

UNIVERSITI TEKNOLOGI MARA

**THE STUDY OF WATER QUALITY
FROM WATER VENDING
MACHINES AND ITS POTENTIAL
RISK TO HUMAN IN SEPANG
DISTRICT**

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Project submitted in fulfillment of the requirements for
the degree of
Bachelor in Environmental Health and Safety
(Hons.)

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DECLARATION BY STUDENT

Project entitled “The Study of Water Quality from Water Vending Machines and Its Potential Risk to Human in Sepang District” is a presentation of my original research work. Whenever contributions of others are involved, every effort is made to indicate this clearly, with due reference to literature, and acknowledgement of collaborative research and discussions. The project was done under the guidance of Project Supervisor, Tuan Haji Mohd Pozi Bin Mohd Tahir. It has been submitted to the Faculty of Health Sciences in partial fulfilment of the requirement for the Degree of Bachelor in Environmental Health and Safety (Hons).

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In the name of Allah, The Most Gracious, The Most Merciful.

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TABLE OF CONTENTS

TITLE PAGE	
DECLARATION BY STUDENT	ii
INTELLECTUAL PROPERTIES	ii
APPROVAL BY SUPERVISOR	ii
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS	x
ABSTRACT	xi
ABSTRAK	xii
CHAPTER 1: INTRODUCTION	
1.1 Background Information	1
1.2 Problem Statement	2
1.3 Study Justification	4
1.4 Study Objectives	5
1.5 Study Hypothesis	6
1.6 Conceptual Framework	7
1.7 Conceptual and Operational Definitions	8
CHAPTER 2: LITERATURE REVIEW	
2.1 World Scenario	11
2.2 Quality of Drinking Water from Water Vending Machines	12
2.3 Effects of Contaminated Drinking Water to Human Consumption	13

ABSTRACT

Abstract. Introduction: The increased demands for drinking water from water vending machines is due to the consumer convenience and warranty from vendors in terms of water treatment. Nonetheless, failure to meet the standards of safe water quality will impose health hazards to consumers directly attributable to recontamination, unhygienic and poorly serviced of water vending machines. Studies shown mainly bacterial contaminants such as *Escherichia Coli*, Coliform and *Clostridium perfringens* were present from the water samples. **Objectives:** Study was conducted to assess the quality of drinking water sold from water vending machines and its potential risks to human in Sepang District. Next is to identify water quality (physical, *E.Coli* bacteria and total coliform) from water vending machines, besides to compare the quality of water from different types of disinfectant used in water vending machines and lastly to discuss the health hazards of drinking water consumption from water vending machines. **Methodology:** A total of 39 water samples were taken from different water vending machines in Sepang District for physical (pH, turbidity and temperature) and microbiological (*E.Coli* bacteria and total coliform) parameters analysis, analyze by using in-situ techniques for physical parameters and *Colilert* Procedure for microbiological parameters. For water sampling method, physical parameter analysis (pH, turbidity and temperature) was conducted by using pH meter and Turbidimeter instruments. After physical parameter analysis done, the water was stopped by pressing hold button. Then, hand sanitizer was applied by the sampler for the microbiological parameter analysis. The nozzles of the machines were sterilized by using alcohol swab. The water was flushed and let it run for 2-3 minutes after the nozzles were sterilized. Water samples were taken for microbiological parameters (*E.Coli* and total coliform) by opening the thio-bag with aseptic technique and filled it with 100 ml water. The thio-bag then sealed. Each samples labeled with sample id, date and time. The samples were transported to the laboratory in cool box with temperature between 2-10°C within 24 hours for analysis. Then, in laboratory, 100 ml water sample was transferred from thio bag into sterile vessel and *Colilert* reagent was added. Then, the sample was poured into Quanti-Tray the Quanti-Tray was sealed by using Quanti-Tray Sealer. Kept the Quanti-Tray in incubator at 36.5°C for 24 hours and read the result after 24 hours. If yellow is observed, Total Coliforms is present. Sample then was placed within 5 inches under UV light in dark environment. If fluorescence is greater or equal to the fluorescence of the comparator, the presence of *E.Coli* bacteria is confirmed. **Result:** 22 out of 39 water vending machines in Sepang district used nano silver as disinfectant while another 17 water vending machines used ultraviolet light. 9 water samples using both types of disinfectant (nano silver=3 & ultraviolet light=6) were found with pH > 8.5 which is violating the pH standard. Furthermore, both types of disinfectant used violates with the turbidity standard which all the water vending machines show the results more than 0.1 NTU. The higher level of turbidity in the water usually related to microbial activity growth. However, all the physical parameters (pH, turbidity and temperature) are not significantly associated to the types of disinfectant used since the result of p-value is more than 0.05. For microbiological parameters, pH in the water samples is not associated to coliform growth and p-value is 0.075 (> 0.05). Furthermore, all the reading of turbidity in water samples is more than 0.1 NTU, thus chi-square test cannot be done since the results of turbidity cannot be compared (all the reading more than 0.1 NTU). The visual binning in SPSS was used to categorize the group of temperature. The presence of total coliform is correlated with the rise of temperature in the water samples with p-value 0.02 (less than 0.05). 16 water samples were detected with the presence of total coliform regardless types of disinfectant (nano silver=27.2% and ultraviolet light=58.8%) and none were detected for *E.coli*. In other words, there is higher prevalence of total coliforms detected in ultraviolet light as compared to nano silver. However, chi-square p-value is 0.522 which is not significant. **Conclusion:** The quality of drinking water from water vending machines in Sepang District violates the Food Regulation 1985 standards for physical parameter. In addition to that, the presence of total coliform was detected and it was found that water vending machines with ultraviolet light disinfectants (58.5%) have higher prevalence than nano silver (27.2%) but the results are not significant. However, the consumption of drinking water from water vending machines may cause potential health hazards to the consumers in future depending on the types of contaminants at certain levels of exposure. This study recommends periodical maintaining services by the vendors as well as regular water sampling and monitoring by the Ministry of Health (MOH).

Keywords: Drinking Water, Water vending machines, Bacteria, Food Poisoning / Food-Water Borne Illness, turbidity, *Escherichia coli*, total coliform