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## **Assessment of Sanitation and Food Bacterial Identification in the Governor Official Canteen of Makassar City**

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### **Abstract**

Food is one of the important parts to human health considering that diseases could be caused by food. Cases of foodborne illness (foodborne disease) can be affected by processing, storage, and food serving that are not meet sanitary requirements. This research aimed to obtain an overview of the quality of food is based on the presence of bacteria and sanitary conditions in Canteen Office of the Governor of South Sulawesi Province. This type of research is descriptive observational. The population in this research is all the food that is in Canteen Office of the Governor of South Sulawesi province and obtained ten samples by using purposive sampling method. Data obtained from direct observation using observation sheet and results of laboratory tests on food samples taken from the Canteen Office of the Governor of South Sulawesi province. The data analysis was using descriptive analysis. The results showed that from ten food samples in Governor's Office Canteen, two samples are containing *Escherichia coli* bacteria, three food samples are containing *Klebsiella sp* bacteria, two samples are containing *Proteus mirabilis* bacteria, one sample is containing *Proteus vulgaris* bacteria, one sample is containing *Enterobacter agglomerans*, and one sample is containing *Alcaligenes faecalis* bacteria. Based on observational assessment for the sanitary conditions in the canteen Office of the Governor of South Sulawesi province in ten canteen, there are no qualified canteen which reach 70% of the total assessment.

**Keywords:** Food; Bacterial Sanitation Facilities; Assessment.

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## 1. Introduction

Food is a basic need of human which is needed at all times and must be properly managed to benefit the body. Food is important for human health, since at any moment diseases can happen caused by food. Cases of foodborne illness (*foodborne disease*) can be influenced by various factors. These factors are cultivate the habit of traditional food, storage, and presentation that are not clean and do not meet sanitary requirements [1].

Canteen is one of the public services which process and provide foods that have considerable potential to cause illness and even poisoning of the food it produces.

Food borne diseases caused by bacteria could be either intoxication or infection. Through food intoxication caused by a bacterial toxin formed in food by the time the bacteria multiply, while infection through food caused by the entry of bacteria into the body through contaminated food and body react to the bacteria. Both of these will lead to disease of the gastrointestinal tract [2].

Food Standards Agency (FSA) in 2011 said that foodborne illness is defined by the World Health Organization as a disease caused by agents that enter the body through food intake.

Food borne illness is a serious global problem, the World Health Organization (WHO) estimates that food borne diseases (food borne disease) and diarrhea becomes the cause of death of about 2.2 million people annually. It is estimated that every year in the UK, around one million people suffer from food borne illness, about 20,000 people receiving treatment in hospital and about 500 deaths caused by food borne illness [3].

The Centers for Disease Control and Prevention (CDC) estimates that each year 1 out of 6 people USA (48 million people) sick because of the food, 128,000 hospitalized, 3,000 died, while the Center for Science in the Public Interest (CSPI), said the incident of poisoning in America most commonly by food in the restaurant as many as 1,610 cases, with victims as much as 28,570 people. CDC documented cases of poisoning in California that caused by Salmonella in 2012 as many as 134 people in 13 states, and in the month of October 2013 as many as 481 people in 25 countries [4].

Based on information collected by the National Poisoning Information Center, from various news about the incidence of poisoning in 138 mass media online for 3 ( three ) months, from January to March 2014 there was 38 cases of poisoning occur in various regions in Indonesia which was dominated by food poisoning cases. Based on data from Makassar City Health Department, in 2012 was occurred Extraordinary Events cases of food poisoning in October as many as 37 people, and in October 2013 outbreak was occurred as many as 16 people suffered food poisoning. In 2014, outbreak occurred in August in which 70 people suffered food poisoning.[5]

Food is a carrier for bacteria that can cause illness and even lead to food poisoning. The food in the canteen also can be a medium for the transmission of the disease.

The quality of food is influenced by food handler hygiene and food processing as well as the condition of canteen itself. Food that has been contaminated bacteria can cause illness if it consumed, resulting in a decrease

in human productivity. Office of the Governor of South Sulawesi province ranked the largest administrative center in Makassar, when food is in the office canteen of the Governor of South Sulawesi province contained the bacteria that causes the disease will affect the productivity of employees who consume foods that exist in the canteen. A decrease in productivity can result in a loss to the community. Based on these descriptions the author intends to examine how the quality of food and sanitary conditions office canteen of the Governor of South Sulawesi province.

## 2. Materials And Methods

This type of research was observational with descriptive approach intended to obtain factual data through field observations and laboratory tests were conducted in March 2015.

The population in this research were all foods that sold in the office canteen of the Governor of South Sulawesi province.

This research was using purposive sampling method to select a menu of the most commonly consumed foods / ordered by the customer from the canteen of governor's office.

Data collected by using observation sheet. Inspection of food quality was done through a test based on the presence of bacteria isolation and identification of bacteria in the laboratory. Data analysis was done manually by laboratory test results and data from observations using computer. Data presented in tabular form with narrative.

## 3. Results

The quality of 10 food samples were examined in the laboratory, there were 2 samples contained *Escherichia coli* bacteria which were sample 3 (Gudeg Rice) and Sample 10 (Pallumara Fish Rice), 3 samples were contained *Klebsiella sp* bacteria which were sample 5 (Fried), sample 6 (Lalapan Rice) and sample 9 (Fried Chicken), 2 samples were contained *Proteus mirabilis* which were sample 1 (Pallumara Fish Rice) and sample 7 (Balado Fish Rice), while *Proteus vulgaris* bacteria contained in the sample 2 (Hokkiang Mie) , *Enterobacter agglomerans* contained in the sample 8 (Lung Soup), and *Alcaligenes faecalis* bacteria contained in sample 4 (Coto) (Table 1).

The sanitary conditions in the canteen of governor's office were ranging from sanitation facilities, the condition of the kitchen, food processing, storage of food ingredients and food, as well as the presentation of the food. Value sanitary conditions obtained from the sum of all the variables under research and divided by the total number of scores multiplied by 70%.

Recapitulation result of observations to assess sanitary conditions, from 10 canteens that the sample in this research, there are no canteens are eligible for sanitary conditions that the total score of  $\leq 700$  (Table 2).

**Table 1:** Description Bacteria on Food in Canteen Office of the Governor of South Sulawesi Province

Canteen Names/Location	Testing Result
	Types of bacteria
Samples 1/ Canteen A1	<i>Proteus mirabilis</i>
Samples 2/ Canteen A2	<i>Proteus vulgaris</i>
Samples 3/ Canteen B1	<i>Escherichia coli</i>
Samples 4/ Canteen B2	<i>Alcaligenes faecalis</i>
Samples 5/ Canteen B3	<i>Klebsiella sp.</i>
Samples 6/ Canteen B4	<i>Klebsiella sp.</i>
Samples 7/Canteen B5	<i>Proteus mirabilis</i>
Samples 8/ Canteen B6	<i>Enterobacter agglomerans</i>
Samples 9/ Canteen B7	<i>Klebsiella sp.</i>
Samples 10/ Canteen B8	<i>Escherichia coli</i>

Source: Primary data, 2015

Note : Eligible if the bacteria in food is still in the maximum limit in accordance with BPOM Regulation No. HK.00.06.1.52.4011 that is negative or 0.

**Table 2:** Recapitulation result of observations to assess sanitary conditions in Canteen Office of the Governor of South Sulawesi Province

Assessment result	Canteen Names									
	Canteen A1	Canteen A2	Canteen B1	Canteen B2	Canteen B3	Canteen B4	Canteen B5	Canteen B6	Canteen B7	Canteen B8
<b>Sanitation facilities</b>										
Water supply	30	30	30	30	30	30	30	30	30	30
Waste water disposal	0	0	0	0	0	0	0	0	0	0
Toilets	2	2	7	7	7	7	7	7	7	7
Bins	0	0	8	8	8	8	8	8	8	8

Hand washing	10	10	0	0	0	0	0	0	0	14
Washing equipment	2	2	2	2	2	2	2	2	2	2
Washing equipment	5	5	5	5	5	5	5	5	5	5
Appliances prevention of entry of insects and mice.	0	0	0	0	0	0	0	0	0	0
<b>Total score</b>	<b>49</b>	<b>49</b>	<b>52</b>	<b>52</b>	<b>52</b>	<b>52</b>	<b>52</b>	<b>52</b>	<b>52</b>	<b>66</b>
<b>Kitchen</b>	<b>56</b>	<b>35</b>	<b>56</b>	<b>56</b>	<b>56</b>	<b>35</b>	<b>56</b>	<b>56</b>	<b>56</b>	<b>35</b>
<b>Food processing storing food</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>
Storage of foodstuffs	20	20	20	20	20	20	20	20	20	20
Storage of food	0	0	0	0	0	0	0	0	0	0
<b>Total score</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>
<b>Presentatio n of the food</b>	<b>40</b>	<b>40</b>	<b>25</b>	<b>40</b>	<b>25</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>25</b>	<b>25</b>
<b>Sanitar y conditio ns</b>	<b>190</b>	<b>169</b>	<b>178</b>	<b>193</b>	<b>178</b>	<b>172</b>	<b>193</b>	<b>193</b>	<b>178</b>	<b>171</b>
<b>%</b>	<b>48</b>	<b>48</b>	<b>50</b>	<b>54</b>	<b>50</b>	<b>48</b>	<b>54</b>	<b>54</b>	<b>50</b>	<b>48</b>

Source: Primary data, 2015

Note : All sample of canteens in this research, there are no canteens are eligible for sanitary conditions

#### 4. Discussion

The research conducted on 4 to 12 March 2015 in the canteen of South Sulawesi Governor's Office. The food sample was taken to the laboratory, samples were then crushed and put into BHIB (Brain Heart Infusion Broth) and cultured for 1 x 24 hours at 37°C. Then the samples were cultured on media isolation using four media namely EMBA (Eostin Methylen Blue Agar, Mac Conkey), BSA (Bismuth Sulfite Agar), and SSA (Salmonella Shigella Agar). Samples then tested by using TSIA (Triple Sugar Iron Agar) and IMViC (Indol Methyl -red Voges - praskauer citrate).

Of the 10 samples obtained, two samples contained *Escherichia coli*, three samples contained *Klebsiella sp*, two samples contained *Proteus mirabilis* and one sample contained *Proteus vulgaris*, one sample contained *Enterobacter agglomerans*, and one sample contained *Alcaligenes faecalis*. These bacteria are classified into bacterial pathogens that can cause damage to the food and cause poisoning in humans.

*Escherichia coli* is a bacteria found in food was indicated if the food has been contaminated by human or animal feces. *Escherichia coli* can proliferate at the optimum temperature 37°C, and can survive for months on land and in the water, but can be turned off by heating at 60°C for 20 minutes [6]. On this research, *Escherichia coli* bacteria in two samples of food that were sample 3 (Gudeg Rice) and 10 samples (Pallumara Fish Rice), the presence of *Escherichia coli* bacteria in food shows that sanitation is still very low at the canteen. The existence of *Escherichia coli* bacteria in food can be caused by food handler hands, tools that are used in food processing are often contaminated by *Escherichia coli* that comes from the water used for washing. This bacterial contamination in food processing-tool or appliance is a sign of poor sanitation practices [7].

This research is in line with that made by Mansauda on 12 samples of tomato sauce meatball skewers snacks circulating in Manado found all positive samples suspected of contained *Escherichia coli* because the process of making tomato sauce meatball skewers snacks are processed solely by trader not hygienic, ranging from cookware dirty, water used for washing the material, water mixed into the tomato sauce had been contaminated, and where the sale is located on the edge of road [8].

*Proteus* is a rod-shaped gram-negative bacteria, actively engaged and capable of spreading, proliferating at an optimum temperature of 37°C. These bacteria are opportunistic pathogens. *Proteus* can be spread on the water and land. [9] In this research, two samples contained *Proteus mirabilis* bacteria that were sample 1 (Pallumara Fish Rice) and sample 7 (Balado Fish Rice), while *Proteus vulgaris* bacteria was contained in sample 2 (Hokkiang Mie). *Proteus* bacteria were pathogenic bacteria that can spoil food [2] These bacteria were found in the human intestinal tract as part of the normal human intestinal flora.<sup>7</sup> The presence of these bacteria in food indicate that food has been contaminated, which may come from the personal hygiene of food handlers, water was used to wash food ingredients and equipment used. This research was carried out in line by V. Oni on 10 samples obtained vegetable salad, 2 samples contained *Proteus spp* bacteria [10].

*Enterobacter agglomerans* or known to the family of *Enterobacteriaceae* is a group of bacteria commonly found and isolated in foodstuffs, vegetables, and grains. *Enterobacter agglomerans* can cause diarrhea, nausea, and vomiting.[11]. In this research, *Enterobacter agglomerans* contained in the sample 8 (Lungs Soup). Indicate the presence of *Enterobacter* bacteria caused by sanitary conditions are not eligible.<sup>3</sup> Presence of *Enterobacter agglomerans* in food can occur through the water from washing food ingredients that are less clean, safe way of foodstuffs and food so poorly and hands of food handlers. This research is in line with that practiced by Ch. Porotu'o were performed on 16 samples, four samples were found to contained *Enterobacter agglomerans* and 1 sample contained *Enterobacter cloacae* [12].

*Klebsella sp.* is a bacteria that was found in the mucous membranes of the upper respiratory tract, intestinal and urinary tract, and genitals. *Klebsiella sp* can live as a saprophyte on the environment, in water, soil, food, and

vegetables.<sup>8</sup> In this research the bacteria of *Klebsiella sp* was found in 3 samples, which were sample 5 (fried), sample 6 (Lalapan Rice) and sample 9 (Fried Chicken). The existence of these bacteria in food can be caused by the use of water to make the dough fried and chicken that may contain *Klebsiella sp*, personal hygiene of food handlers, vegetables in fresh vegetables and chicken that are not washed, and the way poor food storage. This is in line with the research conducted by Puspanadan that found *Klebsiella pneumoniae* contained in vegetables sold in the wet markets and hypermarkets in Selangor, Malaysia [12].

*Alcaligenes faecalis* is a bacteria that causes urinary tract infections in humans. These bacteria are commonly found in soil, water, and environment in relation to humans. In this research *Alcaligenes faecalis* bacteria found in sample 4 (Coto), which is suspected of originating from the water used to make the sauce Coto was not clean, use equipment that was not cleaned prior to use, the hands of food handlers and storage of foodstuffs and food so that no closed. This research was carried out in line by Mohede that the sauce in a food stall in the University Dian Semarang Nuswantoro of from 36 samples contained 3 samples contained *Alcaligenes faecalis* bacteria [13].

The existence of these bacteria indicates poor sanitary conditions at the canteen of governor's office. Based on the results of the assessment carried out by using a checklist sheet obtained from the 10 canteens, there were no qualified sanitary conditions, ranging from sanitary facilities, conditions of the kitchen, food processing, storage of foodstuffs and processed food as well as the manner of presentation.

In this research for variable sanitation facilities, water supply, waste water disposal, toilets, bins, hand washing, washing equipment, washing equipment and appliances prevention of entry of insects and mice into the assessment indicators. Water facilities out of 10 sampled canteen, all of them admitted to the facility clean water has always met and never any shortage of water when necessary and a canteen of water at the Governor's Office to qualify the physical after physical examination by means of clear glass of water was added later seen turbidity, smelled and felt. Wastewater disposal in this research at the Governor's Office canteen there are no waste water disposal, recognized by all owners of the canteen into the sample, the results of the washing water directly discharged to the drainage channel and some are direct results of leaching to remove water canteen backyard. Based on the results obtained direct observation flooded drainage channel, where the water is not flowing and rubbish food there anyway in the channel.

Toilets were there in the canteen A1 and A2 each have a toilet and for canteen B1, B2, B3, B4, B5, B6, B7, B8 use the same toilet. Toilets in the canteen A1 and A2 are not eligible which were directly with the kitchen and the toilet did not have latrines so that water from the toilet directly into the backyard canteen, while for toilet of canteen B1, B2, B3, B4, B5, B6, B7, B8 circumstances toilet clean, located not directly related to the kitchen and available water. The trash in this research to be recognized by the owner of A1 canteen that garbage disposed on the back page canteen and canteen to the canteen A2 and B1, B2, B3, B4, B5, B6, B7 and B8 garbage transported every 24 hours. There are bins in each room and the bin is not closed. Washbasins of 10 canteens at the Governor's Office there are only three that have hand washing facilities but does not provide soap / detergent and 7 canteens which have no hand washing facilities.

Washing equipment in the canteen A1 and A2 on washing equipment while there is water flowing to the canteen B1, B2, B3, B4, B5, B6, B7 and B8 hold water in the bucket so that the washing water for washing equipment accommodated other equipment. Points wash at 10 canteen food ingredients into the sample there is no canteen food ingredients contained solution wash pests. Equipment prevention of entry of insects and rodents out of 10 there was no canteen that has the equipment to prevent the entry of insects and rodents, to the canteen B1, B2, B3, B4, B5, B6, B7 and B8 form a canteen that it is possible for the entry of insects and rodents due to the form from the canteen is open.

All the canteens at the governor's office had food storage facilities such as a refrigerator, stove heat and hot thermos. The conditions in some canteens kitchen clean is not marked with the floor flooded. In addition there was a canteen that put messages hygiene handlers / employees. In the food processing power most of the food handlers do not use work clothes such as apron and head covering. Storage of foodstuffs at 10 canteens storing food in the fridge and some groceries just put in certain places, while storage of food in the canteen governor's office a sample of food ready to eat, the canteen putting some food in glass cabinets not sealed and some are laid on the table (buffet) with no closed. The presentation of the food on the food being sampled mostly warm and not less than 60°C and on the terms of the observation of most of the food handlers carrying and serving food at the canteen is not closed.

This research is in line with that made by Blongkot at home eating in Gorontalo found that hygiene and sanitation for the restaurant in the review of variable sanitary facilities there were 5 (24%) the restaurant that has a qualified health and 16 ( 76 % ) eat home yet qualified.<sup>14</sup> Similar research conducted by Puspita obtained based on the distribution of hygiene and sanitation practices of food handlers handlers showed 11 (35.5%) have done a poor hygiene and sanitation practices, and most of the samples studied hodgepodge has a number of *Escherichia coli* bacteria more than 0 colonies per gram as many as 26 samples. [15]

This shows that both the research conducted at the Office canteen of the Governor of South Sulawesi Province and the research mentioned above have relevance between the pathogenic bacteria to sanitation. Lack of attention from the owner of the canteen, as well as lack of awareness of food handlers can be seen from the condition of the existing canteen , as well as the way of presenting food.

Prevention of contamination of pathogenic bacteria, can be done by handling food with proper cooking process, prevention of cross contamination (cross contamination), the application of personal hygiene and sanitation. The cooking process with a temperature of 60°C - 70°C can make the bacterium of *Escherichia coli*, *Klebsiella sp*, *Proteus mirabilis*, *Proteus vulgaris*, *Enterobacter agglomerans*, and *Alcaligenes faecalis* can be destroyed, because these bacteria were not resistant to heat .

## 5. Conclusion

The research concluded that based on the quality of food in the canteen of Governor's Office by BPOM Regulation No. HK.00.06.1.52.4011 to 10 sample food menu all have a poor quality of food is characterized by the presence of pathogenic bacteria in the food. Sanitary conditions in the office canteen of the Governor of South Sulawesi province in ten canteens, there were no qualified 70% of the total assessment.



## References

- [1]. Chandra, Budirman. Pengantar Kesehatan Lingkungan. Jakarta: Penerbit Buku Kedokteran EGC; 2011.
- [2]. Badan POM RI. Pengujian Mikrobiologi Makanan. InfoPOM Pengawas Obat dan Makanan Republik Indoneisa. 2008; 9(2): 1-3.
- [3]. Food Standards Agency. Foodborne Disease Strategy 2010-15 An FSA Programme For The Reduction Of Foodborne Disease In The UK. 2011.
- [4]. Centers for Disease Control and Prevention (CDC). CDC Estimates of Foodborne Illness in the United States: CDC 2011 Estimates. 2011.
- [5]. Sentra Informasi Keracunan Nasional, Badan POM RI. Keracunan Makanan Akibat Bakteri Patogen. [Online] 2011 [Diakses 8 Desember 2014]. available at: <http://ik.pom.go.id>.
- [6]. Jawetz, Melnick dan Adelberg's. Mikrobiologi Kedokteran. Edisi Pertama. Jakarta: Penerbit Salemba Medika; 2011.
- [7]. Siregar, Nurtilawati. Uji Most Probable Number (MPN) Bakteri Coliform Dan Identifikasi *Escherichia Coli* Pada Minuman Air Tebu Yang Dijual Oleh Pedagang Kaki Lima Disekitar Jl.A.H.Nasution (Asrama Haji) Medan. [Undergraduate thesis]. Medan: University of North Sumatra; 2012.
- [8]. Mansauda,dkk. Analisis Cemaran Bakteri Coliform Pada Saus Tomat Jajanan Bakso Tusuk Yang Beredar Di Manado. Pharmacon. 2014; 3(2): 4-7.
- [9]. Medscape. Proteus Infections. [Online] 2014. Available at: <http://emedicine.medscape.com/article/226434-overview>.
- [10]. V Oni, A Oni, F Esumeh. Prevalence Of Bacteria Food Poison From Vegetable Salads. The Internet Journal of Nutrition and Wellness. 2009;10(1): 3-5.
- [11]. Puspanadan,dkk. Detection of Klebsiella pneumoniae in raw vegetables using Most Probable Number-Polymerase Chain Reaction (MPN-PCR). International Food Research Journal. 2012; 19(4):1758-1760.
- [12]. Ch. Porotu'o, dkk. Identifikasi Bakteri Aerob Pada Makanan Jajanan Jagung Bakar Di Pinggiran Jalan Ring Road Manado. Jurnal e-Biomedik (eBm). 2015; 3(1): 3-6.
- [13]. Mohede,dkk. Hubungan Higiene Penjual Dengan Keberadaan Bakteri *Escherichia Coli* Pada Sambal Makanan Yang Dijual Di Sekitar Universitas Dian Nuswantoro Semarang. [Undergraduate thesis]. Fakultas Kesehatan Masyarakat. Dian Nuswantoro University, Semarang; 2014.
- [14]. Blongkot, Fitriani R. Studi Hygiene Sanitasi Rumah Makan Di Kecamatan Kota Timur Dan Kecamatan Dumbo Raya Kota Gorontalo. Jurnal University of Gorontalo. 2012; 1(1): 3-4.
- [15]. Puspita,dkk. Hubungan Praktik Higiene Sanitasi Penjamah Makanan Terhadap Cemaran *Escherichia Coli* Pada Makanan Gado-Gado Di Sepanjang Jalan Kota Manado. Media Kesehatan. 2013; 1(7): 3-5.