

## REVIEW

# PAPER REVIEW OF FACTORS, SURVEILLANCE AND BURDEN OF FOOD BORNE DISEASE OUTBREAK IN MALAYSIA

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## ABSTRACT

Food borne diseases like cholera, typhoid fever, hepatitis A, dysentery and food poisoning occur as the results of ingestion of foodstuffs contaminated with microorganisms or chemical. The true incidence of food borne disease in Malaysia is unknown, however the incidence is low ranging from 1.56 to 0.14 cases per 100,000 population and the food poisoning cases is on the rise as the evident by the incident rate of 62.47 cases per 100,000 population in 2008 and 36.17 in 2009. The rapid population growth and demographic shift toward ageing population, changing eating habit such as consumption of raw or lightly cooked food, long storage of such food, lack of education on basic rules of hygienic food preparation and food trading without appropriate microbiological safety procedure become contributing factors for food borne diseases. Food borne disease in Malaysia is in the rise and the direct and indirect cost management of FBD will become one of the most common issues to face by the government. The world is spending millions and millions in cost of treatment due to food borne diseases. The information on this paper was collected via findings of previous journals, data and statistics from the MOH of Malaysia and WHO websites. As a result, authors found that the prevention and management of the food borne disease outbreak needs to be addressed seriously.

**Key words:** food borne diseases, contaminated, outbreak, cost, Malaysia.

## Introduction

In this 21<sup>st</sup> century, it is very challenging to reduce the outbreak of food borne diseases to which the WHO had taken all efforts to maintain food safety all over the world<sup>1</sup>. One of five leading causes of death globally is unsafe water and sanitation. Food borne disease is an important public health problem causing a significant impact on economic and trade in Malaysia and others developing country. Food borne disease define as any illness resulting from the consumption of foods (water) or beverages contaminated with one or more of disease producing agents (bacteria, parasites, viruses, fungi and their products as well as toxic substances not of microbial origin)<sup>2</sup>. Food borne diseases occur as the results of

ingestion of foodstuffs contaminated with microorganisms or chemical. The contamination of food may occur at any stage in the process from the food production to consumption and can also result from environmental contamination including pollution of water, soil and air. These diseases are cholera, typhoid fever, hepatitis A, dysentery and food poisoning and mainly related to poor sanitation. It may lead to permanent health problem and disability. Food poisoning can cause death if not treated early. The food borne pathogens are bacteria, virus, parasites and toxin. Table 1 shows the types of food borne pathogen, characteristic and example for each pathogen<sup>2</sup>.

Table 1: Food Borne Pathogens (CDC 2006)<sup>2</sup>

Types	Characteristics	Example
Bacteria	In environment or animal reservoir and multiply in or on food	Campylobacter Salmonella
Virus	Reproduce only within living cells Remain infectious in food	Hepatitis A Norwalk Virus
Parasites	Reproduce within host cells Cannot multiply in food Develop cyst - inert and resistant to environment	Giardia lamblia
Toxins	Preformed and produced by certain bacteria or chemical	Bacillus cereus Staph aureus Clostridium botulinum E. coli O157:H7

The food borne disease transmission can be explained by used a 6F and 1H. The first F stands for faeces that can be contaminated to finger, flies, field and fluid or water. The finger can be the hand of food handlers and flies came in contact with food when no proper storage of food and no proper wastes disposal will contaminated the ground water and when there are no proper toilet, the field are the symbolic for the defecation done in open space or at the ground. All these will actually lead to contamination of

the food and when the host ingested the food, the food borne disease will occur. All new cases of cholera, typhoid, paratyphoid, all form of food poisoning and dysentery are required to be notified by law of Malaysia. The food borne disease surveillance in Malaysia include the mandatory notification, laboratory based surveillance, HMIS, Syndromic surveillance and hospital based surveillance. Definition of each food borne disease are simplified in Table 2<sup>3</sup>.

Table 2: Definition of each food borne disease (ICD 10)<sup>3</sup>.

Types Disease	Food Borne Case Definition	Case Classification
Food Poisoning	Acute onset of vomiting and/or diarrhoea and/or other symptoms associated with ingestion of food. May also presented with neurological symptoms such as paraesthesia, motor weakness and cranial nerve palsies.	Provisional/ suspected: A case that meet the clinical case definition. Confirmed: A suspected case in whom laboratory investigation confirms the presence of one or more food poisoning pathogens in a clinical specimen However lab confirmation is NOT required. Should notified within 24 hour
Cholera	Acute severe watery diarrhoea with or without vomiting Laboratory criteria for diagnosis: Isolation of <i>Vibrio cholera</i> 01 or 0139 from stools in any patient with diarrhoea	Provisional/suspected: A case that meets the clinical case definition Confirmed: A suspected case that is laboratory confirmed
Typhoid/paratyphoid	A illness with prolonged fever, constitutional symptoms (malaise, headache, anorexia) and hepasplenomegaly Laboratory criteria for confirmation: Isolation of <i>Salmonella typhi</i> /paratyphi from blood or stool or other clinical specimens.	Suspected: A case that meets the clinical case definition. Confirmed: Isolation of <i>Salmonella typhi</i> /paratyphi from blood or stool or other clinical specimens. Both provisional/suspected and confirmed should be notified within 1 week
Hepatitis A	Acute illness typically including acute jaundice, dark urine, anorexia, malaise, extreme fatigue and right upper quadrant tenderness with raised alanine aminotrasferase >2.5 times normal Laboratory criteria for diagnosis; Positive anti HAV IgM	Provisional/suspected: A case that compatible with clinical description. Confirmed: A suspected case that is laboratory confirmed
Dysentery	Acute diarrhoea with visible blood in the stool. Laboratory criteria for diagnosis: Stool culture and examination to confirmed possible outbreaks of specific diarrhoea, such as <i>Shigella dysenteriae</i> , <i>E.Coli</i> 0157, <i>Entamoeba histolytica</i> .	Provisional/suspected: A case with bloody diarrhoea that was not lab confirmed Confirmed: A clinical case that is lab confirmed

### Epidemiology of Food Borne Disease

The Centres of Disease Control and Prevention (CDC) United State of America found that the unhygienic food handlers

is the most common factors contribute to food borne disease outbreaks. CDC of United State of America estimated that there are

48 million illnesses, 128,000 hospitalization and 3,000 deaths annually due to food borne illness in the US. In England and Wales, food borne disease resulted in an estimated of 1.3 million cases, 21,000 hospitalizations and 500 death annually<sup>4</sup>. Meanwhile, in Australia, about 5.4 million cases, 15,000 hospitalization and 120 deaths were reported annually<sup>5</sup>.

In Malaysia, the reported food and water borne disease in 2010 e.g. cholera, dysentery, typhoid and Hepatitis A were low ranging from 1.56 to 0.14 cases per 100,000 populations. In contrast, food poisoning is on the rise as evident by the incident rate of

36.17 in 2009 and 44.18 in 2010 per 100,000 populations<sup>6</sup>. The number of cases and incidence rate for food water borne disease (FWBD) from 2000 to 2009 is shown in Table 3<sup>7</sup>.

Table 3: Number of Cases and Incidence rate of Food and water borne diseases, Malaysia, 2000 - 2009.

Year	Food Poisoning		Typhoid		Cholera		Dysentery		Hepatitis A	
	Case	IR	Case	IR	Case	IR	Case	IR	Case	IR
2000	8129	34.9	765	3.3	124	0.5	447	1.9	-	-
2001	7137	30.7	695	3.0	557	2.4	384	1.5	453	1.9
2002	7023	28.6	853	3.5	365	1.5	292	1.2	295	11.0
2003	6624	25.4	785	3.0	135	0.5	310	1.2	-	-
2004	5957	23.3	484	1.9	89	0.4	356	1.4	107	0.4
2005	4641	17.8	1072	4.1	386	1.5	141	0.5	44	0.2
2006	6938	26.0	204	0.8	237	0.9	105	0.4	64	0.2
2007	14,455	53.2	325	1.2	133	0.5	146	0.5	94	0.4
2008	17,332	62.5	201	0.7	93	0.3	92	0.3	36	0.1
2009	10,238	36.2	303	1.1	276	1.0	154	0.5	40	0.1

Source: Department of Statistic Malaysia, 2011<sup>7</sup>

### Factors Associated With Food Borne Disease

According to a studies by Methahuddin<sup>8</sup> factors for occurrence of the food borne disease in Malaysia namely unhygienic food handling practices, poor environmental sanitation and inadequate of safe drinking water supply in the slum and squatter areas. However the most common factor for food borne disease outbreaks is unhygienic food handling practices. Practices indirectly related to food refer to the hygiene status or cleanliness of the food handlers. This can be reflected through wearing clean clothes and aprons, having short and clean hair as well as fingernails and also wearing shoes while handling food in the premises<sup>9</sup>.

Rapid population growth and demographic shift toward ageing population will not only cause acute socioeconomic problems but will also create a large sector of people with

lower resistance to diseases, including food borne disease. It was found that plant commodities contribute mostly to illness where else animal commodities attribute to deaths when it comes to food borne disease<sup>10</sup>.

The way the food are consumed is another factor where changes in eating habit such as consumption of raw or lightly cooked food

has become a current lifestyle behaviour based on belief that such food is healthy and invigorating<sup>11</sup>. The food that is stored for a longer time may result in the growth of pathogens, even at refrigeration temperatures, thus increasing the risk of disease. It's a known fact that education is another factor that can influence the occurrence of food borne disease where lack of education in the basic rules for hygienic food preparation perhaps becomes one of the most important factors for causation of food borne diseases<sup>12</sup>. If an appropriate microbiological safety procedure are not followed when it comes to international food trading, then this could also contributing factor for food borne diseases<sup>13</sup>.

In Malaysia, the incidence rate of acute diarrhoea among the ethnic Chinese are the lowest compared to other major ethnics as a results of food preparation where it's usually served hot for the wok. When the food is served hot meaning it is thoroughly cooked and eaten immediately, this will for sure minimizes the risk of food poisoning. Improper food handling, preparation and storage and very low awareness about the food borne disease had increased the risk factor and this has become a cultural practice among the Hmong community<sup>14</sup>.

Previous studies also suggests that similar racial or cultural group differences in rates

of acute diarrhoea<sup>15,16,17</sup>. Although the reasons for such differences are not clear, the findings could be attributed to genetic or socio cultural differences between the ethnics, thus related to dietary and culinary practices.

### **Food Borne Disease surveillance on Outbreak**

A food borne disease outbreak is occurrence of two or more cases of similar illness resulting from ingestion of a common food<sup>18</sup>. It is still norm that many such outbreak goes unreported or not investigated and as for Malaysia, the outbreak of food borne disease still occurs in certain high risk area where it need to be properly managed. It is a major obstacle in Outbreak investigation when in almost all cases, the contaminated food could not be traced<sup>1</sup>.

Food borne disease surveillance is important to determine the severity of the disease and the trends, determine the importance and policies for the disease preventive measures, identifying and prevent food borne disease outbreaks, monitoring food safety and evaluate the preventive measures taken for food borne disease<sup>1</sup>.

Surveillance is a systematic and timely collection of existing clinical or laboratory data about the health condition in a defined population. The surveillance of food borne diseases varies from country to country depending on its economic status, infrastructure, availability of resources (manpower and laboratory facilities) and technical expertise. Surveillance of food borne diseases may also be part of a national notifiable communicable disease system. However there is no clear 'best-method' of surveillance at the moment for example, the Surveillance system in United States of America using several networks and the example is routine national surveillance in all jurisdictions that is based on clinical report of the disease<sup>19</sup>. Authorities would take appropriate action and preventive measures based on these data obtained via the outbreak investigation<sup>20</sup>.

In Malaysia, the surveillance and outbreak investigation are done by the physician where food borne disease data are collected. Notification are received by the

communicable Disease Surveillance Section, Disease Control Division, Ministry of Health, Malaysia, via an electronic reporting systems known as the Communicable Diseases Control Information Systems (CDCIS) from the public health facilities consisting of health clinic, outpatient department and hospitals and also from private hospitals and general medical practitioners. Cholera, thyphoid/parathyphoid fever, viral hepatitis A, food poisoning and dysentery are five food and water borne diseases on the list of communicable diseases which required to be notified under the Prevention and Control of Infectious Disease Act 1988<sup>21</sup>.

This notification is based on the syndrome present from the surveillance of food borne disease rather than a specific disease<sup>22</sup>. Syndromic notification is advantageous since it facilitates timely notification and enables rapid response to disease outbreak without being delayed by the laboratory confirmation<sup>23</sup>.

Meanwhile, the National Laboratory Surveillance Programme is laboratory base surveillance system which entails the reporting of certain microorganisms isolated in all public or private laboratories in Malaysia to the Ministry of Health. The following bacterias are monitored by the National Laboratory Surveillance System are Salmonella Typhi and Salmonella Paratyphi, Salmonella Spp., Vibrio Cholera along with Haemophilus influenza and Neisseria Meningitis<sup>21</sup>.

In Malaysia, food borne disease outbreak mainly occurs due to insanitary food handling procedure which had more than 50% of the poisoning episode<sup>21</sup>. Besides this, inappropriate food handling method, meals prepared too early, keep food in the ambient temperature until served and unhygienic practices also contributes outbreaks of food borne diseases.

### **Cost of Management and Lost Cost Secondary to Food Borne Disease**

The food borne disease cause significant impact on economic and trade if no action to be taken to control the outbreak. Increased incidence of food borne disease with widespread of the outbreak, emerging of new pathogen that caused food borne disease and current development resistance to treatment were noted as the threat in

food safety. Studies had been conducted to find a better way to calculate the cost of food borne illness by including the 2011 CDC model replication with the existing cost-of-illness models which include economic estimates for deaths due to the illness, treatment costs and pain, suffering and functional disability measured where the costs are estimated for each pathogens<sup>24</sup>.

Food borne disease in Malaysia is in the rise and the direct and indirect cost management of FBD will become a common issue facing the government. In Malaysia, treatment of food borne disease started with simple oral rehydration salt and will end up with more expensive treatment when there is complication occurs thus the estimated cost also varies. The estimation cost includes the willingness to pay, cost of illness and disability adjusted life years (DALYS) method. Each of the method has different outcome or effect on food borne disease and depends on objective of the study.

Food borne disease in United States of America through its study on Shiga toxin producing *Escherichia coli* O157 showed that the estimated cost per case vary by severity level and the total cost is \$6256 per case<sup>25</sup>. The same article states that food borne disease cost is estimated at \$6.5 billion to \$34.9 billion annually when 6 bacterial pathogens and 1 parasite included in the analysis. In the year 1999 and 2000, there was a sharp decrease on the burden of food borne disease in California as a result of restaurant hygiene grading with public posting of results<sup>26</sup>.

In Malaysia, no such cost analysis study done pertaining to food borne disease and to evaluate the economic burden of all or a group of food borne disease. Study done at Canada regarding estimation of the cost of acute gastrointestinal illness mainly due to food borne disease revealed that estimated mean annual cost per capita was CAN\$128.61 with the mean annual cost per case of CAN\$1,342.57 and the major element for cost was the lost of productivity associated with time away from paid employment by both the sick and their caregiver<sup>27</sup>. Another study in Australia estimated that there are ~5.4 million cases of food borne disease per year, costing A\$1.2 billion annually<sup>5</sup> and in Sweden, food borne illness cost about 123

million per year<sup>28</sup>. New Zealand, on the other hand estimated that food borne disease cost are \$161.9 million which includes government outlays of \$16.4 million, industry cost of \$12.3 million and \$133.2 million for incident case costs of disease associated with treatment, loss of output and residual lifestyle loss<sup>29</sup>.

### Conclusion

Food borne disease is considered the most grossly under reporting issue and if no intervention done to control the outbreak will eventually cause economic burden to the government. The indirect cost such as number of medical leaves taken and direct cost such as the cost of treatment had to be beared by the provider and this issue can reduce the productivity of the country as a whole. Therefore, intervention has to be done to overcome this problem for better management of food borne disease in the near future.

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