

KNOWLEDGE AND ATTITUDE ON FOLIC ACID
INTAKE AMONG ANTENATAL MOTHERS IN
PREVENTING BIRTH DEFECTS IN HOSPITAL
UNIVERSITI SAINS MALAYSIA

MAHIRAH KAMARUDDIN

SCHOOL OF HEALTH SCIENCES
UNIVERSITI SAINS MALAYSIA

2020

KNOWLEDGE AND ATTITUDE ON FOLIC ACID
INTAKE AMONG ANTENATAL MOTHERS IN
PREVENTING BIRTH DEFECTS IN HOSPITAL
UNIVERSITI SAINS MALAYSIA

by

MAHIRAH KAMARUDDIN

Dissertation submitted in partial fulfilment of the
requirements for the Degree of Bachelor of Nursing
(Honours)

JUNE 2020

CERTIFICATE

This is to certify that the dissertation entitled “Knowledge and Attitude on Folic Acid Intake Among Antenatal Mothers in Preventing Birth Defects in Hospital Universiti Sains Malaysia” is the bona fide record of research work done by Ms Mahirah Kamaruddin during the period from September 2019 to June 2020 under my supervision. I have read this dissertation and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation to be submitted in partial fulfilment for the degree of Bachelor of Nursing (Honours).

Main supervisor,

.....

PUAN HASNI EMBONG

Lecturer

School of Health Sciences

Universiti Sains Malaysia

Health Campus

16150 Kubang Kerian

Kelantan, Malaysia

Date:

DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duly acknowledged. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research and promotional purposes.

.....

MAHIRAH KAMARUDDIN

Student of Bachelor of Nursing (Honours)

School of Health Sciences,

Health Campus,

Universiti Sains Malaysia.

16150 Kubang Kerian.

Kelantan, Malaysia.

Date:

ACKNOWLEDGEMENT

Alhamdulillah, praise to Lord for everything. With His blessings, I was able to start this project and completed it. I could never be able to get through this without Your mercy. Thank you, for giving me chances in life, granted my prayers and giving me this journey in life as a Degree nursing student. Thank you, for sending these wonderful people in my life to get through in many situations. First of all, I would like to express my greatest gratitude to my main supervisor, Puan Hasni Embong for spending her invaluable time in guiding, supervising and encouraging throughout the preparation until completion of dissertation. Without her assistance and dedicated involvement in every step throughout the process, this research project would never have been accomplished. I would like to thank her for continued support and understanding all these conditions.

Moreover, I would like to extend my appreciation to all the participants for their co-operation and willingness to participate in this research and make this study a reality. Also, greatly thanks to Puan Hasni Embong and Encik Mohd Noor in providing useful recommendations on my questionnaire.

Last but not least, none of this could have happened without my family and friends. Endless support and encouragement is the backbone of me in order to complete the dissertation. Without all of you, this dissertation would not be completed in a timely manner.

Table of Contents

	Page
CERTIFICATE	ii
DECLARATION	iii
ACKNOWLEDGEMENT	iv
LIST OF TABLES.....	viii
LIST OF FIGURES.....	ix
LIST OF ABBREVIATIONS	x
ABSTRAK.....	xi
ABSTRACT	xii
CHAPTER 1 INTRODUCTION.....	1
1.1 Background of the study	1
1.2 Problem Statement	4
1.3 Research Questions	6
1.4 Research Objectives	7
1.4.1 General Objective.....	7
1.4.2 Specific Objectives.....	7
1.5 Research Hypotheses.....	8
1.6 Conceptual and Operational Definitions	9
1.7 Significance of the Study	10
CHAPTER 2 LITERATURE REVIEW.....	13
2.1 Introduction.....	13
2.2 Prevalence of birth defects	13
2.3 Folic Acid.....	14
2.4 Folic acid use in women of childbearing age	15
2.5 Knowledge of the importance of folic acid among antenatal mothers.....	16
2.6 Attitudes of folic acid among antenatal mothers.....	17
2.7 Socio-demographic characteristics related to the knowledge and attitudes of folic acid intake	18
2.8 Theoretical and Conceptual Framework of Study.....	20
CHAPTER 3 RESEARCH METHODOLOGY	22
3.1 Introduction.....	22
3.2 Research Design.....	22
3.3 Population and setting	22
3.4 Sampling Plan	22

3.4.1 Inclusion and Exclusion Criteria	23
a) Inclusion Criteria.....	23
b) Exclusion Criteria	23
3.4.2 Sample Size Estimation.....	23
3.4.3 Sampling Method	24
3.5 Instrumentation	25
3.5.1 Instruments	25
3.5.2 Translation of the Instrument	26
3.5.3 Validity and Reliability	26
3.6 Variables	27
3.6.1 Variable Measurement	27
3.6.2 Variable Scoring.....	28
3.7 Data Collection Plan	29
3.8 Data Analysis	31
3.9 Ethical Consideration	33
3.9.1 Privacy and Confidentiality.....	33
3.9.2 Vulnerability Issue	33
3.9.3 Community sensitivities and benefits	34
3.9.4 Declaration of Interest.....	34
3.9.5 Honorarium and Incentives	34
3.10 Expected Outcomes.....	34
CHAPTER 4 RESULTS	35
4.1 Introduction.....	35
4.2 Socio-demographic Characteristic	35
4.3 Knowledge Towards Folic Acid	37
4.4 Folic Acid Intake Knowledge Level	39
4.5 Attitude Towards Folic Acid Intake.....	39
4.6 Level of Attitudes on Folic Acid Intake.....	41
4.7 Association of Selected Socio-demographic Characteristics with Level of Knowledge towards Folic Acid Intake	41
4.8 Association of Selected Socio-demographic Characteristics with Level of Attitude towards Folic Acid Intake	43
CHAPTER 5 DISCUSSION	44
5.1 Introduction.....	44
5.2 Socio-demographic Characteristics.....	44
5.3 Level of Knowledge on Folic Acid Among Antenatal Mothers	45
5.4 Level of Attitude on Folic Acid Among Antenatal Mothers	46

5.5 Association of Selected Socio-demographic Characteristics with Knowledge and Attitude Level.....	47
5.6 Strength and Limitation of the Study	48
5.6.1 Strengths of the Study	48
5.6.2 Limitations of the Study	48
CHAPTER 6 CONCLUSION.....	50
6.1 Introduction.....	50
6.2 Summary of the Study Findings.....	50
6.3 Implications and Recommendations	50
6.3.1 Implications for Nursing Practice	50
6.3.2 Implications for Nursing Education	51
6.3.3 Recommendation for Future Research.....	52
6.4 Contribution to Theory Development	52
6.5 Conclusion	53
REFERENCES.....	54
APPENDIXES	59
Appendix A : Questionnaire (English Version)	59
Appendix B : Resesearh Information (English Version)	62
Appendix C : Subject Information & Consent Form (Signature Page).....	66
Appendix D : Participants’s Material Publication Consent Form (Signature Page)	67
Appendix E : Questionnaire (Malay Version)	68
Appendix F : Research Information (Malay Version)	71
Appendix G : Subject Information & Consent Form (Signature Page)	75
Appendix H : Participants’s Material Publication Consent Form (Signature Page)	76
Appendix I : Permission to Use the Instrument	77
Appendix J : Institutional Approval (Permission to Conduct the Study).....	78
Appendix K : Ethical Approval	81
Appendix L : Gantt Chart.....	84

LIST OF TABLES

Table 3.1	Study Variable.....	27
Table 3.2	Scores of Choices in Section B & Section C.....	28
Table 3.3	Knowledge and attitude level scoring categories.....	29
Table 4.1	Socio-demographic characteristics of the participants.....	36
Table 4.2	Knowledge on Folic Acid Intake.....	38
Table 4.3	Level of Knowledge on Folic Acid Intake among Antenatal Mothers...	39
Table 4.4	Attitude on Folic Acid Intake.....	40
Table 4.5	Level of Attitude on Folic Acid Intake among Antenatal Mothers.....	41
Table 4.6	Association between knowledge level on folic acid intake and selected socio-demographic data.....	42
Table 4.7	Association between attitude level of folic acid intake and selected socio-demographic data.....	43

LIST OF FIGURES

Figure 2.1	The Health Belief Model by Janz & Becker (1984)	20
Figure 2.2	The Adapted Health Belief Model on Knowledge and Attitude on Folic Acid Intake in Preventing Birth Defects.....	21
Figure 3.1	Sample size calculating using Raosoft Software.....	24
Figure 3.2	Flow Chart of Data Collection.....	30

LIST OF ABBREVIATIONS

HBM	-	Health Belief Model
USM	-	Universiti Sains Malaysia
NTD	-	Neural Tube Defects
WHO	-	World Health Organization

**PENGETAHUAN DAN SIKAP TERHADAP PENGAMBILAN ASID
FOLIK DALAM KALANGAN IBU MENGANDUNG DALAM
MENCEGAH KECACATAN KELAHIRAN DI HOSPITAL
UNIVERSITI SAINS MALAYSIA**

ABSTRAK

Pengambilan asid folik merupakan salah satu isu yang memerlukan perhatian dalam masyarakat. Pengambilan asid folik penting dalam mencegah kecacatan kelahiran. Asid folik dapat membantu pembentukan sel-sel darah terutamanya dalam pembentukan janin. Penyelidikan ini adalah untuk menilai pengetahuan dan sikap terhadap pengambilan asid folik dalam kalangan ibu mengandung untuk mencegah kecacatan kelahiran di Hospital Universiti Sains Malaysia. Kajian keratan rentas dijalankan terhadap 160 ibu mengandung yang menghadiri Klinik Obstetrik dan Ginekologi Hospital USM. Ibu mengandung di trimester pertama telah diambil melalui kaedah persampelan mudah. Ciri-ciri sosio-demografi, pengetahuan dan sikap dalam kalangan ibu mengandung diperoleh melalui soal selidik. Analisis data dilakukan dengan menggunakan SPSS versi 24.0. Keputusan menunjukkan bahawa 86.9% daripada peserta mempunyai tahap pengetahuan yang tinggi dan 49.2% daripada peserta bersikap neutral dalam pengambilan asid folik. Manakala pengetahuan tentang asid folik menunjukkan bahawa, tiada hubungan antara umur ($p=0.205$) dan tahap pendidikan ($p=0.813$). Terdapat perhubungan dengan pekerjaan ($p=0.001$). Penyelidikan ini juga menunjukkan bahawa, tiada hubungan antara umur ($p=0.452$), tahap pendidikan ($p=0.688$) dan pekerjaan ($p=0.256$) dengan sikap tentang asid folik. Oleh itu, program atau aktiviti perlu dilaksanakan untuk memberi pendidikan yang meluas berkaitan dengan pengambilan asid folik dalam mencegah kecacatan kelahiran.

KNOWLEDGE AND ATTITUDE ON FOLIC ACID INTAKE AMONG ANTENATAL MOTHERS IN PREVENTING BIRTH DEFECTS IN HOSPITAL UNIVERSITI SAINS MALAYSIA

ABSTRACT

Folic acid intake is one of the concerned issues in the society. Folic acid intake important in preventing birth defects. Folic acid helps the development of the blood cells especially in fetal development. This study aimed to assess the knowledge and attitude on folic acid intake among antenatal mothers in preventing birth defects in Hospital Universiti Sains Malaysia. This was cross-sectional study conducted 160 antenatal mothers who attended Obstetrics and Gynaecology Clinics in Hospital USM. Antenatal mothers who in first trimester were recruited through simple random sampling method. Socio-demographic characteristics, knowledge and attitude among participants were obtained through questionnaire. Data analysis was done using Statistical Package for Social Science (SPSS) version 24.0 software. Results showed that 86.9% of participants had a high knowledge level and 49.2% of them had neutral attitude level on folic acid intake. This study showed no significantly associated between age ($p=0.205$) and level of education ($p=0.813$) and knowledge of folic acid intake while there is significantly associated between employment ($p=0.001$) and knowledge on folic acid intake. This study also showed no significantly associated between age ($p=0.452$), level of education ($p=0.6888$) and employment ($p=0.256$) and attitude on folic acid intake. Hence, programme or activities will be organised to provide more education on folic acid intake in preventing birth defects.

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Nutrition during pregnancy is very important for the fetus development and decreasing chronic diseases (Vitale, Mujkić, Todorović & Tulchinsky, 2009) One of the most important nutrients for the fetus is folic acid which is a B complex vitamin (B9) (Center for Disease Control and Prevention, 2007). Folic acid (FA) is the synthetic form of folate which is a B-group vitamin naturally present in many foods especially leafy green vegetables.

Folic acid plays a crucial role in synthesizing, repairing and replication of DNA in the growth of the baby (Tekkeşin & Taser, 2012). According to Al-Gailani ((2014), folic acid is presumed essential for cell growth such as neural tube growth and development. The neural tube is what develops into the baby's brain and spinal cord. The process of developing the neural tube is completed by day 29 of gestation (Abdulmalek, 2017).

The failure of the formation of the vertebral column that protects the spinal cord can result into birth defects such as spina bifida. It can happen anywhere along the spine, and causes a range of lifelong disabilities including paralysis. The neural tube may not close correctly with the presence of deficiency of folic acid that may lead to open or occult forms spina bifida (Abdulmalek, 2017). Neural tube defects (NTDs), including spina bifida, anencephaly, and encephalocele , as well as congenital heart disease, cleft lips, and cleft palate, are among the most common birth defects, and cause morbidity and mortality among foetuses and babies (Czeizel, 2009).

Consumption of folic acid in a woman's preconception is known to prevent a variety of birth defects (Grosse, Berry, Mick Tilford, Kucik & Waitzman, 2016) while folic acid intake in early pregnancy is known to significantly reduce birth defects (Auriel, Biderman, Belmaker, Freud, & Peleg, 2011). Preconception folic acid intake is associated with morbidity and mortality, including the burden for children with birth defects and their families (Yi, Lindemann, Colligs, & Snowball, 2011).

Neural tube defects (NTDs), serious birth defects of the brain and spine usually resulting in death or paralysis, affect an estimated 300,000 births each year worldwide (Atta et al., 2016). More than 90% of all infants with serious birth defects were born in low-and middle-income countries have reported in global birth defects. According to WHO (2016), birth defects affect an estimated 1 in 33 infants and account for 276,000 newborn deaths yearly. The prevalence of birth defects is estimated at between 55 and 65 per 1000 live births in the South East Asian region based on The March of Dimes's Global Report on Birth Defects (WHO, 2015).

The Malaysia National Neonatal Registry (2013) report from 2010 to 2012 indicated that more than 1000 babies were born with birth defects every year. A total of 4830 cases of birth defects were reported in 38 hospitals between 2010 and 2012. The most common type of NTD was anencephaly (0.19 per 1000 live births), followed by spina bifida (0.11 per 1000 live births) and encephalocele (0.07 per 1000 live births). Majority of the infants with anencephaly (94.5%), 45.8% with encephalocele and 9.5% with spina bifida died (Boo, Cheah, & Thong, 2013)

Consuming foods rich in folate such as green vegetables, citrus fruits, brussel sprouts, turnip greens, potatoes, yeast, dried beans, legumes, liver and others helps, but is not enough as around only 50% of its content is absorbed (Taulikar & Arulkumaran,

2011). Hence, to prevent the neural tube defects that caused by the failure of the open neural tube to close by the 29th-day post conception, a daily supplement of 400 micrograms folic acid is recommended starting a month before conception to the end of the first trimester (Abdulmalek, 2017).

The World Health Organization (2016) state that folic acid should be commenced as early as possible (ideally before conception) to prevent neural tube defects while United Nations International Children's Emergency Fund (UNICEF) recommend to take 400 microgram of folic acid to improve maternal health and give sufficient nutrients to the antenatal mothers and babies.

In Malaysia, the national recommendation includes that all women of childbearing age consume 400 micrograms to 800 micrograms of folic acid daily in supplement form in addition to folic acid provided by enriched foods (MNNR, 2013). Folic acid supplementation has been shown to reduce the annual number of neural tube defect's affected pregnancies by 50 to 70%. Despite evidence, most women are not aware that folic acid prevents neural tube defects and its supplementation rates have remained slow (Hursthouse, Gray, Miller, Rose, & Houghton, 2011).

1.2 Problem Statement

A balance diet is very crucial for pregnant women, which consists of proteins, carbohydrates, vitamins, minerals and fats. Supplements do not replace a healthy diet but rather encourage that a pregnant woman to has enough supply of daily nutrients. Folic acid (FA) is a water soluble vitamin, which is found in different foods but can be best got through multi-vitamin. Leafy green vegetables, fortified cereals, orange juice and strawberries are some of the foods that contain folic acid. Folic acid act as a co-enzyme essential to rapidly growing cells, especially in growth and reproduction processes. The bioavailability of folic acid (stable form of folate) is 70% more than of folate found in naturally in foods. (Khan, 2017).

The deficiency of folic acid in a pregnant mother can results many complications to the fetus and the mother itself. The insufficient of folic acid to the mother can leads to anemia and peripheral neuropathy while for the fetus can causes neural tube defects including spina bifida, anencephaly, and encephalocele, low birth weight and fetal growth retardation (Greenberg, Bell, Guan, & Yu, 2011). Birth defects are a leading cause of death in the first year of life, and, for infants who survive there is an increased risk for long-term disabilities (Atta et al., 2016).

The Malaysia National Neonatal Registry (MNNR) report from 2010 to 2012 indicated that more than 1000 babies were born with birth defects every year. According to MNNR, a total of 4830 cases of birth defects were reported in 38 hospitals between 2010 and 2012 (National Malaysia Neonatal Registry, 2013). The prevalence of neural tube defects was 0.42 per 1000 live births. It was the highest among the indigenous people of Sarawak (1.09 per 1000 live births) and lowest among Malaysians of Chinese descent (0.09 per 1000 live births), followed by spina bifida (0.11 per 1000 live births) and

encephalocele (0.07 per live births). Majority of the infants with anencephaly (94.5%), encephalocele (45.8%) and spina bifida (9.5%) died (Boo, Cheah & Thong, 2013).

Previous study in Kelantan had stated that there is also a big gap between the proportion of folic acid awareness and use among Kelantan women which more than half of these women stated their reason for not using folic acid supplementations is because “they perceived that they do not need them” as they belief that these “doctor pills” could cause them to have bigger babies and thus, longer and harder labour (Fauzi, McKenna, Yusoff, & Rahman, 2009).

Multiple studies have been done back to 1980s sufficiently established the function of the folic acid in lowering the risk of NTDs, provided that is taken at a daily dose of 400 microgram recommended by WHO in preconception period that defined by one month prior to gestation until the end of the first trimester (Keshavarzi, Ting, Yi, & Yusoff, 2016) as the timing allocated for the closure of neural tube at around fourth week of pregnancy. The usage of folic acid has been assessed in several other countries and areas resulting different outcomes on the level of knowledge, perception and behaviour association to different demographic and socioeconomic characteristics. However, Malaysia is lacking with the research of consumption of folic acid.

Due to these phenomena, a research will be conducted to determine the knowledge and attitudes of folic acid intake among antenatal mothers in Hospital Universiti Sains Malaysia (HUSM), Kubang Kerian, Kelantan. This study is crucial in order to increase knowledge of folic acid regarding the benefits, dosage as well as the complications of not taking folic acid among pregnant women to prevent the birth defects occur.

1.3 Research Questions

- i. What is the level of knowledge on folic acid among antenatal mothers in preventing birth defects in Hospital Universiti Sains Malaysia (HUSM)?
- ii. What is the level of attitude towards folic acid among antenatal mothers in preventing birth defects in Hospital Universiti Sains Malaysia (HUSM)?
- iii. Is there any association between the knowledge and the selected sociodemographic data (age, education, employment) of folic acid intake among antenatal mothers in preventing birth defects in Hospital Universiti Sains Malaysia (HUSM)?
- iv. Is there any association between the attitudes and the selected sociodemographic data (age, education, employment) of folic acid intake among antenatal mothers in preventing birth defects in Hospital Universiti Sains Malaysia (HUSM)?

1.4 Research Objectives

1.4.1 General Objective

This study aims to evaluate the knowledge and attitudes on folic acid intake among antenatal mothers in preventing birth defects in Hospital Universiti Sains Malaysia (HUSM)

1.4.2 Specific Objectives

- i. To determine the level of knowledge on folic acid among antenatal mothers in preventing birth defects in Hospital Universiti Sains Malaysia (HUSM).
- ii. To determine the level of attitude towards folic acid among antenatal mothers in preventing birth defects in Hospital Universiti Sains Malaysia (HUSM).
- iii. To find out the association between the knowledge and the selected sociodemographic data (age, education, employment).
- iv. To find out the association between the attitude and the selected sociodemographic data (age, education, employment).

1.5 Research Hypotheses

- Hypothesis 1**
- There is no association between selected sociodemographic data (age, education, employment) and knowledge on folic acid intake among antenatal mothers in preventing birth defects in Hospital Universiti Sains Malaysia (HUSM). (H_0)
 - There is association between selected sociodemographic data (age, education, employment) and knowledge on folic acid intake among antenatal mothers in preventing birth defects in Hospital Universiti Sains Malaysia (HUSM). (H_A)
- Hypothesis 2:**
- There is no association between selected sociodemographic data (age, education, employment) and attitudes on folic acid intake among antenatal mothers in preventing birth defects in Hospital Universiti Sains Malaysia (HUSM). (H_0)
 - There is association between selected sociodemographic data (age, education, employment) and attitudes on folic acid intake among antenatal mothers in preventing birth defects in Hospital Universiti Sains Malaysia (HUSM). (H_A)

1.6 Conceptual and Operational Definitions

Definition for the conceptual and operational terms used in this research proposal are as shown below:

Terms	Definition
Knowledge	The information, skills and understanding that is gained through education or experiences (Oxford, 2018). This section consists of 15 statements related to antenatal mothers' knowledge about what is folic acid, the functions of folic acid in maternal and pregnancy health and the complications of not taking folic.
Attitude	A predisposition or a tendency to respond positively or negatively towards a certain idea, object, person, or situation. Attitude influences an individual's choice of action, and responses to challenges, incentives, and rewards (together called stimuli) (Business Dictionary, 2019). This section consists of 9 statements related to antenatal mothers' attitudes towards folic acid by how the antenatal mothers respond to the benefits of the folic acid during pregnancy.
Intake	Amount of a substance taken into a body within a certain period, whether or not it is absorbed in or assimilated by the body (Business Dictionary, 2019). In this study, the process of consume or eating the folic acid in the correct dose.

Birth defects	A birth defect is a problem that happens while a baby is developing in the mother's body. Most birth defects happen during the first 3 months of pregnancy. (Medline, 2019). In this study, birth defects refer to the abnormalities of cell replication and growth of the baby resulting abnormal physical state of the baby. For example, spina bifida, anencephaly, and encephalocele.
Antenatal mothers	A woman who are pregnant that relate to the medical care. (Collins Dictionary, 2019). In this study, the pregnant woman who came to the HUSM for antenatal check-up at obstetrics and gynaecology clinic, Hospital USM..

1.7 Significance of the Study

Generally, folic acid is obligatory in pregnancy because it is vital for both mother and fetus. Deficiency of folic acid can lead fetus to have congenital abnormalities while in mother can causes anaemia and peripheral neuropathy (Khan, 2017). However, the issue is still not getting proper attention in Malaysia and there is lack studies of the folic acid consumption in preventing birth defects. Thus, we conducted this study aiming to give benefits to population specifically on folic acid intake in preventing birth defects.

First and foremost, we believe that by conducting this study, we can provide benefit to the antenatal mothers. This is in the aspect of knowledge regarding folic acid and the complications of not taking folic acid. Deficiency of folic acid can lead to anaemia and increased chances of birth defects like neural tube defects, low birth weight and fetal growth retardation. Thus, this study will help to increase knowledge of folic acid intake among antenatal mothers in preventing birth defect in Hospital Universiti Sains Malaysia (HUSM) following the Millennium Development Goal

(MDG) 4 (WHO, 2015) which includes the goal of reducing birth defects to reduce infant mortality.

Birth defects are structural abnormalities which develop in fetus during their intrauterine life. Depending on the underlying cause, birth defects may affect one or more organ systems and sometimes present as recognizable syndromes. According to large series studies, heart defects (affecting 1 of every 100 to 200 livebirths), neural tube defects (affecting 1 of every 1000 pregnancies), lip and palate defects (affecting 1 in 700 to 1000 livebirths) (Boo, 2005) Despite evidence, most women are not aware that folic acid prevents neural tube defects and its supplementation rates have remained too low (Hursthouse et al., 2011).

Although congenital abnormalities are responsible for an estimated 4% of neonatal deaths in south-east Asia, it must be emphasized that birth defects contribute to a huge burden of foetal losses (abortions, medical terminations and stillbirths), the exact extent of which remains unknown. As the proportion of deaths due to infections and malnutrition decreases, birth defects will become a more and more important cause of newborn and child mortality (WHO Global Health Observations, 2012).

Moreover, in many society, the awareness of the folic intake among women is scarce. Previous studies have stated that three out of every four (75.8%) Kelantan women of childbearing age have heard or read about folic acid is encouraging. However, only a small proportion was aware that folic acid supplements could prevent neural tube defects and even lesser percentage knew that it should be taken before conception. (Fauzi et al., 2009).

Apart from that, this study will give significant benefit to the antenatal women and practice it during next preconceptional period and pregnancy to prevent birth defects. The information gained from this cross-sectional study will help them to deliver health education regarding the importance of folic acid to those in need specifically the vulnerable population who has higher risk of getting birth defect and complications to the mothers.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review focus on knowledge and attitude on folic acid intake in preventing birth defects. The literature search for this study covers period 12/9/2019 to 25/9/2019 that revealed English language listing articles in nursing and medical journals such as Medline, ProQuest, Science Direct, Ebscohort and online journal by key in the keywords of the study.

2.2 Prevalence of birth defects

The March of Dimes, Global Report on Birth Defects reported that neural tube defects, including spina bifida, anencephaly and encephalocoele, occur when part of the neural tube, which forms the spine, spinal cord, skull and brain, fails to close between 21 and 28 days after conception before women realize they are pregnant. These serious errors in the development of the central nervous system can cause death or permanent damage to the brain, spinal cord and spinal nerves.

Many children affected by neural tube defects have multiple lifelong disabilities, including varying degrees of lower limb paralysis, bowel and bladder incontinence, hydrocephalus, intellectual and learning disabilities. Each year spina bifida and anencephaly, the two most common forms of neural tube defects, occur in an estimated 300,000 newborns worldwide (CDC, 2005).

World Health Organization (2016) stated that an estimated 303 000 newborns die within 4 weeks of birth every year, due to congenital defects which can contribute to long-term disability, that may have significant impacts on individuals, families, health-care systems and societies. The most common, severe congenital defects are heart defects, neural tube defects and Down syndrome. A smaller population-based survey in the Kinta district of Malaysia in 2001–2002 reported a birth prevalence of NTDs of 0.73 per 1000 live births in 17 720 live births (Thong, Ho, & Khatijah, 2005).

2.3 Folic Acid

Folic acid also referred as folate, folacin or vitamin B9 is an essential nutrients and its chemical name is pteroyl-L-glutamic acid and pteroyl-L-glutamate. Folic acid is crucial for several functions of the body as it is used to protect cells in the body. Repairing, replication and methylation of human body needs folic acid to synthesize DNA. Folic acid is a water soluble vitamin and found in large amount of food especially in leafy vegetables and citrus fruit. The bioavailability of folic acid (stable form of folate) is 70% more than that of folate found in naturally in foods (Khan, 2017).

Deficiency of folic acid can cause megaloblastic anaemia (condition in which the bone marrow produces unusually large, structurally abnormal, immature red blood cells) that can produce several symptoms of anaemia such as fatigue, irritability, heart palpitations, headaches, shortness of breath, soreness in the oral mucosa, tongue ulceration and also effects on skin, hair and nails (Khan, 2017).

Folic acid is important in pregnancy because it is vital for both mother and fetus. In mother, its deficiency causes anaemia and peripheral neuropathy (R.J. et al., 2012). Meanwhile, in fetus, it is necessary for growth and development and its deficiency leads

to congenital abnormalities such as neural tube defects (NTDs) which is the congenital defects of central nervous system occur at the early stage of parental development results abnormal shape of cells and division, anencephaly or spina bifida (Greene & Copp, 2014).

2.4 Folic acid use in women of childbearing age

Public Health Service recommended that all women of childbearing age in the United States capable of becoming pregnant consume 400 micrograms of folic acid daily to reduce their risk for having a pregnancy affected by NTDs (Petrini, Hamner, Flores, Mulinare, & Prue, 2008). It is recommended that pregnant women get 600-800 mcg of folic acid per day from their diet or supplements starting 1 month before pregnancy and during pregnancy. Pregnant women with a history of neural tube birth defects are advised to get 4000 mcg of folic acid per day (CDC, 2019).

Only 6% of the women who took folic acid were taking it consistently before pregnancy with the aim of preventing neural tube defects and only 20% of the women who took folic acid in the first month of pregnancy, thus show that low rate can be attributable to late presentation for antenatal care and delayed prescription of the folic acid for women during pregnancy in Libya (Abdulmalek, 2017).

Previous study has stated that among who were pregnant at the time of the survey done in Malaysia, only 18.2% reported taking folic acid supplements daily before conception and the percentage of the non-pregnant women reported taking the supplements daily is almost similar (23.9%) as they perceived that they do not need the folic acid supplements, believe that they can get enough vitamins from food, busy or have no time, do not like medications, afraid of gaining weight and was not allowed by husband to take folic acid (Exploratory et al., 2009).

Following the preconception folic acid campaigns set up previously by the Ministry of Health in Malaysia to raise awareness about the prevention of birth defects, the findings showed that more than half (60%) of the public had adequate knowledge toward preconception folic acid intake in preventing birth defects but their perception score was low. Nearly half (48.7%) of the participants answered incorrectly and did not know that childbearing women who had had one pregnancy affected by a birth defect (44.3%) should take folic acid before pregnancy. This highlights that the need to educate the public continuously especially women of childbearing age to recognize and act on the need to take preconception folic acid before conception and during the first trimester of pregnancy to avoid congenital defects in their newborns (Geok, 2018).

2.5 Knowledge of the importance of folic acid among antenatal mothers

Knowledge of preconception care can be acquired through experience or education. Education can be attained from multiple sources, e.g., books, newspapers, radio channels, television, the Internet or medical staff consultations. Studies have shown that women who receive pre-pregnancy care have more knowledge and often show risk-reduction behaviours (Lim et al., 2016).

The proper time of taking folic acid supplements is very important for the normal development of the nervous system of fetus and to reduce the risk of NTDs, the results from different studies showed that most women start taking FA after they know of their pregnancy between 2nd-4th week of the gestation and missing the sensitive Period of neural tube development (Bukhari & Bajouh, 2016). However, there is only 33.7% knew that it must be taken during preconception as early first 12 weeks, similar to figures seen in Hai-Saudi Arabia (10%) and Lebanon (24.7%) (Bukhari & Bajouh, 2016).

Close to 90% of the respondents have heard of folic acid and its use and almost half of the women interviewed understood the natural or supplemental sources of folic acid during pregnancy in previous study in Malaysia which is only 8% of the respondents are reported with good level of knowledge, 54.3% and 37.8% reported have poor and moderate level of knowledge in folic acid use (Keshavarzi et al., 2016). The poor knowledge of folic use is may be contributed by lacking in exposure during formal education, campaign events promoting folic knowledge and use as well as accessibility to maternity programmes (Ho, 2004).

2.6 Attitudes of folic acid among antenatal mothers

The success of preconception care greatly depends on women's attitudes and their willingness to participate. Previous study had stated that majority of respondents agreed and strongly agreed that preconception care is an important health issue during the reproductive age chose government facilities as the best place to receive preconception care advice as it is easily accessible to the public and the services are also provided equally without bias (Lim et al., 2016)

According to the Bukhari & Bajouh (2016), 91.8% heard about folic acid and 50.7% of the respondents in that study were planning for pregnancy, 85.6% had taken folic acid supplements but only 14% took it before becoming pregnant and this indicated that although there is an increasing in the general awareness among women in the reproductive age about folic acid, there is still a gap between knowing and acting need to be improved, as there is difficult to admit their lack of awareness to folic acid benefits.

The fact that three out of every four (75.8%) Kelantan women of childbearing age have heard or read about folic acid is encouraging. However, only a small proportion was aware that multivitamin especially folic acid could prevent neural tube defects and even lesser percentage knew that it should be taken before conception (Fauzi et al., 2009).

2.7 Socio-demographic characteristics related to the knowledge and attitudes of folic acid intake

According to WHO, (2014), maternal age is also a risk factor for abnormal intrauterine fetal development. Advanced maternal age increases the risk of chromosomal abnormalities, including Down syndrome.

Educational level plays a main role in folic acid consumption in preventing birth defects. It is clearly shown that education has positive impact on practice. Women had bachelor or Master degree, start taking folic acid supplement before pregnancy and having percentage of 68% and 59% respectively as compare to lower educational level (Khan, 2017). Higher educated women knew more about folic acid and used it significantly more often in preconception and first trimester than lower educated women (Bener, Al Maadid, Al-Bast, & Al-Marri, 2006). Women with a higher level of education were more likely to be aware of and take folic acid and more than 70% of pregnant women in Korea knew that folic acid could prevent NTDs, as well as the appropriate time to take folic acid. (J. Kim et al., 2017).

Low-income may be an indirect determinant of congenital anomalies, with a higher frequency among resource-constrained families and countries. It is estimated that about 94% of severe congenital anomalies occur in low- and middle-income countries. An indirect determinant, this higher risk relates to a possible lack of access to sufficient,

nutritious foods by pregnant women, an increased exposure to agents or factors such as infection and alcohol, or poorer access to healthcare and screening. Factors often associated with lower-income may induce or increase the incidence of abnormal prenatal development (WHO, 2014). Moreover, the household income and educational level serve as significant predictive factors leading to optimal behaviour of folic acid use (Keshavarzi et al., 2016).

According to M. J. Kim et al. (2018) stated that there is significantly higher proportions of employed women were aware of folic acid and had knowledge of folic acid compared with unemployed women. It was stated to in a study done in Sweden, women with better employment results better consumption of folic acid as they have more awareness of benefits of folic acid (Murto et al., 2017).

Parity is negatively associated with adherence to folic acid supplementation (Sharman Moser et al., 2019). However, it has previously been observed that women who already have children use fewer dietary supplements, especially folic acid supplements (Murto et al., 2017). Previous study by Berry (2013) in Norway showed that as parity increased, the proportion of mothers consuming folic acid decreased among previously nulliparous women, 44.6% of pregnant mothers consumed FA, compared with 19.4% of mothers with two or more prior births.

2.8 Theoretical and Conceptual Framework of Study

In this research, the Health Belief Model is used as a guide. The Health Belief Model (HBM) (Figure 2.1) is originated in 1950s as a systematic method to explain and predict preventive health behaviour. (Janz & Becker, 1984). HBM consists of several components which is perceived susceptibility, perceived severity, perceived threat, perceived benefits, perceived barrier and behaviour change.

Perceived susceptibility is the individuals who identify themselves are prone to a health problem will occupy in behaviours to minimize their risk of developing the health problem. (Janz & Becker, 1984). Then, perceived severity is a verbal assessment of seriousness of the problem and what are the future consequences of it. (Janz & Becker, 1984). Perceived benefits refer to individual's assessment of the value of engaging in a health-promoting behaviour to decrease risk of disease. (Cao, Chen, & Wang, 2014). Perceived barrier refer to an individual's estimation of the hurdle for behaviour change.

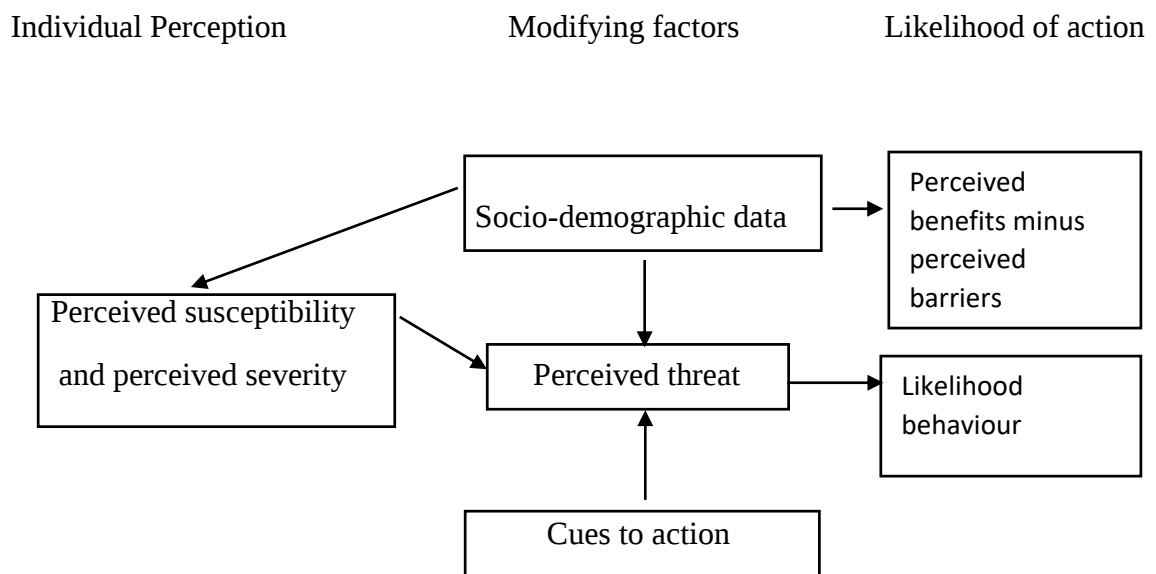


Figure 2.1 Basic Elements of the Health Belief Model. (Janz & Becker, 1984)

This Figure 2.2 emphasizes on the relation between certain factors started which are knowledge, socio-demographic and practice of folic acid consumption that can contribute to the occurrence of the birth defects. All of the three elements are related to each other. From this diagram, it also shows the symptoms and complications when deficiency of folic acid occurs. This study shall determine how socio-demographic data influence the folic acid consumption among antenatal women in the Hospital Universiti Sains Malaysia (HUSM). Furthermore, measurement of level of knowledge might affect the incidence of birth defects. This is predicted because when students aware of symptoms and complications of deficiency of folic acid consumption, they can prevent it by practicing consume folic acid in correct dose to prevent birth defects.

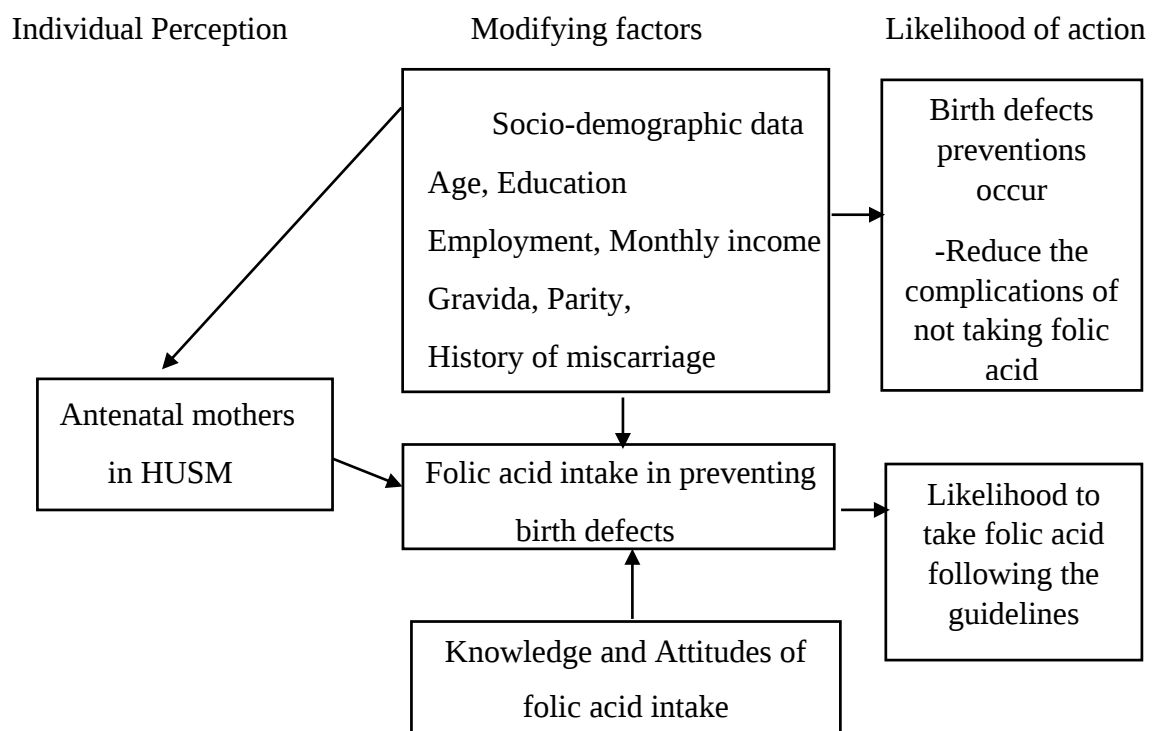


Figure 2.2 The Health Belief Model as the conceptual framework.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the researcher will describe the methodology and methods chosen to conduct the proposed study in terms of research design, sample selection, data collection and data analysis. In addition, the researcher will explain detail the ethical considerations of the study as part of a requirement prior to the conduct of this study.

3.2 Research Design

This study employed a descriptive cross sectional study design to assess the knowledge and attitudes on folic acid intake among antenatal women. A cross sectional study takes place at the single point in time and they explained that the data are collected at one present time or implementation period, to look for numerous thing and prevalence in a population.

3.3 Population and setting

The study will conduct among antenatal mothers in obstetrics and gynaecology clinic in Hospital Universiti Sains Malaysia (HUSM), Kubang Kerian, Kelantan.

3.4 Sampling Plan

When conducting a research study, certain inclusion and exclusion criteria is considered in selecting an eligible participant from the population.

3.4.1 Inclusion and Exclusion Criteria

a) Inclusion Criteria

Subjects will be selected as participants if they are:

- Antenatal mothers with first trimester of pregnancy
- Antenatal mothers visiting obstetrics and gynaecology clinic
- Antenatal mothers who are willing to participate
- Able to understand, and speak Malay or English

b) Exclusion Criteria

Subjects will be excluded from this study if they are:

- Antenatal mothers who are unwilling to participate

3.4.2 Sample Size Estimation

The total respondent of this study were calculated by using Raosoft Software with the 0.05 of margin error and 95% of confidence interval. The total population of the antenatal mothers attending obstetrics and gynaecology is 230. The sample size estimation of this study is 145. However, the sample is adding with 10% of drop out. Hence, the sample size estimation in this study is 160.

$$N = 145 + 10\% \text{ of drop out}$$

$$= 145 + 15$$

$$= 160 \text{ participants}$$

Raosoft®		Sample size calculator
What margin of error can you accept? 5% is a common choice	5 %	The margin of error is the amount of error that you can tolerate. If 90% of respondents answer yes, while 10% answer no, you may be able to tolerate a larger amount of error than if the respondents are split 50-50 or 45-55. Lower margin of error requires a larger sample size.
What confidence level do you need? Typical choices are 90%, 95%, or 99%	95 %	The confidence level is the amount of uncertainty you can tolerate. Suppose that you have 20 yes-no questions in your survey. With a confidence level of 95%, you would expect that for one of the questions (1 in 20), the percentage of people who answer yes would be more than the margin of error away from the true answer. The true answer is the percentage you would get if you exhaustively interviewed everyone. Higher confidence level requires a larger sample size.
What is the population size? If you don't know, use 20000	230	How many people are there to choose your random sample from? The sample size doesn't change much for populations larger than 20,000.
What is the response distribution? Leave this as 50%	50 %	For each question, what do you expect the results will be? If the sample is skewed highly one way or the other, the population probably is, too. If you don't know, use 50%, which gives the largest sample size. See below under More information if this is confusing.
Your recommended sample size is	145	This is the minimum recommended size of your survey. If you create a sample of this many people and get responses from everyone, you're more likely to get a correct answer than you would from a large sample where only a small percentage of the sample responds to your survey.

Figure 3.1 Sample size calculation using Raosoft Software

3.4.3 Sampling Method

Sampling was guided by the designed sampling criteria and a sampling frame. For this study, simple random sampling is used to select the sample. It is a procedure that is used to ensure every unit or subject has the same chance of being selected as respondent (Chua, 2016).

A list of subjects in a population was obtained one day before from the obstetrics and gynaecology clinic in hospital USM. The subjects will be labelled from number 1 to 3. Selected every number 3 of subjects as respondents who are meet the inclusion criteria of this study. Then, the researcher will recruit the selected respondents that attend the obstetrics and gynaecology clinic and approach them to ask for permission to involve in this study. If the respondents agree and willing to participate, details explanation regarding the procedure will be given.