

**DETERMINATION OF HALAL STATUS AND
MICROBIOLOGICAL VERIFICATION OF READY TO EAT
BURGERS SOLD AT STREET MARKET**

BY

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ABSTRACT

Nowadays, street food especially ready to eat (RTE) burgers are very popular in Malaysia. However, it is very hard to find halal certificate shown at burger stalls thus the halal status of RTE burgers sold at street markets is questionable. This research aimed to determine the halal status of street burger stalls around Shah Alam and Kuantan towns and verified the microbiological quality of the burger as halalan - toyyiban indicator. Respondents of this study comprised of 47 RTE burger entrepreneurs in Kuantan and 80 RTE burger entrepreneurs in Shah Alam. The halal status was identified through survey and observation using a specific questionnaire. For microbiology verification, about 68 samples were convenient randomly purchased from RTE burger stalls in Kuantan and the samples were examined for Total Plate Count (TPC), Coliform, Faecal coliform, *E. coli* and *S. aureus*. About 14 samples of RTE burgers from one burger stall at Kuantan town were also purchased at one time to evaluate their microbiological growth. The samples were divided into seven groups which are then left at ambient temperature for seven interval holding hours before the analysis. About 30-100% of RTE burgers sold at street markets contain raw ingredients that are from animal or mix-animal sources and about five to 15% of the raw materials have no halal logo or certificate. The observation during the survey also found that there is still no indicator of halal packaging used for RTE burgers sold at street markets. The results show that RTE halal street burger samples had low to high risks where TPC was less than 3.3×10^3 cfu/g (low risk), mean Coliform count were 1.96×10^2 MPN/g (high risk) and mean F. coliform count was 5.6×10^2 MPN/g (high risk). Pathogenic *E. coli* were not detected (low risk) and *S. aureus* counts less than 3.3×10^3 cfu/g (medium risk). Microbial growth study showed that RTE street burger is still safe to consume even though after left at ambient temperature up to 24 hours. The overall study shows that RTE burgers sold at street markets have *syubhah* ingredients especially from raw materials and have some microbiological risks even though they can be consumed up to 24 hours. Thus, the implementation of halal certification on street burger stalls is vital to ensure the halalan – toyyibah aspect of street RTE burgers.

ملخص البحث

شكلت أطعمة الشارع في الوقت الحاضر شهرة كبيرة في ماليزيا وبشكل خاص البيرجر الجاهز للأكل. ومع ذلك، من الصعب جداً العثور على شهادة حلال معروضة في أكشاك بيرجر، وبالتالي فإن أمر البيرجر الجاهز المباع في أسواق الشوارع مشكوك فيه من حيث حالة الحلال. يهدف هذا البحث إلى تحديد حالة الحلال لأكشاك بيرجر الشوارع حول بلدي شاه علم وكوانتان والتحقق من الجودة الميكروبيولوجية للبيرجر كمؤشر حلالاً طيباً. المشاركون في هذه الدراسة عددهم أربع وسبعون (47) من رواد الأعمال في مجال بيع البيرجر الجاهز للأكل في كوانتان وثمانون (80) من رواد الأعمال في نفس المجال في منطقة شاه علم. تم تحديد حالة الحلال من خلال المسح و المراقبة باستخدام السنتيان المحدد. للتحقق من علم الأحياء الدقيقة، تم شراء حوالي ثمانية وستين (68) عينة بشكل عشوائي من أكشاك بيرجر الجاهز للأكل في كوانتان وفحصت العينات لمعرفة إجمالي عدد الصفائح القولونية، البكتيريا البرازية (*E. coli* and *S. aureus*) تم أيضاً شراء حوالي أربعة عشر (14) عينة من بيرجر الجاهز للأكل من كشك بيرجر واحد في مدينة كوانتان في وقت واحد لتقييم نموها الميكروبيولوجي. تم تقسيم العينات إلى سبع مجموعات والتي تركت بعد ذلك في درجة الحرارة المحيطة لمدة سبع ساعات احتجاز فاصل قبل التحليل. حوالي 30-100% من بيرجر الجاهز للأكل الذي يباع في أسواق الشوارع يحتوي على مكونات خام من مصادر حيوانية أو مخلوطة من الحيوانات وحوالي 5 إلى 15% من المواد الخام ليس لها شعار أو شهادة حلال. كما وجدت الملاحظة أثناء المسح أنه لا يوجد حتى الآن أي مؤشر على استخدام العبوات الحلال مع بيرجر الجاهز للأكل المباع في أسواق الشوارع. أظهرت النتائج أن عينات بيرجر الحلال الجاهزة للأكل تحتوي على مخاطر منخفضة إلى عالية حيث كان التعداد البكتيري (TPC) أقل من 3.3×10^3 (cfu/g) (خطر منخفض)، وكان متوسط تعداد بكتيريا القولونيات 96.1×10^2 (MPN/g) (خطر مرتفع) ومتوسط عدد القولونيات 6.5×10^2 (MPN/g) (مخاطر عالية). لم يتم الكشف عن (*E. coli*) الممرضة (خطر منخفض) و (*S. aureus*) أقل من 3.3×10^3 (cfu/g) (خطر متوسط). أظهرت دراسة نمو الميكروبات أن بيرجر الشارع الجاهز للأكل لا يزال آمناً للاستهلاك على الرغم من تركه في درجة حرارة الغرفة لمدة تصل إلى 24 ساعة. تظهر الدراسة الشاملة أن البيرجر الجاهز المباع في أسواق الشوارع يحتوي على مكونات شبيهة خاصة من المواد الخام ولها بعض المخاطر الميكروبيولوجية على الرغم من أنه يمكن استهلاكها خلال مدة تصل إلى 24 ساعة. وبالتالي، فإن تنفيذ شهادة الحلال في أكشاك بيرجر الشوارع أمر حيوي لضمان جانب الحلال الطيب في بيرجر الشارع الجاهز للأكل.

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Science (Halal Industry Science)

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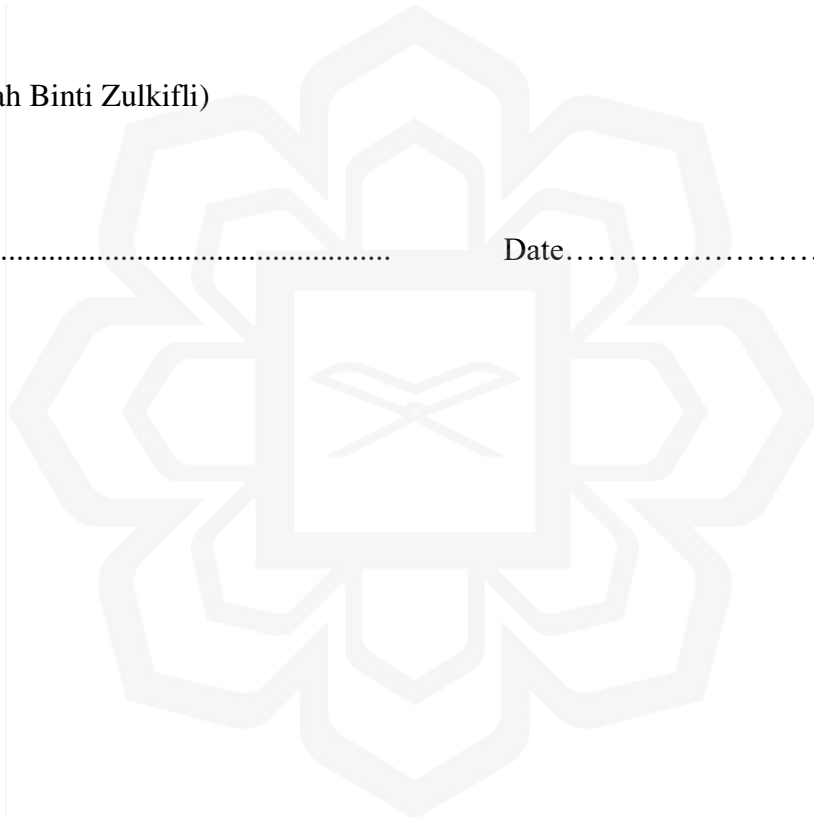
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LIST OF ABBREVIATIONS

APHA	American Public Health Association
BGLB	Brilliant Green Bile Broth
Cfu	Colony Forming Unit
TPC	Total Plate Count
LTB	Lauryl Tryptone Broth
GMP	Good Manufacturing Practices
RTE	Ready to Eat
PCA	Plate Count Agar
MPN	Most Probable Number
EMB	Eosin Methylene Blue
ICMSF	International Commission on Microbiological Specifications for Foods
FOSIM	Food Safety Information Malaysia

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Islam is not merely a religion of rituals, but it is a way of life where every single act of individual *Muslim*'s life is governed by *Syariah* law. In Islam, eating is considered as a matter of worship of God. *Muslims* must pursue the Islamic dietary code that must meet matters regarded as *halal* (lawful or permitted). *Muslims* are ought to find *halal* food which regarded as good quality food. In surah *Al-Baqarah* verses 172 and 173, Allah s.w.t had mentioned that all foods are *halal* except those that are specifically remark as *haram*. Allah s.w.t said: “o ye who believe! Eat of good things wherewith We provided you, and render thanks to Allah, if it is, He whom we worship. Indeed, what He has forbidden to you is the flesh of dead animals and blood and the flesh of swine, and that which has been sacrificed to anyone other than Allah. But if one is compelled to anyone by necessity, neither craving it nor transgressing, there is no sin on him; indeed, Allah is forgiving, merciful”. In the above verses, Allah s.a.w explains that there are no *haram* foods except the four kinds mentioned.

Further details about four kinds of *haram* food are referred in another verse: “Forbidden unto you (for food) are : carrion and blood, and swine flesh, and that which hath been dedicated unto any other than Allah, and the strangled, and the dead through beating, and the dead through falling from a height, and that hath been killed by the gorging of horns, and the devoured of wild beast saving that which ye make lawful and that which hath been immolated to idols, and that ye swear by divining arrows. Forbidden to you is anything that dies by itself, and blood and pork, as well as whatever has been consecrated to something besides Allah,

and whatever has been strangled, beaten to death, trapped in a pit, gored, and what some beast of prey has begun to eat, unless you give it the final flow; and what has been slaughtered before some idol or what you divide up in a raffle;(all) that is immoral” (Surah Al-Maidah: verse 3).

The above Quranic verses explained that meat is the most strictly regulated of the groups. Not only blood, pork, and the meat of dead animals or those sacrificed to other than God strongly forbade, it is also commanded that halal animals be slaughtered while pronouncing the name of Allah at the time of slaughter.

The opposite of halal is *haram* which suggest forbidden and prohibited. *Syubhah* or doubtful is defined as any food or drink which lies within the grey area and does not fall clearly under halal or non-halal category. It is obligatory for all Muslims to avoid consuming the product that fall under this category. Halalan toyyiban means allowed and permissible for consumption in relation to *Syariah* law if they are safe and not harmful. For non-Muslim consumers, halal food is often perceived as specially selected and processed to achieve the highest standards of quality (Chaudry, M. N., 2004).

Nowadays, in Malaysia, ready to eat foods which were sold at street market or street stalls are well accepted and famous among Malaysians. One of the popular ready to eat food sold at street stalls or street market is burger. However, the halal status of ready to eat burger sold at street market and stalls is questionable and doubtful as many of them do not have halal logo or halal certificate for premise and/or food products. Malaysian Halal Certification scheme is divided into several categories such as food product, food premise, consumer goods and others (Manual Procedure for Malaysian Halal Certification).

According to Health Department of Federal Kuala Lumpur and Putrajaya, the food premise means premises used for or in connection with the preparation, preservation, packaging, storage,

conveyance, distribution or sale of any food or re-labelling or re-processing or repair of any food. Thus, the owner of the burger stalls shall apply Halal certification for premises (stall) or the food product which is ready to eat burgers. In this research, the survey was done in Kuantan and Shah Alam where both cities had a high residency area to determine the Halal status of ready to eat burgers sold at street stalls.

Toyyiban of the food is determining by food safety and quality aspects such as safety, cleanliness, nutritional values, and quality of food. Halalan toyyiban food should not contain or are exhibit to any ingredients that are filth or unclean and are not prepared or manufactured using equipment which are contaminated with things that, according to *Syariah* law, are *najs*. The technical aspect or *toyyiban* can be determined according to scientific evidence that will ensure the food are free from any hazardous materials or contaminant and safe to be consumed. Some of the food analysis involved were analytical methods like gas chromatography mass spectroscopy analysis, microscopic determinations, molecular biological approaches chemical testing and microbiological testing (Saeed, E., 2013). According to Hogue, M. N (2013), food which is considered as safe (*toyyib*) must not contain of three types of hazards which are microbiological, physical, and chemical hazards. Thus, microbiological assessment was carried out to verify the microbiological conditions of RTE burgers as halalan toyyiban indicators. The results for microbiological assessment were then compared to local and international guidelines.

1.2 STATEMENT OF THE RESEARCH PROBLEM

Halalan toyyiban are related to food safety aspect. *Tayyib* refers to clean, pure and comply with *Syariah* law (Arif & Ahmad, 2011). The implementation of *tayyib* in food industry is taken into consideration of food hygiene, food handlers and premises, contaminants and *mashbooh*

ingredients to prevent foodborne illness. Food that does not labelled with halal logo or does not have halal certificate is categorized as *mashbooh* (uncertainty).

In Malaysia, among the legislation relating to halal aspect is the Trade Descriptions Act 2011, Food Act 1983 and MS2400-2-2010. The Codex General Principles of Food Hygiene and the Malaysian Standard MS1514 on General Principles of Food Hygiene have outlined a details procedure in hygienic practices to assure food hygiene and safety of products (WHO, 2010). Yaakob C.M (2009) stated that halal is not only based on the label or logo but its deals with everything from beginning until to the end consumers. For Muslims – Securing Halal and Quality food (halalan toyyiban) always is vital not only as a religious obligation but also for an active and healthy life.

Recently, many issues rise on halal certification of the street stalls or street vendors. The rising number of cases on the abuse of halal logo and doubtful status of halal ready to eat food has brought up many concerns among the *Muslim* consumers regarding the status of halal food in Malaysia (Sazelin *et al.*, 2015). There is an uncertainty in raw material, and it is crucial that ready to eat food sold at the street market are comply with the halalan toyyiban aspect.

Street stalls provide opportunities for entrepreneurs looking to start a business and introduce their local's product with lower start-up and infrastructure costs. Typical food offers include baked goods, snack foods, ready to eat food such as burgers, sandwich, and local specialties (Agriculture and Agri food Canada, 2014). According to WHO (2010), certain street vended food can cause significant risk to consumers due to microbiological adulteration. The risk is dependent generally on the type of food, the method of preparation and the handling process before consumption. There were limited studies on the halal status of ready to eat foods especially burger sold at street stalls and there is lack of information on the microbial quality or microbial load level of ready to eat

burgers sold at the street market in Malaysia. Because of the limited information, the halal status of ready to eat burgers sold at street stalls is doubtful.

Several studies in the safety of street vended foods (Haryani *et al.*, 2007) and ready-to-eat (RTE) foods (Marian *et al.*, 2012; Jamali *et al.*, 2013) had been conducted in Malaysia. For example, the studies on microbiological assessment of selected ready to eat food in Hulu Langat (Saif & Norrakiah, 2009), microbiological contamination in ready to eat food in Melaka (Zaid & Jamal, 2011), assessing *Staphylococcus aureus* in ready to eat food (Shafizi *et al.*, 2016), assessing *Staphylococcus* in selected street food (Cheong, 2016) and food service hygiene factors (Ungku *et al.*, 2011).

The previous study research is focused on several ready to eat foods thus, this research is concerned mainly on one of the popular ready to eat food among Malaysians which are chicken and beef burger that were sold at street stalls or street market. Thus, this research focused on determination of halal status and microbiological verification of ready to eat burgers sold at street market. Survey method is used to determine the halal status of RTE burgers and is confirming by carrying out the microbiological analysis on ready to eat burger which will determine the *tayyiban* aspect related to food safety.

1.3 RESEARCH OBJECTIVES

This study aimed to achieve the following objectives:

1. To determine the halal status of street burger stalls which potentially make the RTE burgers *haram* or *syubhah* to be eaten.
2. To verify the microbiological conditions of RTE street burgers as halalan toyyiban indicators.

3. To evaluate the microbiological growth in wrapped RTE street burgers after several interval holding hours at ambient temperature.

1.4 RESEARCH QUESTIONS

Several research questions are listed below for this study:

1. Why many burger stalls at street market do not have halal logo or certificate?
2. Is there any *Syubhah* materials used in preparation of RTE burgers sold at street markets?
3. How much are the microbial load in RTE burgers sold at street markets?
4. Are RTE burgers sold at street markets safe to be eaten after several intervals holding times?

1.5 RESEARCH HYPOTHESES

The research hypotheses are:

H₁: There is no *Syubhah* burger stall at street market in Kuantan and Shah Alam town.

H₂: There are no *Syubhah* raw ingredients used in the preparation of RTE burgers sold at street market around Kuantan town.

H₃: There are no RTE burgers sold at street market around Kuantan town contain microbial load more than microbiological standard.

H₄: RTE burgers sold at street market are not safe to be eaten after 12 - 24 hours of holding time at ambient temperature.

1.6 SIGNIFICANCE OF THE STUDY

It is a *Muslims* obligation to consume only halal food. As stated in the Quran, the consumption of halal food is compulsory for all *Muslims*. Our beloved Prophet Muhammad (PBUH) has stated:

“What is halal is clear and what is haram is clear. In between those two is a dubious area in which many people do not know about. So, whoever distance himself from it, he has acquitted himself from blame and those who fall into it, he has fallen into a state of haram (narrated by Bukhari).

The aim of this research was to identify the halal status of RTE burgers sold at street markets around Shah Alam and Kuantan towns. The survey was conducted to know whether the ready to eat burger stalls complied with the Malaysian Halal Standard in term of their halal status. Furthermore, this research was contributed additional knowledge and detail information on burgers vendors around Shah Alam and Kuantan towns in term of halalan toyyiban aspect. This study had also determined the microbial load of the ready to eat street burgers and evaluate the microbial growth of halal ready to eat burgers sold at street market around Kuantan town after several interval holding hours. Thus, this study will be significant to improve the information regarding microbiological quality of ready to eat burgers sold at street market and its microbial growth during several interval holding times. This information will become the reference point to all academia, industries, and business as it will go in-depth to the field site. It is also beneficial for local *Muslim* entrepreneur to improve their quality, safety and Halal standard in food production and manufacturing. The data can be used to establish the implementation of control measures as well as to improve the cleanliness level of food stalls and especially the food handlers' practices.

CHAPTER TWO

LITERATURE REVIEW

2.1 CONCEPT OF HALALAL TOYYIBAN

There are specific commands from Allah s.w.t. regarding the choice of halal food, particularly associated with the term *al-tayyib* or *al-tayyibat*. Allah s.w.t. commands His people to eat halal and good quality food, while at equivalent time avoid taking filthy food. The term *al-tayyibat* is originated from the word *taba* which suggest good, tasty, delicious, sweet, pure, clean, and uncontaminated by things that are *makruh* (Ibn Manzur, n.d; al-Ghazzali, n.d). The command to select halal food and *tayyib* is available in several verses of the al-Quran, and one of them is surah al-A'raf (7) verse 157.

In this verse, the word *al-tayyibat* is interpreted as halal (al-Qurtubi, n. d.; al-Tabari, n. d.; al-Suyuti, 1990), halal and not repugnant (Ibn 'Ashur, 1984). Another definition is *halal*, good, beneficial to the body and helpful in terms of habits and therefore the law of Islam (Ibn Kathir, n. d.). The word *tayyib* is also mentioned in surah al-Baqarah verse 168. In this verse, al-Sharbini (n.d) claimed that the word *tayyiban* has four main elements which are the content of the food is from the source that is halal, not *haram*, secondly, the food is clean and does not have any kind of impurities. Other than that, the food does not cause any pain or misery to the people who consume it. Lastly, the food consists of elements that are nutritious and beneficial to the people who consume it.

Sazelin & Ridzwan (2011) had suggested for the need to combine the concept of *tayyib* and halal. This suggestion is according to the understanding of Islamic scholars, like al-Qurtubi, al-Suyuti, Ibn 'Ashur and Ibn Kathir. It is also supported the command from Allah s.w.t. that mankind

should choose foods that have the features of halalan tayyiban. The concept of halalan tayyiban considers all the physical and spiritual advantages of the food to the humankind.

Halalan tayyiban can be interpreted as foods that are permitted to be consumed (halal) and can give advantages to the human body. Food that is categorized as halalan tayyiban is the foods that have the two criteria: firstly, the food is halal and taken from a halal sources, and secondly, the food has quality and it provides benefit for those who consume it. The food identified as halal must be in good quality, hygiene and safe to be consumed. Further, this idea is applicable from the initial preparation of the food until its final production. This includes the methods of preparation, manufacturing, and distribution of the food until it is served to the purchasers. The concept of *tayyiban* does not mean that the food must be halal, good, delicious, tasty, and pure only.

It also means that the food must be beneficial to the body and does not cause any harm or any other things that have been decreed as *najs* by *Syariah* law. As *Muslims*, consuming halal and *tayyib* products is an order from Allah *s.a.w* and it is an obligatory for each individual *Muslim* and part of the Islamic faith. Allah *s.a.w* has emphasized the obligatory to consume of halal materials as in Surah Al-Baqarah in the Quran, verse 168: *O ye people! Eat what is on earth, lawful (halal) and good, and do not follow the footsteps of Evil One, for He is to you an avowed enemy.* Allah *s.a.w* also emphasized in Surah Al-Mukminun in verse 51: *O ye messengers! Enjoy all things good and pure (tayyib), and work righteousness: for I am well-acquainted with (all) that ye do.* Apart from attaining Allah's pleasure, consuming halal and *tayyib* food can deeply affects one's personality and religious practice. It enlightens one's heart and brings the feeling of gratification and devotion towards Allah because of the permissibility, cleanliness, and the purity of the food.

2.2 MALAYSIAN STANDARD OF HALAL FOOD

Government made the policies and standard safety legislation such as Food Act 1983 and Food Hygiene Regulation 2009 optional to improve safety, quality, and halal compliance of the processed foods. The optional certification includes Makanan Selamat Tanggungjawab Industri (MESTI), Hazard Analysis Critical Control Point system (HACCP), Good Manufacturing Practices (GMP), International Standard of Organization (ISO), Malaysia Standard of MS1500:2009 and MS2400:2010 by Department of Standard and Halal certification requirement from The Department of Islamic Development of Malaysia (JAKIM).

The Ministry of Health (MOH) controlled the food safety standard with support from other governance body that is also responsible on the development of halal food products. Other governance bodies that are involved in the food safety standard and halal certification are Kementerian Perdagangan Dalam Negeri Koperasi dan Kepenggunaan (KPDNKK) and Jabatan Perkhidmatan Veterinar (JPV). The Department of Islamic Development of Malaysia (JAKIM) is the only government institution that is responsible for the halal certification for food products along with the collaboration with Jabatan Agama Islam Negeri (JAIN) and Majlis Agama Islam Negeri (MAIN). Jabatan Agama Islam Negeri (JAIN) and Majlis Agama Islam Negeri (MAIN) are responsible on the halal audit and inspection to the food factory and food services according to each state and district area. JAKIM will do an auditing to certify and approve the halal certification based on the audit report from both institutions.

To ensure the food products companies are following the policy and procedure of halal food products manufacturing process, auditing and inspection to the food factory are being carried out. Malaysia government through the Parliament enacted certain Act such as Trade Description Order 2011, Food Act 1983, Food Regulation 2009, and Consumer Act which provide a legal provision of the halal food production. Generally, these acts enacted as a protection to consumer and food

manufacturer in terms of business trade and industry practices of halal food. The Acts and regulation enable the consumer to purchase halal food products without any doubt on food product halal status. Simultaneously, the Acts and regulations also help the manufacturers and logistics services providers to perform business according to the right business ethics and conducts.

2.3 HALAL ISSUES IN READY TO EAT STREET FOOD

Nowadays street food sector has become an important component of food distribution system in many cities in Malaysia however, certain street-vended food can cause certain risk to consumers due to microbiological contamination (Shafiee et.al, 2018). Large amount of RTE food is sold on the street in developing country due to its convenience rather than its safety, quality, and hygiene aspects (Abdalla & Bakiet 2009). Ready to eat food (RTE) can be defined as status of food being ready for immediate consumption at the point of sale, it could be raw or cooked, and can be consumed without further treatment (Tsang, 2002).

Vary terms had been used to describe RTE foods such as convenient, ready, instant, and fast foods. Some examples of ready to eat food are pastries, meat pie, sausage rolls, burger, doughnut, shawarma, salads or coleslaw, milk, and milk products. Now RTE foods play an important role of daily diet in developed countries. Most of the ready to eat food sold at street market is cooked well and served hot, there is less chance for food poisoning to occur. However, the environmental cleanliness round the street premises may contribute to episodes of gastrointestinal disorder (Makelele *et al.*, 2015). Since most street foods are sold at the roadside, they are exposed to the unhygienic surrounding conditions such as an expose to air or dust (Muyanja *et al.*, 2011).

According to the statistics, it was shown that consumption of fast foods including RTE foods has increased by 10% from 2007 to 2010 in New Zealand (Statistics New Zealand, 2010). While