might have enriched or confirmed the findings in food safety control implementation in general and local level.

9.5 Future research

In other to have better supporting information, further research studies are suggested based in the results and gaps identified in this study. These include:

- Urban poverty and local value income calculation to seek positioning of street food vendors for urban city situations
- It's a government program review to evaluate street food vendors income and develop a program to enhance their income.
- Evaluate the option for providing online food hygiene training and partnership with competent third parties to improve public service delivery to food handlers
- If the implementation of registration and licensing has been done, analysing the impact of licencing for street food vendors can be reviewed, especially on its mechanism and display, consumer health, food safety and as a street food reward system (i.e. food hygiene rating)
- Longitudinal study of the impact of any food safety policy changes on outbreak case trends
- Longitudinal study evaluating the impact of new hygiene sanitation facilities (government program in facilities) on food hygiene practices in street food vendors.
- Consumers' perception and predictors factor of their food choice specifically the role of food hygiene and nutrition in selection of vendor and food. This will investigate the consumers' perception which can be used by government as a driver to improve food safety in low cost eating place or RTE street food vendors. It can be linked to the development of a food hygiene rating scheme.

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APPENDIX I

Selection of Data Analysis

Phase, Variables, Chapter	Statistical analysis
➢ **Pilot project** Knowledge, attitude, practice (Chapter 3)	• Cronbach alpha was used to test reliability or internal consistency of the questionnaire. The range of Cronbach's alpha value is from zero to one. The higher values implying the items are indicating that the tool has works or measuring in the same dimension(Bujang et al., 2018). Correlation analysis can be used to measure minimum sample size (Bonett, 2000). • Kendall Tau correlation size was performed for estimating power sample or minimum sample, in two pairs Kendall Tau usually has smaller value from other correlation analysis i.e. Spearman's rank correlation. However, the strength of correlation coefficient between Kendall Tau and Spearman rank correlation are similar. Furthermore, Kendall Tau may describe more accurately rather than Spearman's rho in sample population (Akoglu, 2018). Kendall Tau suggested to use maintain adequate control and has similar powerful. It also provides clear interpretation rather than Spearman rho which was a bit difficult to interpret (Arndt S, 1999).
➢ **Phase 1** Socio-demographic, knowledge attitude practice and its correlation between variables (Chapter 4)	• T test univariate was used to give descriptive profile the respondents i.e. means, median, SD. • Kruskal-Wallis non-parametric test was used to determine significant differences between two or more groups of an independent variable on ordinal dependent a continuous variable(du Prel et al., 2010). • In this study, Kruskal Wallis test was used for determining predictor factor of socio-demographic to KAP. • Likert scale was used to measure attitude of food handlers as non-parametric variable. Likert scale can be used for measuring statement agreement and their response can be summarized by using media to interpret the data (Jamieson, 2004).

Table Statistic data analysis in phases (continued)

Phase, Variables, Chapter	Statistical analysis
	• Spearman's correlation (non-parametric) was used to confirm relationship between variables. It also provides information the strength and give direction which is negative or positive of a correlation between two variables (Akoglu, 2018).
➢ **Phase 1** Practice and microbiology variables (Chapter 5)	• T test univariate analysis was used to analyse data in descriptive for microbiology contamination (VBRG and TVC) and also elements of cross contamination • Spearman rank correlation was used to see the relationship between practices main variables (cross contamination and hygiene facility) and also food street vendors characteristics.
➢ **Phase 2** Socio-demographic respondent groups, knowledge attitude practice before after intervention and its correlation between variables (Chapter 6)	• T test univariate and bivariate analysis was used to analyse data in descriptive for socio-demographic of respondents' groups and also elements of cross contamination • Mann Whitney non-parametric (unpaired correlation) test was used in two groups to determine relationship. It confirmed correlation between groups trained and untrained on KAP and two groups (control and intervention) (Akoglu, 2018) • Wilcoxson rank test non-parametric (paired correlation) test was used in two groups to determine relationship. It confirmed correlation between after before intervention on KAP and two groups (trained and retrained) (Akoglu, 2018)
➢ **Phase 3** Food handler's perspective (Chapter 7)	• T test univariate analysis was used to analyse data in descriptive for rank choice of food handler's perspective
➢ **Phase 3** Food inspector perspective in order implementing food enforcement (Chapter 8)	• T test univariate analysis was used to analyse data in descriptive for rank choice of food inspector perspective on socio-demographic respondent and variables for implementing food enforcement i.e. legislation-regulation, guidance and its enforcement, work environment, and FSA audit. • Likert scale was also used in this chapter to measure officer agreement.

Example:

Phase 1, Kruskal Wallis H

Test Statistics[a,b]

	Knowledge	Attitude	Practice
Kruskal-Wallis H	10.004	5.443	13.016
df	1	1	1
Asymp. Sig.	.002	.020	.000

a. Kruskal Wallis Test

b. Grouping Variable: Gender

Test Statistics[a,b]

	Knowledge	Attitude	Practice
Kruskal-Wallis H	5.915	1.255	24.773
df	1	1	1
Asymp. Sig.	.015	.263	.000

a. Kruskal Wallis Test

b. Grouping Variable: Trained

APPENDIX II

Inform consent information for Quantitative survey in Indonesia

Perkenalkan, nama saya adalah……. (merupakan bagian dari tim riset*) yang sedang meneliti mengenai keamanan pangan khususnya pedagang kaki lima.

Please introduce, my name is…….(part of research team) that study in food hygiene especially street vendors.*

***for interviewer team**

Kami memohon kesediaan anda untuk berpatisipasi dalam penelitian dalam rangka tugas akhir doctoral, sebelumya saya akan membacakan inform consent terlebih dahulu.
We would like to have your participation in our research as a final assignment of doctoral study, before I started I would like to read out the inform consent of study.

Judul Penelitian "**Evaluasi Keamanan Pangan – Peluang Dan Tantangan hygiene makanan Untuk Pedagang Kaki Lima, Bandung, Indonesia**"

Research title ***Evaluating Food Safety – Opportunity and Challenges on Food Hygiene of Street Food Vendors, Bandung.***

1. Tujuan penelitian/ *Research Objective*

Penelitian ini mempunya beberapa objektif:

1) Mengobservasi pengetahuan, sikap dan praktis pedagang kaki lima terhadap hygiene makanan di Bandung, Indonesia
2) Menginvestigasi mikrobiologi kontaminasi pada permukaan yang kontak dengan makanan di pedagang kaki lima
3) Mengases dampak perubahan KAP dari intevensi yang diberikan pada pedagang kaki lima*.

This research has several following objectives:

1) *To observe the knowledge and attitude, and audit practice (KAP) of food hygiene of food handlers in the street food sector*
2) *To investigate microbial contamination of food surface contact in the street food sector*
3) *To assess impact of a bespoke intervention on the food handlers KAP.**

Note: *Read out number 1 and 2 for baseline, 3 for after intervention.

2. Alat Penelitian/ Research tools

Survey ini terdiri dari socio-demographic dan KAP. Interviewer/ kami akan membacakan pertanyaan dan juga pilihan jawabannya, tolong untuk menjawab pada setiap pertanyaan yang diberikan dan kami akan mencatat pada form yang tersedia. Setelah ini survey selesai kami meminta kesediaan untuk dapat mengambil sampel mikroba dengan swab Dip Slide pada permukaan talenan, gelas, piring atau permukaan tempat penjual dan juga utensil yang digunakan.

This survey has socio-demographic and KAP questionnaire. Interviewer/ We will read out the questions and we asked your participation to answer all of questions and we will help you to fill out it in form. After survey, we asked your permission to take out microbiology sampling by swabbing Dip Slide to food surface contact i.e. chopping board, glass, plate or utensil that use inn your premises.

3. Kerahasiaan *(confidentiality*)

Kami menggunakan kode untuk identitas partisipan sehingga tidak dapat mengidentifikasikan individu. *Interviewer* yang terlibat telah menandatangani surat pernyataan untuk tidak membocorkan/memberikan informasi yang diketahui selain kepada peneliti dan penanggung jawab penelitian. Data yang diberikan kepada pihak lain atas seizin peneliti dan penanggung jawab penelitian, dan tidak berupa data mentah.

We will use code for participant and it will protect for personal identification. Interviewer who involve had signed confidential letter for not giving information/data and protecting information /data to others accept the researcher. The data if given to others by researcher permit will not in rough data.

4. Right to refuse and asking

Jika ada pertanyaan yang tidak mau untuk dijawab, maka anda berhak untuk tidak menjawab. Anda berhak untuk menolak berpartisipasi dalam penelitian ini jika anda tidak bersedia. Walaupun anda telah setuju untuk berpartisipasi, anda dapat berhenti berpartisipasi, selama ataupun sesudah wawancara selesai, maximum 7 hari setelah survey dilakukan. Anda tidak bisa menarik partisipasi anda setelah lewat masa tersebut. Ketika berhenti untuk berpartisipasi, otomatis kami akan menghancurkan informasi terbut dan hanya menghitung response rate saja. Jika anda mempunyai pertanyaan terkait penelitian ini, silahkan untuk mengajukan pertanyaan tersebut.

If you do not want to answer the question, you have right to refuse it. In addition, you have right to refuse for participating if you do not want to do it. Even though you have already agree to participate, you can stop to participate during this survey or after this survey finish, maximum 7 day after survey. You cannot withdrawal your participation after it. When you stop to participate, we automatically will destroy it just counted it as a response rate.
If you have any question regards to this study, do not hesitate to ask it.

5. Resiko/ *Risk*

Tidak akan ada risiko fisik atau bahaya yang berpartisipasi dalam penelitian ini. Survey ini hanya membutuhkan waktu saja, kami membatasi sekitar 20 menit untuk menjawab kuesioner dan 15-menit untuk pengambilan sampel. Tidak akan merugikan subyek bila subjek tidak berpartisipasi, berhenti berpartisipasi, atau tidak menjawab pertanyaan.

There is no physically risk or other risk when you involve this study. This survey only asked your time, the time limit maximum 20 minutes for answering survey and 15 minute for swabbing sample. There is no harm if you are not willing to participate, stop to participate or to refuse for answering question.

6. Biaya/ Cost & Penghargaan/ *Appreciation*

Tidak akan ada biaya untuk subyek penelitian. Kami menghargai waktu anda, suvenir kami berikan atas kesediaan anda berpartisipasi dalam studi ini.

There is no cost for this study. We appreciated your time; we will give souvenir as our gratitude for your willingness joining this study.

7. Manfaat Penelitian/ *Research Benefit*

Riset ini akan bermanfaat bagi akademik untuk dapat melakukan penelitian selanjutnya. Juga bagi pembuat kebijakan untuk mendapatkan perspektif dalam membuat kebijakan dimasa yang akan dating. Selain pemenuhan tugas akhir, agar penelitiaan ini dapat bermanfaat, hasil akhir yang telah dianalisis akan kami publikasikan pada konferensi atau jurnal ilmiah sehingga pihak lain yang tertarik dapat belajar dari penelitian ini.

This research will benefit for academician for developing further research. Also, for policy maker for having perspective in developing policies in the future. Beside for doctoral thesis, this research will be published in journal or conference for contribute beneficial to respondents who interest with this study.

8. Hak kekayaan Intelektual/ *Intellectual Property Right*

Tidak ada hak kekayaan intelektual yang terlibat pada survei penelitian ini.

There is no intellectual property right involve in this study.

9. Kontak Peneliti/ Researcher Contact

Nama/*Name*: Dea Winiarti
Whatapps: [redacted]
Email: [redacted]
Alamat/ Adress: [redacted]
Institusi/ Institution: Badan Standardisasi Nasional & University of Birmingham

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Saat anda bersedia untuk berpartisipasi pada penelitian ini, kami tidak akan memberikan form persetujuan untuk diisi secara tertulis, kami akan menyampaikan secara oral saja. Persetujuan anda dibuktikan dengan keiikutsertaan anda berpartisipasi dalam studi ini. Bila anda mempunyai pertanyaan, silahkan diutarakan.

When you agreed to participate in this study, we will not ask you to fill out agreement form; we will ask you in oral. Your agreement proved by your participation in this study. If you have a question, please ask.

Appendix III

Survey Sheet for Quantitative Study

Survey Sheet Food Safety and Hygiene Practice on Street food vendors in Bandung City, INDONESIA

(Updated on 14 Sept 2016)

ID Respondent : ☐☐☐

District/City & Zone : ☐☐

Sub-District : ☐

Village/ RW/ RT : ☐ / ☐ / ☐

Date of interview : ...../...../.....

Interviewer : .....

Food menu : .....

Put cross (X) in your answer

I. Socio-demographic and general information

1. Gender :
   (1) Male (2) Female ☐
2. Age : ..... years old
3. Marital status :
   (1) Married (3) Widow Widow/Widower ☐
   (2) Divorce (4) Single
4. Education level :
   (1) No schooling (4) High School ☐
   (2) Elementary School (5) Diploma
   (3) Junior High School (6) Graduate Degree
5. Daily bussines profit : .....
6. Type of occupation
   (1) Self employer ☐
   (2) Employee (How many employee there? :.....)
   (3) Owner (How many employee do you have? .....)
7. Do you have a health insurance?
   (0) No, I do not have (3) BPJS ☐
   (1) Askes/Asabri (4) Jamsostek
   (2) Jamkesmas/Jamkesda (5) Private insurance
8. How frequent you eat food that you sells? ☐

(0) Never
(1) Rarely (1-4 times a month)
(2) Sometimes (1-4 times a week)
(3) Often (more than 4 times a week)
(4) Very often (every day)

9. Are you having resident ID Card Bandung/ Bandung citizen?
   (1) No, temporary (1) Yes, permanent ☐

10. How long have you been in the business?
    (1) Less than a year (3) 3> years> 5 years (5) more than 10 years ☐
    (2) 1 – 3 years (4) 5 ≥ years ≥ 10

11. What is your employment type?
    (0) Full time (1) Part time ☐

12. Zone location?
    (1) Zone 1 (2) Zone 2 (3) Zone 3 ☐

13. Selling point place?
    (1) Stay (2) Moved ☐

14. Location near (≤ 250 meter) to :
    (1) School/college /office (3) Resident place
    (2) Traditional market/ market place (4) Elsewhere ☐

15. How many days in a week you selling?
    (1) 7 (2) 5-6 (3) less than 5 ☐

    For choice (2) and (3)
    The day off is certain days or and weekend? ……

16. How many hours/ day you open your business?
    (1)24 hours per day (4) < 12 – 8 hours
    (2) < 24 - 18 hours (5) < 8 – 5 hours
    (3) < 18 – 12 hours (6) < 5 hours ☐

    Start at……until ……

11. Type of facilities:
    (1) Tent (3) Overhang/bear/hawkers
    (2) Cart (4) Car vendor ☐

12. Food served :
    (1) Take away (2) Eat Onsite and take away ☐

    If the answer no 1, what kind of plate do you used…repeated plate or glass/ disposable plate*

    If the answer no 2, what kind of packaging…..cartoon/laminated paper plastic/plastic heat resistant/ Styrofoam/ plastic box*

Food condition served in street vendors

13. Main material of food?
    (1) Meat
    (2) Poultry
    (3) Fish/ Seafood
    (5) Beverage
    (6) Mixed Soup
    (7) Vegetable
    (8) Fruit
    (9) Milk products ☐

(4) Cereal and products (Noddle, pancake, pasta, rice, wheat, maize, ,etc.)

(10) Egg

14.Type of cooking?

(1) Fried
(2) Barbeque
(3) Boiled
(4) Steam
(5) Oven
(6) Fresh

☐

14. Storage of food?

(1) Hot (≥ 40°C)
(2) Warm (≥ room temperature < 40°C)
(3) Room temperature
(4) Chill (0-8°C)

☐

15. Do you serve Ice drink? **Yes** / **No**, If yes where do you get it

(1) Buy from Ice retailer (2) Buy from home industries (3)Making by own self

☐

16. What kind water source do you have for washing:

(1) Water bottle (tap at toilet / tap at home/ vendors cart/ water sprinkler/ ……)
(2) Onsite water supply
(3) Re-used water in plastic bucket (tap at toilet / tap at home/ vendors cart/ water sprinkler/ Others……)

☐

General information and training

1. Have you ever heard about handling food in term hygiene and safe?

(1) Yes (2) No

☐

2. Have you already trained how to handle food with hygiene and safe?

(1) Yes (2) No

☐

If yes, please continue to no 3.

3. Who have give you training about it?

Other employees The owner Local authority/formal (……)

Name of training……

Part II. Knowledge

Specific Knowledge test (will be given in separated paper)

Items	**Knowledge Test** (N=10)	**Score**
1	What is the correct temperature for chiller? a) 0-8 ^{0}C b) -10-0 ^{0}C c) 8-12 ^{0}C	
2	What is the correct temperature for freezer? a) 0-8 ^{0}C b) -18 ^{0}C c) -10- 0 ^{0}C	
3	If you have raw meat and vegetable, it is proper to used cut board : a) differently b) similarly c) not know	
4	Which one is the correct statement? a) Raw meat should be placed in different shelf b) Raw and cook meat can be stored on the same shelf c) Not know	
5	Which one is the correct statement?	

Items	**Knowledge Test** (N=10)	**Score**
	a) Raw meat and fish should be stored in different shelf b) Raw and fish can be stored on the same shelf c) Not sure	
6	What is benefit of keeping food on refrigerator? a) Killing germs b) Slowing germs growth c) Not know	
7	How would you clean the knife after cutting raw meat? a) Wipe with a damp cloth or kitchen towel b) Wash it under a running water with detergent c) Not know	
8	Which one is the most important food that you need to wash your hand after you handle it? a) Handling raw meat b) Slicing cooked meat/ cooked vegetables c) Cutting fruit d) Not know	
9	is smoking allowed when preparing food? a) Allowed b) Not allowed c) Not know	
10	Wearing mask or gloves, apron when you work is reduce contamination risk. a) True b) False c) Not know	

Part III Attitude

Attitude (N=8)	**Strongly Disagree**				**Strongly Agree**
	1	**2**	**3**	**4**	**5**
Handling food with safety is an important part of my job responsibilities					
Having clean nails is not important when handling food					
Storing food at the correct temperature is important for food safety					
Applying food hygiene practice in my daily work should happen all the time					
Better knowledge about food hygiene safety is important					
It is acceptable for raw food and cooked food to be kept on the same shelf					
Chewing, eating and smoking when preparing food provides a risk of contamination					
Selling food without consideration for your customer health and safety may result in penalty such fine and/or jail as a punishment					
The use of safer material ingredien from approved/ trusted supplier is not necessary					
Selling food without consideration for your customers' health and safety will risk a loss of customer trust.					

Part IV. Practice test (based on observation)

Hygiene Practice Checklist		Yes	No	NA
Cross-contamination				
Personal hygiene	Staff wearing head covering			
	Clothes are clean			
	Clean, short and unpolished nail			
	No smoking/chewing/eating			
	Using apron/ protective clothes			
	Disposable cloths or paper towels for wiping surface available			
Storage	Food store in food grade container			
	The food container is clean			
	Food are covered to protect from contamination			
	Food is stored based on consideration free of cross contamination between materials			
	Food storage stored up the ground minimal 45 cm.			
Pest control	Controls for flying insects			
	No evidence of flying insects			
Utensils and Equipment	Using stainless steel and hard plastic material or other suitable material			
	Knives, chopping boards and other equipment are clean			
	Separate chopping board for raw ingredients and ready-to-eat foods are available			
	Disposable plates or packaging used			
Water/ raw ingredients supply				
Potable water	Available			
	Water tanks/containers/ hose are clean			
	Water source is not taken from re used water			
	Ices used for food is made/bought safe			
Facilities				
Wash hand basin in food preparation area	Hand washing basin is available in the kitchen area			
	Clean			
	Facility only for hand washing			
	Water source is not from reused water			
	Hot water available			
	Soap available			
	Bactericidal soap available			
	Hand dryer/ paper towels are available			
	Waste water no risk of contamination			
Toilet	Toilet locates within a convenient distance			
	Clean			
	Hand washing basin available			
	Hot water available			
	Soap available in their toilet/have their own			
	Bactericidal soap available			

Hygiene Practice Checklist		Yes	No	NA
	Hand dryer/ Paper towels are available			
Sink	Available			
	Separate sink for washing food is available			
	Clean			
	Water source is not taken from re used water			
	Hot water available			
	Detergents for washing utensils are available			
	Disinfectants available			
	Paper towels or air drying for clean equipment			
	No risk of contamination from waste water			
Walls	The materials are easy to clean			
	No damage/holes			
Waste	Waste disposal bag or waste container available			
	Well stored and has a lid			
Food packaging	Disposable used			
Temperature control				
Storage	Ice box (or equivalent) available			
	Chilled food are kept below 8˚C			
	Fridge thermometers available			
	Records of temperature available			

Please noted for handler who have wound in their hand

- Covering wound, burn with bandage and using gloves (Y/N)

Government support need

II. Presence and local regulation

Item	Yes	Not
Having information how to access for financial support?		
Having financial support?		
Having training in food hygiene or food safety/ maintenance from local authority?		
Visited and fostering by the local authority?		
For cooking with gas, Having Fire safety training?		

III. What kind of support do you want from government to make sure your food is safety and shaving good selling point, please give number as your priority

- ✓ Training and certified support
- ✓ Monitoring consistently
- ✓ Supporting facility for hygiene such as place and other facility*)

  *Please explain

Appendix IV

Inform Consent for Qualitative Study (Interview)

Research project subtitle: Improving food safety - Opportunity and Challenges on food hygiene in Indonesia: Government and stakeholders' perspectives

Research investigator: Dea Winiarti

This research is a thesis project under University of Birmingham, School of Chemical Engineering, Food Safety, Nutrition and Health Program. The research aims are evaluating existing approach of implementation in food regulation, especially in control of ready to eat street food vendors, in Indonesia, to explore the governance process and its performance, and the barriers faced by the government in Indonesia concerning ready to eat street food vendors. In addition, the aim is also to understand the view of some stakeholders on ready to eat street food.

This research is a part of the PhD thesis "Improving Food Safety - Opportunity and challenge food safety on food hygiene ready to eat street food vendor.

The interview will take maximum 120 minutes. There was not risk associated with the participation; we also used pseudonym/coding number for covering subject identity, if you want it.

Thank you for agreeing to be interviewed as part of the above research project. You have right to stop or withdraw anytime from the research. After you agree and you sign this form to certify you approve this session, we will conduct the interview with the following:

a) The interview session will be will transcribed and analysed by research investigator
b) Limited access for this transcript only available for researcher investigator and its academic supervisors, and other researcher whom collaborate in a research part
c) All result made available through publication/academic publication

Interview agreement

Research Participation Name:

Code name*:

By signing this form confirm that

a) I have read and understand the inform consent
b) I agree to participate to this interview. I also understand that my words will be quoted. I agree to quoted by *coding name/pseudo name/ directly name.
c) I understand and agree if the result will be published in publication/ academic publication/ other media such as presentation and website.
d) I do not expect to receive any benefit of my participation

Date: ……/……./…….

Printed name:

Signed……

*will be given by researcher
**Please, choose one

APPENDIX V

Intervention Method and its Materials

Place	This activity delivered as in available place near their food premises in small number of people (3-5 person).
Overview of Intervention and time estimation	This activity consists of several lessons such as: - Personal hygiene (20 minute) - Cleaning including Sanitation, waste and Pest control (15 minute) - Food contamination (15 minute) - Food storage and Cooking including temperature (10 minute) It was delivered by presentation, discussion and demonstration (germ test and how to check temperature by thermometer).
Objective:	Food handlers can aware and enable for: - Maintaining their personal hygiene - Understanding about how to clean and maintaining waste - Understanding about germ and cross contamination - Enabling to prevent cross contamination - Enabling to how to do proper storage and keeping in correct temperature
Source:	Presentation slide*, link washing hand video*, picture of washing step by WHO**, germ test kit and thermometer *The material can be found in the CD **The picture of washing hand (WHO,2009) can be found below

Cara Mencuci Tangan
Dengan Sabun dan Air

(Waktu 40-60 detik)



(WHO, 2009)

APPENDIX VI

Qualitative Questionnaire (Semi Structure Question)

Transcript of focus question for government institution (Key actors)

1. Would you explain your role in food safety/ ready to eat street food /school meal (PJAS)?
2. What kind of program or mechanism that use to support food safety control and its monitoring system?
3. How you did communication and collaboration doing your role? And who is your government partner? Is there any issue about it?
4. What do you think about regulation, is it update and support enough to control monitoring or promote hygiene and sanitation?
5. What is your obstacle for doing your role? What do you think about your target achievement?
6. Would you able to identify any variables to improve?

Transcript of focus question for local government institution (local health/sanitarians)

1. Would you explain your role in food safety/ ready to eat street food /school meal (PJAS)?
2. What kind of program or mechanism that use to support food safety control and its monitoring system? Please share how you do it
3. How you did communication and collaboration doing your role? And who is your government partner? Is there any issue about it?
4. What do you think about regulation, is it update and support enough to control monitoring or promote hygiene and sanitation?
5. What is your obstacles for doing your role? What do you think about your target achievement?
6. Would you able to identify any variables to improve?

Transcript of focus question for stakeholders

1. Would you explain your role in ready to eat street food vendors or school meal (PJAS)?
2. How you did your role?
3. How did you implement the food hygiene regulation in your role? Do you think your support has maximum enough, what is your obstacle?
4. Would you able to identify any variables to improve?

5*. What do you feel about government support? And what you want from government related street vendors business?

Note: * additional question for street vendors community

APPENDIX VII

SurveyMonkey Questionnaire

Efficacy of food law enforcement (Inspectors Perspective)

1. Effective Food Law enforcement in UK (Inspectors Perspective)

Thank you for participating this survey.

Your opinions are being collected to identify aspects of good practice used in the UK. The data will be used as part of a PhD project which is evaluating the delivery of food controls in SME's especially street food vendors. The project is sponsored by the Indonesian Competent Authority and its purpose is to collate examples of good practice which could inform their review of controls .

The survey will take approximately 15 minutes. All the answers received will be treated with strict confidence and anonymised. Q 5, asking about the region, will only be used to demonstrate the extent of participation.

1. Work status

- ◯ Full Time local Government
- ◯ Part time local Government
- ◯ Other (please specify)

2. Please specify your age group

- ◯ <21
- ◯ 21-30
- ◯ 31-40
- ◯ 41-50
- ◯ 51-60
- ◯ >60

3. Please specify your education

- ☐ B.Sc Environmental Health
- ☐ M.Sc Environmental Health
- ☐ Higher Certificate in Food Control
- ☐ Other (please specify)
- ☐ Higher Certificate in food premises inspection
- ☐ Trading Standards qualification

1

4. How long have you been working as an enforcement officer/inspector in food?

- ◯ less than 2 years
- ◯ 2-5 years
- ◯ between 5 and 10 years
- ◯ more than 10 years

5. Which is your area of work ?

- ◯ West Midlands
- ◯ East Midlands
- ◯ East of England
- ◯ London
- ◯ South East
- ◯ South West
- ◯ Yorkshire and the Humber
- ◯ North West
- ◯ North East
- ◯ Wales
- ◯ Northern Ireland
- ◯ Scotland

Efficacy of food law enforcement (Inspectors Perspective)

2. Legislation

4. How long have you been working as an enforcement officer/inspector in food?

- ◯ less than 2 years
- ◯ 2-5 years
- ◯ between 5 and 10 years
- ◯ more than 10 years

5. Which is your area of work ?

- ◯ West Midlands
- ◯ East Midlands
- ◯ East of England
- ◯ London
- ◯ South East
- ◯ South West
- ◯ Yorkshire and the Humber
- ◯ North West
- ◯ North East
- ◯ Wales
- ◯ Northern Ireland
- ◯ Scotland

Efficacy of food law enforcement (Inspectors Perspective)

2. Legislation

2

4. How long have you been working as an enforcement officer/inspector in food?

- ◯ less than 2 years
- ◯ 2-5 years
- ◯ between 5 and 10 years
- ◯ more than 10 years

5. Which is your area of work ?

- ◯ West Midlands
- ◯ East Midlands
- ◯ East of England
- ◯ London
- ◯ South East
- ◯ South West
- ◯ Yorkshire and the Humber
- ◯ North West
- ◯ North East
- ◯ Wales
- ◯ Northern Ireland
- ◯ Scotland

Efficacy of food law enforcement (Inspectors Perspective)

2. Legislation

2

6. Thinking specifically about UK food hygiene legislation, ie Food Safety Act 1990, Food Safety and Hygiene (England) Regulations 2013 or national equivalent, please select all the statements that apply, in your opinion

- [ ] The legislation is consistent
- [ ] The legislation is clearly worded
- [ ] The legislation is easy for enforcement officers to understand
- [ ] The legislation is easy for the FBO to understand
- [ ] The legislation is straightforward to apply
- [ ] The legislation is easy to enforce
- [ ] The legislation covers all the main issues in food hygiene enforcement
- [ ] The legislation is fit for purpose
- [ ] In my opinion none of the above apply
- [ ] I do not enforce the hygiene legislation
- [ ] please comment if you wish

7. Thinking specifically about the EC Hygiene legislation, i.e Regulation 852/2004, Regulation 853/2004 and Regulation 178/2002, select all the statements that apply, in your opinion

- [ ] The legislation is consistent
- [ ] The legislation is clearly worded
- [ ] The legislation is easy for enforcement officers to understand
- [ ] The legislation is easy for FBO's to understand
- [ ] The legislation is straightforward to apply
- [ ] The legislation is easy to enforce
- [ ] The legislation covers all the main issues in food hygiene enforcement
- [ ] The legislation is fit for purpose
- [ ] In my opinion none of the above apply
- [ ] I do not enforce any of this legislation
- [ ] please comment if you wish

8. Thinking specifically about UK food standards legislation, e.g Food Safety Act 1990, Food Information Regs 2014, Nutrition & Health Claims Regs 2007, Chocolate & Cocoa Product Regs 2003

- [ ] The legislation is consistent
- [ ] The legislation is clearly worded
- [ ] The legislation is easy for enforcement officers to understand
- [ ] The legislation is easy for FBO's to understand
- [ ] The legislation is straightforward to apply
- [ ] The legislation is easy to enforce
- [ ] The legislation covers all the main issues needed for food law enforcement in food standards.
- [ ] The legislation is fit for purpose
- [ ] In my opinion none of the above apply
- [ ] I do not enforce food standards legislation
- [ ] please comment if you wish

9. Thinking specifically about EU food standards legislation, e.g Regulation (EU) No 1169/2011, select all the statements that apply, in your opinion

- [ ] The legislation is consistent
- [ ] The legislation is clearly worded
- [ ] The legislation is easy for enforcement officers to understand
- [ ] The legislation is easy for FBO's to understand
- [ ] The legislation is straightforward to apply
- [ ] The legislation is easy to enforce
- [ ] The legislation covers all the main issues needed for food law enforcement in food standards
- [ ] The legislation is fit for purpose
- [ ] In my opinion none of the above apply
- [ ] I do not enforce Food Standards legislation
- [ ] please comment if you wish

10. Does your organisation carry out consistency training for inspectors?

- ◯ Yes
- ◯ No
- ◯ I don't know

Efficacy of food law enforcement (Inspectors Perspective)

3.

11. If yes, please answer the following questions below

a. How often?	
b. When was the last one?	
c. What were the outcomes from the most recent training?	
d. Was it (the most recent) useful in improving the delivery of controls?	
e. Was the most recent carried out in house and or by an external agent?	

Efficacy of food law enforcement (Inspectors Perspective)

4. Guidance

12. Are you aware of guidance for inspectors on how to risk rate food premises with regard to delivery of controls?

- ◯ Yes
- ◯ No

13. If yes, who provides the guidance for risk rating premises with regard to delivery of food controls?

14. If Yes, please rate how useful you find the risk rating guidance (1 = completely useless -5 extremely useful)

1	2	3	4	5
◯	◯	◯	◯	◯

15. Is there any guidance on how to judge non-compliance with food legislation?

- ◯ Yes
- ◯ No
- ◯ I don't know

16. If yes, who provides the guidance for judgement of non- compliance?

17. If yes, on a scale of 1-5, with 5 being extremely useful, how useful do you find this guidance?

1	2	3	4	5
◯	◯	◯	◯	◯

18. Is there guidance on how to select the course of action when non compliance is identified?

- ◯ Yes
- ◯ No
- ◯ I don't know

19. If yes, who provides the guidance for course action when non conformity is identified?

20. On a scale of 1-5, please rate how useful you find this guidance, with 5 being very helpful and 1 being very unhelpful.

1	2	3	4	5
◯	◯	◯	◯	◯

21. Is there guidance for inspectors on the procedures to follow when taking enforcement action?

- ◯ Yes
- ◯ No
- ◯ I don't know

22. If yes, who provides guidance for inspectors on procedures for enforcement action ?

23. If yes, on a scale of 1-5, how useful do you find the guidance on procedures for enforcement action (5 being very useful, 1 being completely useless)?

1	2	3	4	5
○	○	○	○	○

24. In general, how easy do you find it to carry out appropriate enforcement action when you identify non-compliance? (1 = very difficult- 5 very easy)

1	2	3	4	5
○	○	○	○	○

25. If you need help or support when carrying out enforcement action where do you get this assistance (or from whom) ?

Efficacy of food law enforcement (Inspectors Perspective)

5. Powers

26. Do you feel you have sufficient powers to deal with non compliance in the food industry?

- ○ Yes
- ○ No
- ○ I don't know

Efficacy of food law enforcement (Inspectors Perspective)

6.

27. If 'no' please list which additional powers you feel would be useful

7

28. What could you suggest that would support your work and enable you to work more efficiently and effectively in food law enforcement?

Efficacy of food law enforcement (Inspectors Perspective)

7. Sanctions

29. Do you think the sanctions currently provided by UK food legislation are appropriate for addressing non compliance?

- ◯ Yes
- ◯ No

please comment

30. Do you think the sanctions currently provided by the UK food legislation are sufficiently flexible to cover the common non compliances in food?

- ◯ Yes
- ◯ No

please comment

31. Do you think the sanctions available for non compliance with food legislation are effective in improving Food Business Operator compliance?

- ◯ Yes
- ◯ No
- ◯ I don't know

32. In your experience how do Food Business Operators respond/react when s/he finds s/he is going to be prosecuted?

33. When a food business is successfully prosecuted, do you feel the sanctions awarded by the courts are transparent?

- ◯ Yes
- ◯ No

please comment

34. When a food business is successfully prosecuted, do you feel the sanctions awarded by the courts are consistent?

- ◯ Yes
- ◯ No

please comment

35. Is there clear guidance for the courts on sanctions to be used in food safety prosecutions?

- ◯ Yes
- ◯ No
- ◯ I don't know

Efficacy of food law enforcement (Inspectors Perspective)

8.

36. In your opinion is the guidance correctly followed?

- ◯ Yes
- ◯ No
- ◯ Usually
- ◯ Sometimes
- ◯ I don't know

9

37. when your authority takes prosecutions, do you have a particular lawyer who specialises in food legislation to handle the case?

- ◯ Yes
- ◯ No
- ◯ I don't know
- ◯ The authority has never taken a prosecution that I am aware of
- ◯ Other (please specify)

38. Do you feel the sanctions awarded by the courts after successful prosecution are effective in protecting public health?

- ◯ Yes
- ◯ No
- ◯ I don't know

please comment

39. Can you suggest additional sanctions that you feel could improve FBO compliance and/or protect public health?

Efficacy of food law enforcement (Inspectors Perspective)

9. Working environment

40. Please rate how important the following factors are in affecting your work satisfaction.
(Rate each option 1- 5 with 1 being very unimportant and 5 being very important.

	1	2	3	4	5
a. Good work environment (building, equipment)	○	○	○	○	○
b. Work operating procedure - clear objectives and support to deliver	○	○	○	○	○
c. Fair treatment (absence of bullying and inequality)	○	○	○	○	○
d. Satisfactory salary	○	○	○	○	○
e. Personal development, training and evaluation	○	○	○	○	○
f. Sharing responsibilities, collaboration between officers	○	○	○	○	○
g. Manageable Work loads	○	○	○	○	○
h. Promotion and career development	○	○	○	○	○
i. Good management support with regard to food law enforcement	○	○	○	○	○

41. which of the following best describes your position?

- ○ Enforcement officer
- ○ Team leader
- ○ Principal officer
- ○ Senior manager
- ○ Lead food officer
- ○ Other (please specify)

Efficacy of food law enforcement (Inspectors Perspective)

10. management of enforcement

11

42. How do you confirm if a food business is registered?

43. Is the registration system for food businesses effective?

- Yes
- No
- I don't know

44. What suggestions could you make to improve the registration process?

Efficacy of food law enforcement (Inspectors Perspective)

11.

45. In your team/section do you have sufficient resources to deliver official controls?

- Yes
- No
- I don't know

46. If no, please indicate where you consider the shortfall is

- [ ] Insufficient people to carry out inspections
- [ ] Insufficient people to deliver other controls such as sampling
- [ ] Insufficient money to cover delivery - for example sampling or other controls
- [ ] Lack of expertise
- [ ] Lack of support from senior management
- [ ] Lack of support from Food Standards Agency
- [ ] Lack of opportunity to update knowledge
- [ ] Inadequate equipment
- [ ] Inadequate support from laboratory service
- [ ] other
- [ ] Other (please specify)

47. How do you determine the number of person hours needed to deliver official controls?

48. How do you monitor the delivery of official controls?

- [ ] Shadow officers/joint inspections
- [ ] Consistency exercises
- [ ] Unannounced post inspection checks on premises
- [ ] Record the number of actions such as letters/notices/prosecutions
- [ ] Random file checks
- [ ] Number of food samples taken
- [ ] Confirm all premises are inspected according to the frequency associated with their risk category (according to Food Law Code of Practice)
- [ ] We don't monitor the delivery of controls
- [ ] Other (please specify)

49. Do you have a specialist electronic system for monitoring the delivery of food controls?

- ◯ Yes
- ◯ No
- ◯ I don't know
- ◯ Other (please specify)

50. Have you ever experienced an FSA audit?

- ◯ Yes
- ◯ No
- ◯ I don't know

51. How did your local authority prepare for the audit?

52. Did the FSA evaluate whether the local authority had sufficient resources to deliver official controls?

- ◯ Yes
- ◯ No
- ◯ I don't know

53. did the FSA evaluate the competency of inspectors?

- ◯ Yes
- ◯ No
- ◯ I don't know
- ◯ Other (please specify)

54. Did the FSA shadow or otherwise check the quality fo the inspectors delivery of controls?

- ◯ Yes
- ◯ No
- ◯ I don't know
- ◯ Other (please specify)

55. How do you rate the outcomes of the FSA audit for enhancing official work in food law enforcement in your authority? 1 = completely useless, 5 = very useful

completely useless	useless	neither useless or useful	useful	very useful
○	○	○	○	○

Thank you for participating.
If you would like to add any further comments please do so here

56. any further comments?

APPENDIX VIII

Organization structure of branches of NADFC

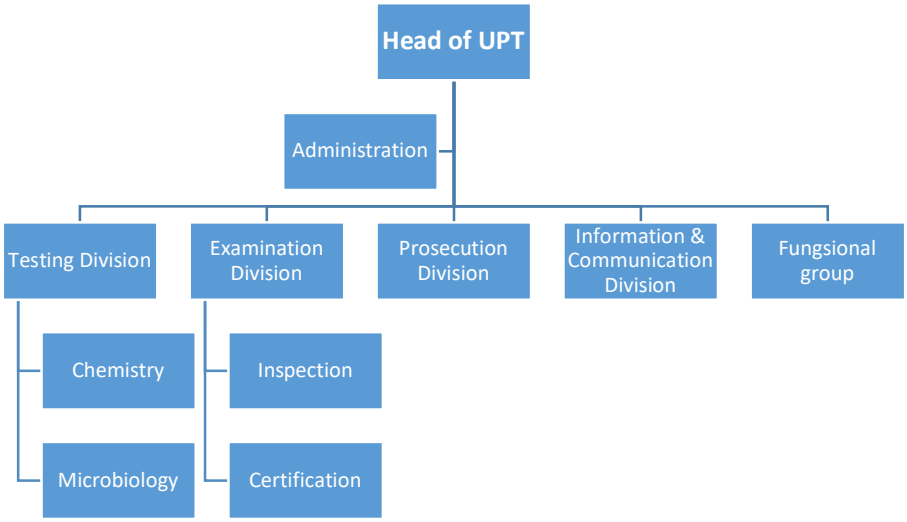


Figure 1. Organization structure NADFC of Main Branch UPT

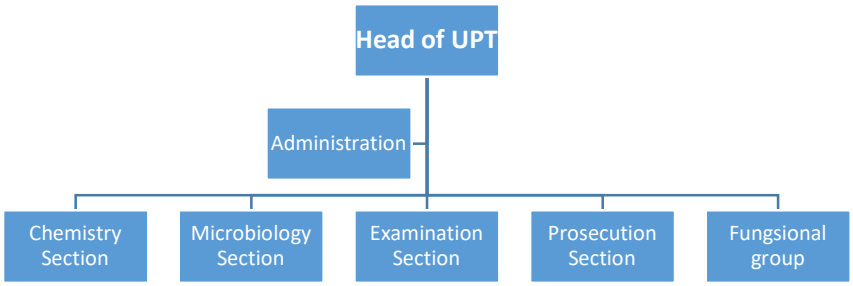


Figure 2. Organization structure NADFC of UPT Type A

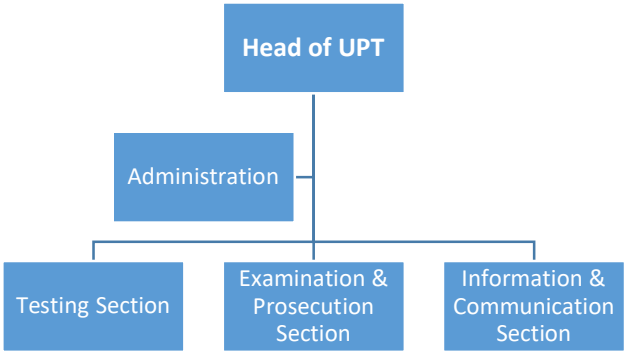


Figure 3. Organization structure NADFC of UPT Type B

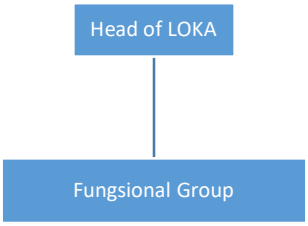


Figure 4. Organization structure NADFC of LOKA

APPENDIX IX

Sticker label for street food vendors

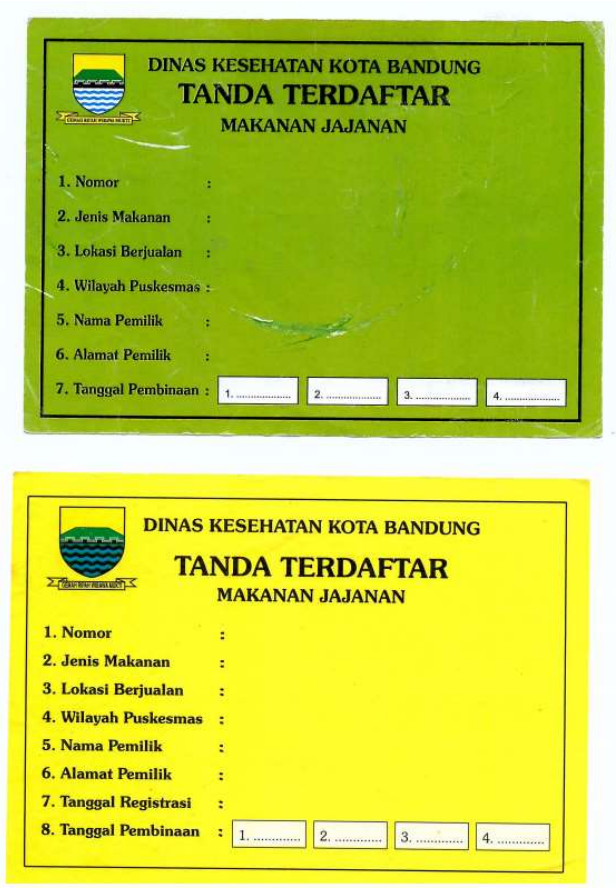


Figure 1 General sticker label launched by local health for street food vendors



Figure 2 Different stickers label used by one UPT Primary health