

**Universiti Teknologi MARA**

**MATHEMATICAL MODELING OF DIET  
PLANNING PROBLEM FOR  
HYPERTENSION PATIENTS**

**Nur Shamien Alfiera Binti Muhamad Isa**

**Report submitted in fulfilment of the requirements for  
Bachelor of Science (Hons.) Management Mathematics  
Faculty of Computer and Mathematical Sciences**

**January 2021**

## STUDENT'S DECLARATION

I certify that this report and the research to which it refers are the product of my own work and that any ideas or quotation from the work of other people, published or otherwise are fully acknowledged in accordance with the standard referring practices of the disciplines.



.....  
NUR SHAMIEN ALFIERA BINTI MUHAMAD ISA  
2019328669

JANUARY 27, 2021

## ABSTRACT

Hypertension or high blood pressure is a global public health issue. It can cause other diseases to occur, such as cardiovascular disease, stroke, diabetes, and others. The nutritional problem of patients with hypertension has long been an issue in the area of operational science. Past and current studies also suggested that diet plays a significant role in influencing hypertension treatment. A healthy diet can provide vital foods for patients with elevated blood pressure that help to stabilise and lower their blood pressure. The purpose of this study was to formulate a mathematical model of diet planning for hypertension patients. Specifically, this study attempted to determine the amount of nutrients needed by hypertension patients, to find the cost of the food combination, and to identify the best model between linear programming and integer programming. The research model included 10 types of food groups with 200 variables based on Malaysian recipes and developed two programming techniques: linear programming and integer programming. The finding showed that the solution provided by the entire programming method have met the constraints and requirements of the food group. The integer programming approach would offer optimal and efficient alternatives to diet planning for patients with hypertension.

**Keywords:** Linear Programming, Integer Programming, Diet Planning, Optimization, Mathematical Model, Hypertension, High Blood Pressure

## **TABLE OF CONTENTS**

<b>CONTENTS</b>	<b>PAGE</b>
SUPERVISOR'S APPROVAL	ii
STUDENT'S DECLARATION	iii
ACKNOWLEDGEMENTS	iv
ABSTRACT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	viii
LIST OF ABBREVIATIONS	ix
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the Study	1
1.2 Problem Statement	3
1.3 Objectives of the Study	3
1.4 Scope of the Study	4
1.5 Significance of the Study	4
1.6 Summary	4
CHAPTER TWO: LITERATURE REVIEW	5
2.1 Diet Planning for Hypertension Patients	5
2.2 Linear Programming	7
2.3 Integer Programming	8
2.4 Summary	10
CHAPTER THREE: RESEARCH METHODOLOGY	11
3.1 Study Design	11
3.2 Data Collection	12
3.3 Data Analysis	15
3.4 Model Descriptions and Development	23
3.5 Summary	25

CHAPTER FOUR: RESULTS AND DISCUSSIONS	26
4.1 Results of Linear Programming Model	26
4.2 Results of Integer Programming Model	31
4.3 Determining the Best Programming Model	34
4.4 Summary	35
CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS	36
5.1 Conclusions	36
5.2 Recommendations	37
5.3 Summary	38
REFERENCES	39
APPENDICES	42
Appendix A: Data Collection in the Malaysian Food Composition Database Website	42