

SOCIOCULTURAL AND OTHER FACTORS ASSOCIATED WITH MALNOURISHED  
CHILDREN AGED UNDER FIVE IN PREAH VIHEAR PROVINCE CAMBODIA



Mr. Sin Vorn

จุฬาลงกรณ์มหาวิทยาลัย

CHULALONGKORN UNIVERSITY

A Thesis Submitted in Partial Fulfillment of the Requirements  
for the Degree of Master of Public Health Program in Public Health  
College of Public Health Sciences  
Chulalongkorn University  
Academic Year 2013  
Copyright of Chulalongkorn University

บทคัดย่อและแฟ้มข้อมูลฉบับเต็มของวิทยานิพนธ์ตั้งแต่ปีการศึกษา 2554 ที่ให้บริการในคลังปัญญาจุฬาฯ (CUIR)  
เป็นแฟ้มข้อมูลของนิสิตเจ้าของวิทยานิพนธ์ ที่ส่งผ่านทางบัณฑิตวิทยาลัย

The abstract and full text of theses from the academic year 2011 in Chulalongkorn University Intellectual Repository (CUIR)  
are the thesis authors' files submitted through the University Graduate School.

ปัจจัยทางสังคมวัฒนธรรม และปัจจัยอื่นที่เกี่ยวข้องกับภาวะทุพโภชนาการในเด็กอายุน้อยกว่า 5  
ปี ในจังหวัดพระวิหาร ประเทศกัมพูชา



นายสิน วอน

จุฬาลงกรณ์มหาวิทยาลัย

CHULALONGKORN UNIVERSITY

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต

สาขาวิชาสาธารณสุขศาสตร์

วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย

ปีการศึกษา 2556

ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

Thesis Title	SOCIOCULTURAL AND OTHER FACTORS ASSOCIATED WITH MALNOURISHED CHILDREN AGED UNDER FIVE IN PREAH VIHEAR PROVINCE CAMBODIA
By	Mr. Sin Vorn
Field of Study	Public Health
Thesis Advisor	Associate Professor Ratana Somrongthong

---

Accepted by the Faculty of College of Public Health Sciences,  
Chulalongkorn University in Partial Fulfillment of the Requirements for the  
Master's Degree

.....Dean of the College of Public Health Sciences  
(Professor Surasak Taneepanichskul, M.D.)

THESIS COMMITTEE

.....Chairman  
(Robert Sedgwick Chapman, M.D, M.P.H)

.....Thesis Advisor  
(Associate Professor Ratana Somrongthong)

.....External Examiner  
(Nipunporn Voramongkol, M.D, M.P.H)

สิน วอน : ปัจจัยทางสังคมวัฒนธรรม และปัจจัยอื่นที่เกี่ยวข้องกับภาวะทุพโภชนาการ ในเด็กอายุน้อยกว่า 5 ปี ในจังหวัดพระวิหาร ประเทศกัมพูชา. (SOCIOCULTURAL AND OTHER FACTORS ASSOCIATED WITH MALNOURISHED CHILDREN AGED UNDER FIVE IN PREAH VIHEAR PROVINCE CAMBODIA) อ.ที่ปรึกษาวิทยานิพนธ์  
 หลัก: รศ. ดร.รัตนา สำโรงทอง, 106 หน้า.

ภาวะทุพโภชนาการส่งผลกระทบต่อทางด้านร่างกาย จิตใจ สติปัญญา การป่วย การตาย รวมทั้งส่งผลการป่วย การตาย และความสามารถในการทำงาน อันมีผลต่อชีวิตมนุษย์ และการอยู่รอด สำหรับในเด็ก ภาวะทุพโภชนาการส่งผลกระทบต่อสุขภาพ โรคต่างๆ และการเสียชีวิตในเด็ก ปัจจัยที่มีผลต่อภาวะทุพโภชนาการมีมากมาย

การศึกษาภาคตัดขวางครั้งนี้ มีวัตถุประสงค์เพื่อศึกษาปัจจัยทางสังคม วัฒนธรรม และปัจจัยอื่นๆ ที่เกี่ยวข้องกับในเด็กต่ำกว่า 5 ปี จังหวัดพระวิหาร ประเทศกัมพูชา ปัจจัยที่ศึกษาี้ รวมถึง ปัจจัยทางด้านสังคม ประชากร เศรษฐกิจ และสุขภาพของมารดา และ เด็ก เก็บข้อมูล โดยใช้แบบสอบถามที่พัฒนาจาก การศึกษาเรื่องแม่และเด็ก (MIC) ขององค์การ UNICEF 2006 และการชั่งน้ำหนัก วัดส่วนสูง เพื่อประเมินภาวะทุพโภชนาการในเด็ก กลุ่มประชากรที่ศึกษา ได้แก่ คริวเรือนที่มีเด็กต่ำกว่า 5 ปี ใน 3 ตำบล ของ อำเภอ เขียว จังหวัดพระวิหาร จำนวน 220 คริวเรือน การวิเคราะห์ข้อมูลใช้ SPSS (16) ความถี่ ร้อยละ ค่าเฉลี่ย ค่าเบี่ยงเบน มาตราฐาน และใช้ ไคว์ สแควร์ ในการศึกษาความสัมพันธ์

การศึกษาพบว่า เด็กร้อยละ 77.3 มีน้ำหนักต่ำกว่าเกณฑ์ ร้อยละ 60.9 มีภาวะทุพโภชนาการเรื้อรังปานกลาง (stunting) และ ร้อยละ 61.4 มีภาวะทุพโภชนาการเฉียบพลัน (wasting) จากวิเคราะห์ทางสถิติ โดยใช้ ไคว์ สแควร์ ปัจจัยที่เกี่ยวข้องกับการมีน้ำหนักต่ำกว่าเกณฑ์ของเด็กอย่างมีนัยสำคัญทางสถิติ (( $p < 0.05$ ). ได้แก่ ระดับการศึกษาของมารดา จำนวน การกินนม/รับประทานอาหาร การให้อาหารเสริมระหว่างมือ การกินอาหารประเภทแป้ง โปรตีน ผัก/ผลไม้ ขนมหวาน สำหรับปัจจัยด้านวัฒนธรรมอาหาร ความเชื่อ และอคติต่ออาหาร ไม่พบว่ามีความสัมพันธ์ กับการมีน้ำหนักต่ำกว่าเกณฑ์ของเด็ก หากแต่พบว่า มารดา/ผู้ดูแลมากกว่าครึ่ง มีความเชื่อว่า การกินปลาทำให้เกิดพยาธิ และการให้เด็กกินนมทันทีหลังคลอดทำให้ท้องเสีย หรืออาจป่วยได้ การส่งเสริมภาวะโภชนาการในเด็กต่ำกว่า 5 ปี ควรเน้นการให้ความรู้ เรื่องสุขภาพ เรื่องอาหารที่เหมาะสม และ น้ำดื่มที่ปลอดภัย

คำสำคัญ ภาวะทุพโภชนาการ เด็กต่ำกว่า 5 ปี ปัจจัยทางสังคมวัฒนธรรม

สาขาวิชา สาธารณสุขศาสตร์

ปีการศึกษา 2556

ลายมือชื่อนิติ

ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก

# # 5678836253 : MAJOR PUBLIC HEALTH

KEYWORDS: SOCIOCULTURAL / FACTORS / MALNUTRITION / CHILDREN / UNDERWEIGHT / STUNTING / WASTING

SIN VORN: SOCIOCULTURAL AND OTHER FACTORS ASSOCIATED WITH MALNOURISHED CHILDREN AGED UNDER FIVE IN PREAH VIHEAR PROVINCE CAMBODIA. ADVISOR: ASSOC. PROF. RATANA SOMRONGTHONG, 106 pp.

Malnutrition affects physical, mental and intellectual development as well as the morbidity, mortality and physical work ability and the continued consequences impact on human performance and survival. Its underlying causes resulted in many diseases and death for the children under-five years of age. Factors contributing to the malnourished children are considered to be many and varied.

The objective of the cross-sectional study is to identify the sociocultural and other factors associated with underweight children age under-five in Preah Vihear province. Factors considered socio-demographic characteristics of the mothers/closed-caregiver, food-related factors, environment factors, household economic and health status of mother and child. It was a cross-sectional study using a modified questionnaire from MICS 2006 and measure of weight and height.

Two hundred twenty households with children under-five from 3 sub-districts of Chhaeb, Preah Vihear participated in the study. SPSS (version 16) was used for data analysis of frequency, percentage, mean, standard deviation and cross-tabulation tested by chi-square test. The result showed that the prevalence of underweight, stunting and wasting children under-five years of age was 77.3%, 60.9% and 61.4%. Most of the respondents were farmers (95.3%) and no education (33.6%) and completed primary school (63.7%). From the statistical analysis using Chi-square; factors associated with underweight children were level of mother's education, number of times feeding/breastfeeding, feeding child extra snacks, children ate carbohydrate, protein food, vegetables/fruits, sweets ( $p < 0.05$ ). Moreover, the finding revealed that the environment factors (child drinking water treatment) and child health factors (child fever with cough) showed statistical significance with underweight children ( $p < 0.05$ ).

In terms of food culture, beliefs and prejudice there were no statistically significant differences. However, over half the mothers/closed-caregivers thought that child ate fish caused parasite and first breast milk caused child diarrhea or sickness due to their food beliefs. For improving the child nutritional status, health and nutrition and safe drinking water should be provided to the mothers.

Field of Study: Public Health

Student's Signature .....

Academic Year: 2013

Advisor's Signature .....

## ACKNOWLEDGEMENTS

First of all, I would like to express a profound thank to Dr. Ratana Somrongthong my thesis advisor for all kind assistance, support and guidance to me within the process of thesis writing.

I would like to give a great thank to Dr. Robert Sedgwick Chapman, my chair person and Dr. Nipunporn Voramongkol my external examiner being as my thesis committees that provided me a remarkable support and advice to accomplish the thesis.

I would like to thank Dr. Surasak Taneepanichsakul, Dean of the College of Public Health Sciences, all lecturers and staffs of the College of Public Health Sciences, Chulalongkorn University that gave me the support during the coursework and the thesis writing.

Moreover, I would like to express million of thanks to Asian Pacific Scholarship Consortium (APSC) program, which funded and supported me for the further study in Master of Public Health. And I would like to thank World Vision Cambodia staff and Preah Vihear Provincial Health Department officers, which supported and permitted me to undertake the data collection in their worksite.

Last but not least, I would also to extent a great thank to all my families and Marvin E-Lang for their kind support and encouragement to me accordingly.

## CONTENTS

	Page
THAI ABSTRACT .....	iv
ENGLISH ABSTRACT .....	v
ACKNOWLEDGEMENTS .....	vi
CONTENTS .....	vii
CHAPTER I INTRODUCTION .....	1
1.1 Background and Rational .....	1
1.2 Research questions.....	4
1.3 Objectives.....	5
1.3.1 General Objectives .....	5
1.3.2 Specific Objectives.....	5
1.4 Study Variables.....	5
1.5 Conceptual Framework.....	6
1.6 Terminology and Operational definitions .....	6
1.7 Conclusion.....	10
CHAPTER II LITERATURE REVIEW .....	11
2.1 Malnutrition.....	11
2.2 Type of malnutrition .....	11
2.2.1 Under-nutrition.....	11
2.2.2 Over-nutrition .....	13
2.3 Sociocultural factors associated with malnutrition .....	14
2.4. Major Causes of malnutrition .....	16
2.4.1 Common causes of malnutrition.....	16
2.4.2 Causes of malnutrition in developing countries .....	16
2.5 Consequences of malnutrition .....	17
2.6 Signs and symptoms in malnourished children .....	18
2.7 Prevention and control of malnutrition.....	21
2.8 Management and treatment of malnourished children.....	23

	Page
2.9 Anthropometric measurements (WHO, UNICEF, 2011) .....	24
2.10 Sociocultural factors associated with malnutrition in Preah Vihear province ..	26
CHAPTER III RESEARCH METHODOLOGY .....	29
3.1 Introduction .....	29
3.2 Research Design .....	29
3.3 Study Area .....	29
3.4 Study Population .....	29
3.5 Sampling Techniques .....	29
3.5.1 Inclusion criteria .....	30
3.5.2 Exclusion criteria .....	30
3.6 Sample Size Calculation .....	30
3.7 Research Instruments .....	31
3.7.1 Reliability test of the instrument .....	32
3.7.2 Validity test of the instrument .....	32
3.8 Data Collection .....	32
3.9 Data Analysis Method .....	32
3.10 Ethical Consideration .....	33
3.11 Study Limitations .....	33
3.12 Expected Benefits .....	33
CHAPTER IV RESULT .....	34
4.1 Introduction .....	34
4.2 Socio demographic characterization of mothers/closed-caregivers .....	34
4.3 Sociocultural and food relating factors .....	37
4.4 Environment factors .....	43
4.5. Household economic status of mothers/closed-caregivers .....	46
4.6 Health status of mother/child .....	47
4.6.1 Health status of mother/closed-caregiver .....	47



	Page
4.6.2 Health status of children .....	49
4.7 Nutritional status of children age under-five .....	53
4.8 The Association between socio demographic characterizations of the mothers/closed-caregivers and underweight children age under-five.....	54
4.9 The Association between food relating factors of the mothers/closed-caregivers and underweight children aged under-five.....	58
4.10 The Association between environment factors and underweight children aged under-five .....	63
4.11 The Association between household economic status of the mothers/closed-caregivers and underweight children aged under-five.....	66
4.12 The association between health status of mother/child and the underweight children aged under-five.....	67
4.12.1 Health status of mother/closed-caregiver:.....	67
4.12.2 Health status of children: .....	70
CHAPTER V DISCUSSION, CONCLUSION AND RECOMMENDATIONS .....	74
5.1 Discussion .....	74
5.2 Limitation.....	80
5.3 Conclusion.....	80
5.4 Recommendation .....	82
5.4.1 Recommendation for policy makers: .....	82
5.4.2 Recommendation for further studies:.....	83
REFERENCES .....	84
APPENDIX A: Administration and Time Schedule .....	89
APPENDIX B: Estimation Budget Plan.....	90
APPENDIX C: Anthropometric measurement.....	90
APPENDIX D INFORMED CONSENT FORM.....	96
APPENDIX E Questionnaire .....	97
VITA.....	106

## LIST OF TABLES

Table 1: Socio demographic characterization of mothers/closed-caregivers .....	36
Table 2: Food prejudice and beliefs of the mother/closed-caregiver .....	37
Table 3: Food availability of the mother/closed-caregiver .....	38
Table 4: Food children ate yesterday during the day and night, either separately or combined with other food ....	39
Table 5 Food children ate yesterday during the day and night, either separately or combined with other food: (continued) .....	40
Table 6 Food children ate yesterday during the day and night, either separately or combined with other food: (continued) .....	41
Table 7 Food children ate yesterday during the day and night, either separately or combined with other food: (continued) .....	42
Table 8: Food relating factors (food culture and beliefs).....	42
Table 9: Environment factors (drinking water source, latrine) .....	44
Table10 Environment factors (hand washing practice, shared toilet):(continued).....	44
Table 11: Household economic status (income, expenditure).....	46
Table 12: Health status of mother/closed-caregiver during pregnancy .....	47
Table 13 Health status of <b>mother</b> (chronic diseases before and during the pregnancy of this child) (diagnosis by medical doctor: (continued) .....	48
Table 14: Health status of children (child breastfed) .....	49
Table 15: Health status of children (child illness during last 2 weeks) .....	50
Table 16 Health status of children (breastfed period, complementary feeding and treatment diarrhea): (continued) .....	51
Table 17: Prevalence of malnourished children age under-five.....	53
Table18: Association between socio demographic characteristic of mother/closed-caregiver and underweight children aged under-five .....	56
Table 19: Food availability of mother/closed-caregiver and underweight children .....	58
Table 20 Food availability children ate yesterday during the day and night: (continued) .....	59
Table 21 Food prejudice and beliefs of the mother/closed-caregiver and underweight children aged under-five: (continued) .....	61
Table 22: Toilet facility, drinking water source and hand washing .....	63
Table 23: Household economic status and level of underweight children .....	66
Table 24: Heath status of mother during pregnancy and underweight children.....	67
Table 25: Child breastfed, complementary feeding, child illness and the underweight children.....	70

## LIST OF FIGURES

Figure 1: Conceptual Framework .....	6
Figure 2: Illustrating prevalence of malnourished children aged under-five .....	12
Figure 3: Conceptual framework of malnourished children .....	13
Figure 4: Illustrating grades of oedema .....	20
Figure 5: Visible severe wasting .....	20
Figure 6: Illustrating clinical signs and symptoms of nutrition abnormality .....	20
Figure 7: Z-score:.....	90
Figure 8: Anthropometric measure of height .....	91
Figure 9: Anthropometric measure of length .....	91
Figure 10: Anthropometric measure of weight.....	92
Figure 11: Child growth standards of the boys .....	93
Figure 12: Child growth standards of the girls .....	94

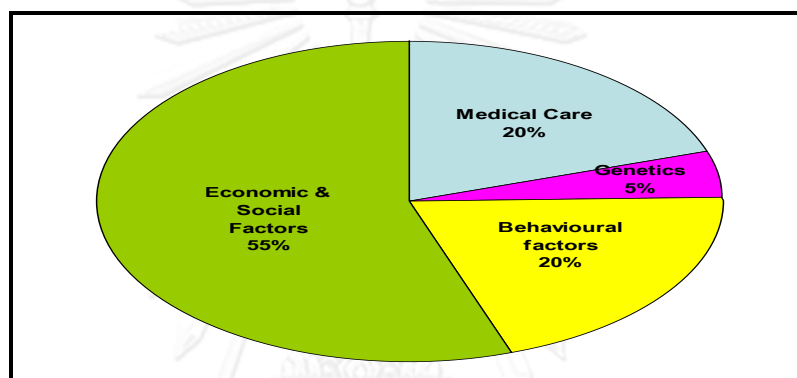
## LIST OF ABBREVIATIONS

WHO	World Health Organization
UNICEF	United Nations Children's Fund
WB	World Bank
MDG	Millennium Development Goals
CMDG	Cambodia Millennium Development Goals
CDHS	Cambodia Demographic Health Survey
ANC	Antenatal Care
PNC	Postnatal Care
MICS	Multiple Indicator Cluster Survey
PMTCT	Prevention Mother To Child Transmission
MAM	Moderate Acute Malnutrition
SAM	Severe Acute Malnutrition
UN	United Nations
NHD	Nutrition for Health and Development
PEM	Protein Energy Malnutrition
ORS	Oral Rehydration Salts
MUAC	Mid Upper Arms Circumferences
IYCF	Infant Young Child Feeding
WVC	World Vision Cambodia
BFCI	Baby-Friendly Community Initiatives
CIMCI	Community Integrated Management of Childhood Illness
CAS	Cambodia Anthropometrics Survey

## CHAPTER I INTRODUCTION

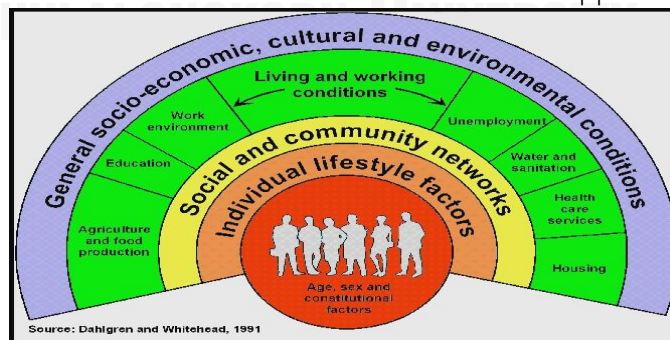
### 1.1 Background and Rational

The sociocultural factors influence health and reproductive health, particularly human development due to the individual access to assets, opportunities and the quality of social relationship that are embedded in cultures. In order to reduce health inequalities need to address the wider socioeconomic and structural factors. Based on the fundamentals of health care reform, economic and social factors are 55 percent influents on health status of the human being.



Source: Sowad, Babara J. *A call to be whole: The fundamentals of health care reform*

Basically, the social determinants affect health outcomes in the conditions that people live and work. Beside this, the sociocultural determinants of health also influence the various levels of individual, household, community, national and international. Further, the sociocultural factors impact the development of a person during the few years of life, education, housing status, access to health services and the quality of those services and discrimination and social support.



Moreover, the sociocultural factors also affect the nutritional status, environmental health, cultural notions and taboo, belief, religion and religious network, social network and traditional medical systems and treatment.

Similarly, the major public health problems are relevant to maternal and child mortality that could be preventable and treatable. In 2012, the major leading causes of death are pneumonia, preterm birth complications, birth asphyxia, diarrhea and malaria and about 45 percent of deaths are linked with malnutrition. Further the report from Lancet malnutrition was identified as the underlying cause of children death at least 3.1 million (The Lancet, 2013). Despite, the malnutrition was associated with more than one third of children death directed the inadequate access to essential nutrition, poor feeding practice, inadequate breastfeeding and complementary food, particular frequent or persistent diarrhea caused to the nutritional status deficiency (WHO, 2013).

### **Global malnourished children**

Globally, there was 20 million of children aged under-five suffered from severe acute malnutrition caused to be serious illness and early death in 2010 (WHO, 2012). In 2011, 165 million children were estimated to be stunted, 101 million were underweight and 52 million were wasted (UNICEF, WHO, WB, 2011).

Basically, the Millennium Development Goal attempts to eradicate by two thirds of children under-five death rate between 1990 and 2015. And A World Fit for Children goal also aims to the reduction of malnutrition and death of children aged under-five by at least one third and continuously effort to decrease by two thirds in 2015 (WHO 2013).

Although, the children mortality aged under-five declined from 12 million in 1990 to 6.6 million in 2011 (UNICEF, 2012). Importantly, there were 10.8 million of children death linked with malnutrition (WHO, 2012).

### **Asia/South-East Asia, malnourished children**

The majority of child mortality before five years of age in low-income country was 18 times higher than in high income country (WHO, 2012).

In Asia, the death of under-five dropped almost half from 82 to 42 deaths per 1,000 live births between 1990 and 2011. And the average annual mortality declined from 1990 to 2011 of 3.2 percent (Vietnam Academy of Social Sciences 2013). Therefore, the malnutrition was accounted for 3.1 million of children death, 52 million of child wasting and 100 million of child underweight among under five in 2011 (UNICEF, 2011).

Unexpectedly, there was 99 percent of under-five deaths occurred in developing countries and three quarters deaths was happened in two World Health Organization regions; Africa and South-East Asia (WHO, 2012).

In addition, South-East Asia, the children mortality under-five was 69 to 29 per 1,000 live births between 1990 and 2011. Though, the prevalence of children 27 percent was stunting and 35 percent was underweight in 2011. Specially, the most children living in the poorest household were twice likely to be underweight. These challenges could cause the major public health recently (UNICEF, WHO, WB, 2012).

Responsively, the proper nutritional feeding significantly contributed to the reduction of children death under-five as well as to achieve the Millennium Development Goals (MDG4). Nevertheless, it was not achieved MDG4 in the global and Asia levels yet because of the malnutrition still attributed 53 percent in 9.7 million of children deaths age under-five each year (UNICEF, 2006).

#### **Cambodian malnourished children**

Cambodia is one of the South-East countries that set the Millennium Development Goal (MDG4) to the reduction rate of children mortality under five by two third from 1990 to 2015. Therefore, the decline from 124 deaths per 1,000 live births in 2000, to 83 per 1,000 live births in 2005 then to 54 children deaths per 1,000 live births in 2010, but it was not satisfactory to achieve CMDG4 (UNDP, 2003). However, the malnutrition still attributed more than 6,400 children deaths each year (Early Childhood Nutrition Fact Sheet-Cambodia, 2011). The government and NGOs pay high attention on children under-five, but it still remains 40 percent of stunting, 14 percent of severe stunting, 11 percent of wasting and 28 percent of underweight.

Moreover, sociocultural aspects associated with malnourished children owing to the traditional and belief of weaning diets and separated child from mother while she went to work during breastfeeding period, which predisposed to be malnourished (Howard, M. 1994). Basically, the malnutrition caused from various factors such as poverty, inadequate utilization and wrong type of food, poor practice and knowledge of nutrition, child diarrhea, acute respiratory infection and micronutrients deficiencies. Importantly, the poorest household that cannot afford to good quality of health care prior to the high cost of services, which led to high incidence of childhood illness (Food Security and Nutrition Cambodia, 2008, 2012).

Mainly, the study revealed with sociocultural and other factors of child malnutrition, it still remains a big gap to know, that's why the researcher is interested in the issue.

### **Preah Vihear province, malnourished children**

Preah Vihear province where is one of the highest prevalence of children under-five death and malnutrition in Cambodia. In 2010, the children deaths was 118 per 1,000 live births and 56 percent of stunting, 8 percent of wasting and 37 percent of underweight (CDHS, 2010).

Significantly, the nutrition for children 6-23 months is very essential for optimal growth and development. And the malnourished children increased dramatically if the occurrence of poor care, lack feeding and persistent infection. Although Cambodia Demographic Health Survey 2010 reported that the prevalence of breastfed children 6-23 months had consumed at least four food groups were 3.3 percent, breastfeeding was 48 percent and milk or milk products was 13.1 percent whilst the non-breastfeeding children had eaten four food groups was 33.5 percent, non-breastfed children was 11 percent, breast milk or milk products was 83.8 percent and only 1.3 percent of non-breastfed children practiced with all three infant and young child feeding (IYCF).

Therefore, the prevalence of mortality and under-five malnutrition remained high across the provinces due to the sociocultural and other factors (CDHS, 2010).

Indeed, the study was interested in malnourished children under-five years of age, but due to the time limited, the study was considered only the underweight children (weight -for-age) because it was responsible for both short and long term transition.

### **1.2 Research questions**

1. What is the prevalence of malnourished children age under-five in Preah Vihear province?

2. What are sociocultural and other factors associated with underweight children age under-five in Preah Vihear province?



## 1.3 Objectives

### 1.3.1 General Objectives

To identify the sociocultural and other factors associated with underweight children age under-five in Preah Vihear province of Cambodia.

### 1.3.2 Specific Objectives

1. To determine the sociocultural and other factors associated with underweight children age under-five.
2. To determine the demographic and economic characteristics associated with underweight children age under-five.
3. To determine the environment factors associated with underweight children age under-five.
4. To find out the food relating factors associated with underweight children age under-five.
5. To determine the health status of mother/child associated with underweight children age under-five.

## 1.4 Study Variables

### Independent Variables

Socio demographic characterization: age/ education/ occupation (of mother)/ number of children/ ethnicity.

Food relating factors: food preparation practices of the mother, food prejudice, food culture and food availability

Environment factors: main source of drinking water for children, type of toilet facility for children

Household economic status: household income, household food expenditure

Health status of mother and child: minimum four ANC visits during pregnancy, history of illness, exclusive and continued breastfeeding, low birth weight child, child illness of diarrhea and respiratory infection.

## 1.5 Conceptual Framework

### Independent Variables:

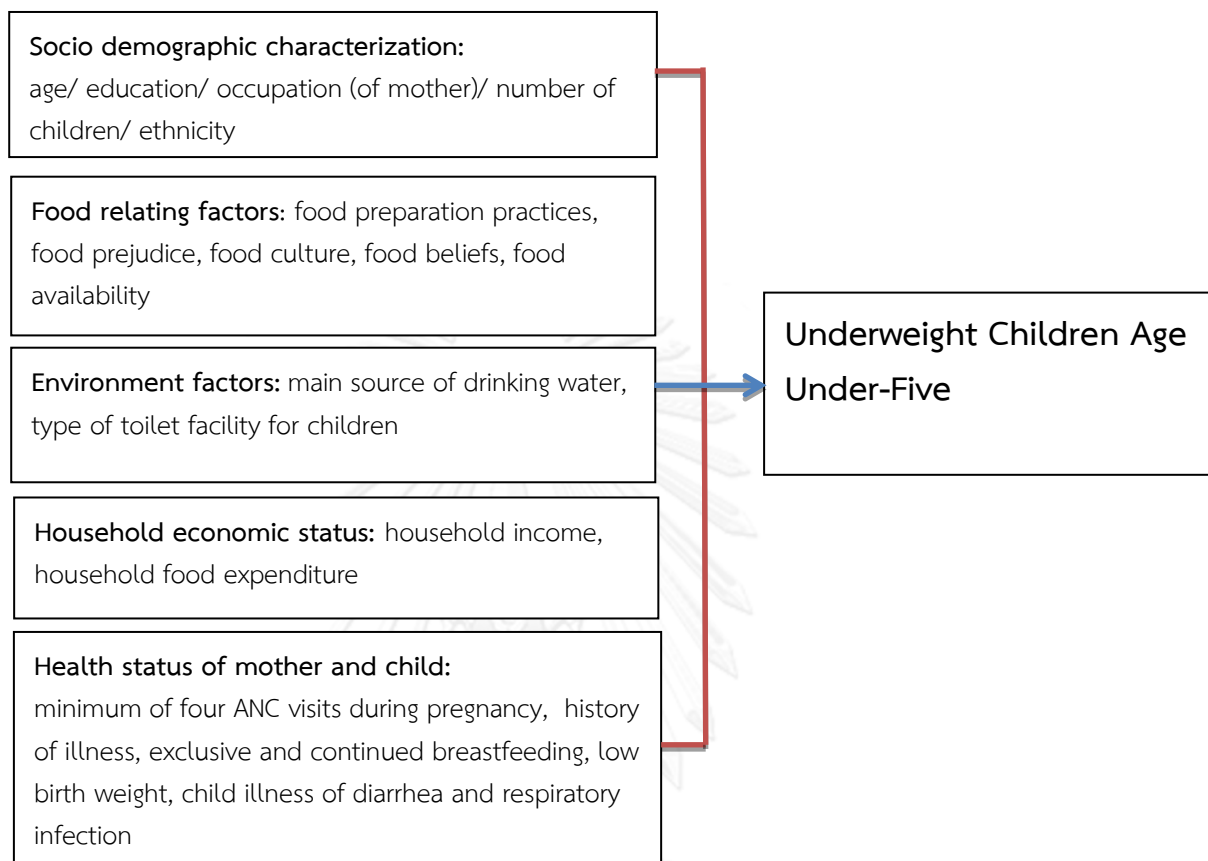


Figure 1: Conceptual Framework

## 1.6 Terminology and Operational definitions

**Malnutrition** defines as children who got undernourished or over-nourished for their optimal growths, therefore in this study were considered only under-nutrition.

**Under nutrition** means the malnourishment resulted from eating insufficient diet and micronutrients or macronutrients deficiencies, persistent infection, which does not able to retain the proper growth. The malnutrition can be classified by weight-for-age (underweight), weight-for-height (wasting) and height-for-age (stunting).

**Underweight** means that the weight of a child is low by comparing to the age. It is indicated by Z-scores (weight for age), it is moderate and severe. If moderate is less than -2SD of the WHO reference value. If severe is below -3SD of the WHO value (WHO, 1997).

**Wasting** reveals rapid weight loss or weight gain and measure current or wasting malnutrition by low weight child compares to the length or height (acute

malnutrition). It is indicated by Z-scores (weight for height), it is moderate and severe. If moderate ( $<-2$  Z cores), a child usually looks thin. If weight for height ( $<-3$  Z cores) is considered acute severe malnutrition. Wasting related to an inadequate of food intake attributes to the increased risk of illness and death. And if moderate acute malnutrition can be treated with supplementary feeding and if severe acute malnutrition are treated with therapeutic feeding of the WHO reference value (WHO, 1997).

**Stunting** means that the length or height of a child is too short compares to the age because the long term effects of poor food consumption. It is indicated by Z-scores (length/height for age), it is moderate or severe. If moderate is less than  $-2SD$  of the WHO reference value (WHO, 1997).

**Z-scores-** based on WHO global data base on child growth and malnutrition uses a Z-scores cut- off point of  $<-2$  standard deviation (SD) can be classified low weight-for-age, low height-for-age, and low weight-for-height as moderate malnutrition and  $<-3SD$  to define severe malnutrition. And the cut-off point of  $>+2SD$  can be classified high weight-for-height as over weight for children (WHO, 1997).

**Child age under-five** refer to children age 0-59.9 months (UNICEF, 2013).

**Anthropometric measurements** define as the physical dimensions of a child aged under-five include length, height and weight. And the Z-score value is an indirect instruments using to assess the body's growth (Faber & Wenhold, 2007).

**Nutritional status** means the proper physical growth with the satisfactory food supplies and nutrients without exposure to persistent illness for the overall health (MICS, 2006).

#### **Socio Demographic Characteristics:**

**Age** refers to the mother's age in year at the interview date.

**Education** refers to the mother's level of education from the lowest to highest. It will be categorized into five aspects: 1: no schooling, 2: primary school, 3: secondary school, 4: high school, 5: college and 6: other.

**Occupation** refers to the mother's career at the interview date.

**Number of children** defines as the number of living children that the mother has at the time of interview.

**Ethnicity** defines as the group of people who share their common and diverse cultures, religion, customs, beliefs, languages and their traditions. The ethnic groups are *Phnomg, Kuy, Steang, Tompoun, Kreung and Jarai* in this study.

**Sociocultural Factors** are the indicators that distinguish the major differences between groups of people in a society such as education, income/occupation, ethnicity/race, religion, political affiliation and geographic region. There are many cultures in a society and social inequalities span across the cultures. In this study sociocultural factors consider on food culture, food beliefs, food prejudice, food availability, food preparation and food culture of the household.

**Food preparation practice** is food prepared hygienically after washing hands, vegetables, meats and ingredients are safe and served hot. And the prepared complementary food for child needs iodine salt for cooking and three food group mixture. The complementary food for child age 6 months should be softly and nutritionally (Subba Rao, Sudershan, Rao, Vishnu Vardhana Rao, & Polasa, 2007).

**Food prejudice** means preconceiving decision, idea and opinion without sufficient reasons or knowledge. Therefore, it has another meaning of disregard or rejects of the right judgment from a particular group, race and religion (Merriam Webster, 2013).

**Food culture** refers to the food sources are sparingly consumed and given to the children. It is mixed of food taboos and beliefs in which are dangerous for the child growth.

**Food availability** refers to the availability of adequate food amounts with appropriate quantity and it was produced by local people.

**Environment factors** in this study will focus only the main source of drinking water and type of toilet facility for the child under five years of age.

Household Economic Status:

**Household income** refers to the income earns by the family members at the interview date.

**Household food expenditure** means that the monthly expenses by the family members for eating out food and food eating at home.

Heath Status of mother/child:

**Antenatal care** means that received care at least four visits during pregnancy. The pregnant women will be screened for dangerous signs and complications. And

the pregnant women also received iron tablet, a dose of de-worming, tetanus toxoid injection and diet counseling (CDHS, 2010). Further the minimum of four ANC visits shall be initiated early after missed-period and then continued checkup within 16 weeks, 28 weeks and 32 weeks if there is no complication and dangerous signs happened (National Center for Health Promotion, 2009). And each visit should include four main categories of care such as,

**First visit:** initiate early after missed-period to ensure the gestation and to identify pre-existing health conditions includes check for weight, anemia, hypertension, syphilis and HIV as well as receiving 60 iron tablets and counseling on diet.

**Second visit:** initiate within 16 weeks to early detection of complications happened during pregnancy such as check for eclampsia and gestational diabetes and then obtaining 2 dose of deworming tablets and tetanus injection.

**Third visit:** initiate within 28 weeks for health promotion and disease prevention such as tetanus vaccine, prevention and treatment of malaria, nutritional counseling and receiving 30 extra iron tablets and other micronutrient supplements as well as family planning counseling.

**Fourth visit:** initiate within 32 weeks to birth preparedness and complications prevention such as birth and emergency plan, breastfeeding counseling, antiretroviral therapy for HIV positive women and reducing mother to child transmission (PMTCT).

**History of illness** refers the history of pregnant women and families with chronic diseases include diabetes, hypertension, heart diseases, anemia, thalassemia and others that cause complications to mother and newborn.

**Breastfeeding** defines as exclusive and continued breastfeeding.

**Exclusive breastfeeding** means that the infants received only breast milk and vitamins, mineral supplements or medicine in the 24 hours prior to the interview.

**Continued breastfeeding** aims to continue breastfeeding the child to two years or beyond because the breast milk provides nutrients and protects children against infection.

**Low birth weight** means that a baby whose birth weight is less than 2,5 kilogram. The baby was smaller than average and it is more likely to be higher risk of early childhood death (UNICEF, 2013).

**Child illness** refers to diarrhea and respiratory infection that enable an increasing level of the malnutrition among children (CDHS, 2010).

### 1.7 Conclusion

This chapter describes about the situation of malnourished children in the global and Cambodia, particularly Preah Vihear region. The various types of malnutrition were discussed. The study also illustrated the factors associated with malnourished children aged under-five as well as the global situations are relevant the issues. Furthermore, the research title, questions and objectives were considered.



## CHAPTER II

### LITERATURE REVIEW

This chapter consist various types of malnutrition, sociocultural factors and cause of malnutrition, consequences and the conceptual framework. And the prevention, control, treatment of malnutrition and WHO recommendation on child nutrition is focused.

#### 2.1 Malnutrition

Malnutrition defines as a bad nutrition due to inadequate or oversupply of food and wrong types of food as well as the body responses to prolonged infection that resulted in poor absorption of nutrients or the ability cannot use nutrients accurately to retain health (UNICEF, 2013). There are two ways assessing malnutrition; nutritional status with the means of anthropometric measurements of weight, length and height. Importantly, the height measurement is determined for two years old children or older. And the measurement of length is determined for children are less than two years by comparing with the WHO reference population (WHO, 2010). Malnutrition is a wide term describes under-nutrition included underweight, wasting and stunting and the micro/macronutrients deficiencies such minerals and vitamins. However, the over-nutrition (overweight) will not consider in this study (UNICEF, 2013).

#### 2.2 Type of malnutrition

##### 2.2.1 Under-nutrition

The under-nutrition results from insufficient food intake to meet the dietary energy requirements (growth failure) and poor absorption of nutrients consumed and commonly resulted in loss of body weight (micronutrients malnutrition).

Acute malnutrition: wasting (thinness or nutritional oedema) because the increase weight failure to enlarge child weight. It can be moderate and severe. Wasting is more likely associated to child death due to the shortage of protein and energy malnutrition including inadequate minerals and vitamins, which cause to body fats and muscle tissues loss.

Moderate Acute Malnutrition (MAM) has also known as wasting, weight for height Z-score below -2SD of the WHO standards.

Severe Acute Malnutrition (SAM) has also known as severe wasting, weight for height less than-3SD of the WHO standards.

Chronic malnutrition: stunting is a consequence of lack nutrition intake for a long period of time and it can be higher risk of diseases. Stunting presented by the growth with inferior height in compares to the average for the child's age. It is associated with longer-term nutrition deficiencies and the exposure to repeated infection.

Acute or chronic malnutrition-underweight is mixed results of wasting and stunting that associated with deprived growth and development.

Micronutrients deficiency defines that the nutritional condition is malfunctioned due to the falling intake and inadequate consumption of one or more vitamins or minerals (UNICEF, 2013). Micronutrients absence included vitamin A, iron, iodine and the other micronutrients.

**Figure 2: Illustrating prevalence of malnourished children aged under-five**

Regions	Child Aged Under-Five Percent 1990-2011		
	Underweight-moderate & severe	Stunting-moderate & severe	Wasting-moderate & severe
Sub-Saharan Africa	21	40	9
Eastern and Southern Africa	18	40	7
West and Central Africa	23	39	12
Middle East and North Africa	8	20	9
South Asia	33	39	16
East Asia and the Pacific	6	12	4
Latin America and Caribbean	3	12	2
Least Developed Countries	23	38	10
World	16	26	8

Source: UNICEF, 2013

In this figure demonstrates the prevalence of children underweight, wasting and stunting by specified regions. Between underweight and stunting are 16 percent and 26 percent respectively in the world. In the studies of South Africa, at the national level children between aged one to nine year-old has seen one in five children got

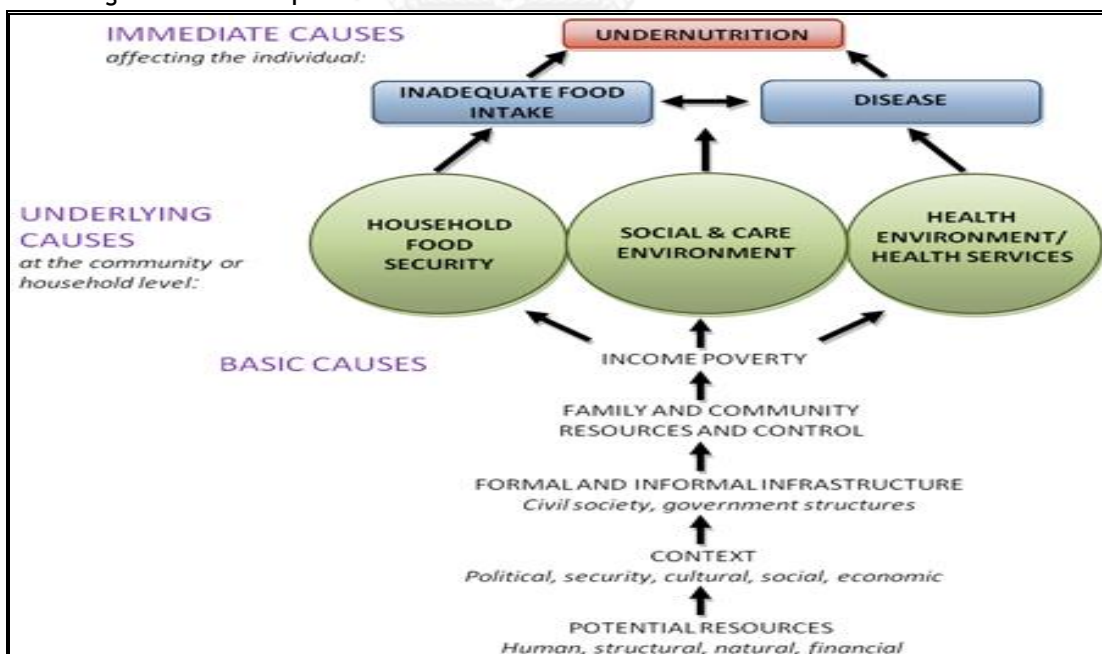


stunted was normally affected their nutritional status. The study also determined that the child living in urban were the least affected. Therefore, based on the similar research, underweight was affected among one in ten children (Labadarios et al, 2005; Labadrios et al, 2008). Preah Vihear of Cambodia, the Millennium Development Goals aims to eradicate extremely poverty and hunger, which was set to achieve in 2015. And the indicator of this success is to expand the proportion of citizens living with income is less than one dollar per day. In 2010, the proportion was 25 percent that describes the decrease number of people living under the national poverty line, 31 percent in 2005. Moreover, children were underweight by age under-five declined between 2005 and 2010 from 36 percent to 29 percent. Generally, 11.3 percent of children bearing age five year and younger got undernourished in 2010, 28 percent was stunted, 10 percent was wasted and 13 percent of the whole populations were underweight (United Nations, 2010).

### 2.2.2 Over-nutrition

The over-nutrition refers to the consequences of more nutrients and food supplies than the need for normal growth. It will enable to be overweight and link with higher risk of diseases such as cancer, hypertension and diabetes.

Figure 3: Conceptual framework of malnourished children



Source: conceptual framework for under-nutrition UNICEF, 1991

Basically, UNICEF created the several types of conceptual framework, which applies into different causes of child malnutrition. This framework organized as basic, underlying and immediate causes.

The underlying causes to malnourished children in this framework are relevant communities and households structures. There are household food security involved in sustainable food production, access to safe food and quality. And it also determines the sustainable access to safe food with adequate quality and amounts to adequate consumption and better health of the household. Therefore, food security is food either available or accessible from the household not only be in the market (UNICEF 1991). And the household also need sufficient food consumption with the adequate balance of fat, protein, carbohydrate and micronutrients. Moreover, the social and care environment encompass with safety, protection, security and participation. Another health environment and service refers to the health service providers, availability of services and affordability from health care seeker.

The last immediate causes of malnourished children are inadequate food consumption and diseases. The malnourished children because the insufficient dietary intake then easily became susceptible to infections such as diarrhea, respiratory infection, measles and malaria and later on, the situation of malnutrition carry on to worsen (UNICEF, 1991). The death of malnutrition is relevant to the indirect causes while the malnutrition occurs (Food Security, 2010).

The basic causes are a wide range factors that attributes to malnutrition such as potential resources-human, structural, natural and financial aspects. And the other contexts include political, cultural, social and economic perspectives which influence the nutritional status deficiencies. Importantly, regarding to the families and community resources controls defines as the lack of participation from household and community leaders to sustain the community resources and increasing profit but the contexts leading causes of the income crisis of self-employment, household assets, remittances and pensions (UNICEF, 1991). Though, when the basic causes of under-nutrition are to be addressed, greater and better-targeted resources and better collaboration are needed.

### **2.3 Sociocultural factors associated with malnutrition**

Sociocultural factors in this study comprise food preparation, food prejudice, food availability and food culture.

Sociocultural factors, the studies in India, associated with the major risks of food disease. There was 65 percent of mothers believed that diarrhea caused by the casting of evil eye, 44 percent of indigestion, 10 percent of eating hot foods like mango and egg, 8 percent of teething and 35 percent of given food while breastfeeding. Other mother complaints their breast milk caused to diarrhea (Y. Motarjemi et al, 2002).

The studies in Vietnam, the belief of ethnic minorities prior to the malnourished children aged under-five, 29.3 percent was underweight, 28.3 percent was stunted and 10.0 percent was wasted because 27.3 percent of mothers have already disposed their colostrum substances and another 21.3 percent of children were given chewing rice before breastfeeding. Further, the exclusive breastfeeding child from four months onward was only 17.8 percent and exclusive breastfeeding for six months up was 8.6 percent. Another weaning child before four months was about 53.7 percent. There was associated between malnutrition and the ethnic mothers as well as the frequency of consumption of protein rich food (Le Thi Huong & Vu Thi Thu Nga, 2013).

The studies in Adamawa state of Nigeria, sociocultural factors associated with malnourished children under-five years of age over one thousand whom living in the villages and town of northern Nigeria. It illustrated that about a third of the children were malnourished, especially female children due to the weaning diet and inadequate supplementary food (Nutrition Health, 1998).

Another study in Zambian culture, a boy needs to eat food with a father. While eating with father may get less food than the female child who always stays with mother, she may pass on whatever she has herself through the day. Furthermore, the boy may expense more energy because of playing, which could attribute to the higher prevalence of malnutrition in the boy than girl (Rudatsikira, E. et al, 2011).

According to the study about beliefs and attitudes around infant and young child feeding in Kenya, the prelacteal feeding is given due its culture. However, some people believed that mother breast milk is just water and light. Thus feeding the child with food before age 6 months mean that the child was not neglected (Kenya, 2011 ).

The study of complementary feeding of young child in developing countries, it has indicated about the report of Mali, the mother believed in control amount of

food child eats, for example, the child's hunger or interest in food should be strict the amount of food given (Detrveller, 1987 ).

However, in this literature review there was no previous study in Cambodia and Preah Vihear province related to sociocultural factors linked with malnutrition.

## **2.4. Major Causes of malnutrition**

### **2.4.1 Common causes of malnutrition**

Poor diet intake: when a person intakes inadequate and wrong type of food as the body needs including lack of nutrients for growth and development (Medical News Today, 2013).

Mental health problems: if a patient has mental health illness such as depression and anorexia nervosa due to changing eating habits and reject eating food.

Bulimia nervosa: eating disorder due to large amounts of food and lack of control over eating. Etiology of BN implicates with bio-psychosocial predisposed patterns such as depression, sociocultural factors, which emphasizes high achievement, particularly promoting instability and lower self-esteem (Wilson et al, 1993).

Mobility trouble: the people are not able to find and get adequate dietary intake commonly.

Digestion and stomach conditions: the absorption of nutrients cannot supply to the body needs due to ulceration of colitis, cutting off of small intestine and serious diarrhea or vomiting constantly (Medical News Today, 2013).

### **2.4.2 Causes of malnutrition in developing countries**

Food shortage: the poor developing countries due to a lack of technology which yielded in agriculture such as nitrogen fertilizers, pesticides and irrigation.

Food distribution and price: precisely 80 percent of child underweight in developing regions due to producing food surpluses and agriculture.

Lack of breastfeeding: the infants and young children are predisposed into malnutrition because of the mothers strongly trust that bottle feeding is better and appropriate for child health. Also, the mothers wean their children from breastfeeding due to breast pain and discomfort (Medical News Today 2013).

In conclusion, there are many factors linked with malnutrition; inadequate care practice, inappropriate breastfeeding, insufficient complementary feeding, poor hygiene and sanitation and lack of nutrients intake. The problems from lack of feeding and care practice from caregivers can attribute to the malnutrition and infection (UNICEF, 1991). Further causes of malnutrition due to inaccessibility and unaffordability to the quality of food and food prices that caused household food insecurity. And the malnutrition may link with poverty, micro/macronutrients deficiencies, economic crisis, food culture and poor quality of agricultural productions.

Although, the study in Vietnam, malnourished children are relevant to the belief of ethnic people in discarding mother breast milk, given only rice to their infants and early weaned children at four months old. Another study in developing countries, malnourished children prior to food availability because of the food prices was higher and the household was unable to access good food quality. Also, some studies in Nigeria, child malnutrition related to poor weaning and inadequate supplementary foods intake because of their cultures and belief for infants feeding.

## **2.5 Consequences of malnutrition**

Pregnant women and lactating mothers prior to the deficiencies of folic acid, calcium, iron, ionization of salt, protein energy malnutrition and vitamin A caused to anemia, maternal death, night blindness, low birth weight and higher risk of death of the fetus (NHD, WHO, 2001).

Intergenerational cycle, because of the protein-energy malnutrition, vitamin A, iron and calcium deficiencies, it may result of continuum passed on children in the following generation (NHD, WHO, 2001).

### **Another result of malnutrition through life span:**

Embryo or fetus for the restriction of intrauterine growth, iodine deficiency disorder and folic acid deficiencies, which caused to low birth weight, brain damage, neural tube defects and stillbirths.

Neonatal malnutrition related the iodine deficiency disorder, low birth weight, which caused to growth and development failure, brain damage and anemia.

Infant and young child was falling of protein energy, iodine deficiency disorder, vitamin A loss, iron deficiency and anemia, which caused to severe malnutrition, optimal growth restriction, and higher risk of infection, child anemia and death.

Nutritional food is essential for child health, particular the first 45 months that is the nine prenatal months plus the first 3 year of child life (WHO, 2001).

Fetus or neonatal has health better due to the health and well-being of mother during pregnancy. If the mother was severe malnutrition attributes to a low birth weight baby. The most of malnutrition is invisible such as protein energy malnutrition. The children may lose their futures, potential of individual and live for the whole life span.

The vulnerable infants and children need breastfeeding for their optimal growth because the breastfeeding can prevent baby all kind of infections, resistance to diseases, psychological development and survival infancy. The malnourished children caused by deficient vitamins and fortified food may attribute to be weak adult and transmit to next generation. Basically, the appropriate complementary feeding with additional breast milk is substantial for optimal growth in children.

The maternal health during pregnancy and breastfeeding is vital importance for her and newborn. The increasing intrauterine growth restriction is a public health alarm because the mother is in the high risk of malnutrition and infection, which may inherit to later generation.

Breadwinners, if they were falling ill, their families may became to poverty, which determine the serious circle of malnutrition. It was estimated almost 46 million years of productive life were lost prior to four aspects of malnutrition include stunting, iodine, iron, and vitamin A deficiencies.

To sum up, the consequences of malnutrition are relevant to long term effect of disease, poor cognitive development and psychological performance. Furthermore, the child become growth failure and delayed motor development as well as increase risk of chronic disease in adult such as diabetes and cardiovascular disease. Though, the malnutrition in children may have higher risk of infection, morbidity and mortality (WHO, 2009). And the contributing factors are relevant to poor breastfeeding, inadequate food amounts or lack nutrients intake as well as given too early of cultural food (Adoption Nutrition, 2013). The malnutrition and hunger is linked about 60 percent of child death (UNICEF, 2007).

## **2.6 Signs and symptoms in malnourished children**

Growth is falling at normal rate of weight and height

Irritability is an extreme crying with behavior change such anxiety and poor attention is common

Skin is dry and flaky include hair may turn dry, dull and straw appearance, plus hair loss.

Muscle is wasted and weak.

Swollen abdomen and legs are due to the poor strength of muscle. Legs are swollen because the lack essential nutrients that is visible in severe malnourished children.

### **Protein energy malnutrition (PEM) in children:**

Marasmus is visible weight loss in wasted muscle because of little or no fat beneath skin. Another skin folds are thin and the face appears pinched. Hair is sparse or brittle.

Kwashiorkor is hair change color to red, grey or blonde. Face is round with swollen abdomen and legs. Dry skin and dark with splits or stretch marks like streaks where stretched.

The clinical techniques for assessing nutritional status by check signs at specific places on the body and ask the parents whether any symptoms that may suggest for nutrients supplementation. The signs include pallor on palm of the hand, conjunctiva of the eyes, Bitot's spots on the eyes, pitting oedema, goiter and severe visible wasting (these signs are explained below).

### **Check for bilateral pitting oedema in children:**

In order to determine the presence of oedema, you should apply normal thumb pressure on both feet for three seconds (count the numbers 101, 102, 103 to estimate three seconds without a watch). If a shallow print persists on both feet, then the child has nutritional oedema, so-called pitting oedema. You must test for oedema with finger pressure because you cannot tell by just looking.

### **Grades of oedema:**

The oedema is the water and sodium retention in the extra cellular spaces, which is responsible for 10-30 percent of the bodyweight, yet the severe Kwashiorkor can be 50 percent of proportion. There are three grades of bilateral pitting oedema. The grade is classified:

**Figure 4: Illustrating grades of oedema**

Grades	Define
Absent	Absent
Grade +	Both feet or ankles: mild
Grade ++	Both feet plus lower legs, hands and lower arms: moderation
Grade +++	Bilateral pitting oedema such as feet, legs, arms and face: severe

Source: UNICEF, 2008

Goiter is a swelling on the neck because the lack iodization of salt intake.

#### Visible severe wasting:

Determining the presence of visible severe wasting in children below 6 months, you need to ask the mother to remove the children's clothing so you can look at the arms, thighs and buttocks for loss of muscle bulk. Sagging skin and buttocks indicates visible severe wasting.

**Figure 5: Visible severe wasting**

Source: Ethiopian Federal Ministry of Health, 2010

**Figure 6: Illustrating clinical signs and symptoms of nutrition abnormality**

Signs and symptoms	Nutritional abnormalities
Pale: palm, conjunctiva, tongue	Anemia: the deficiencies of iron, folic acid, vitamin B12, copper and protein or vitamin B6
Get tired easily, lost appetite, shortness of breath	
Bitot's spots: whitish patchy triangular lesions on the side of the eye	Vitamin A deficiency
Goiter: swelling on the front of the neck	Iodine deficiency disorder

Source: UNICEF, 2008

#### Dietary methods for nutritional status assessment:

The assessments include looking at the past or current nutrients intake by individual or group determining their nutrition. You also can ask the families or the mothers, what the child has eaten during the past 24 hours and then take this data for dietary score calculation.



Dietary variety can measure the number of food group consumed over a period, normally 24 hours. Basically, there are six food groups that the body needs every day.

The symptoms of lack vitamins: the inadequate micronutrients intake include vitamins and minerals, there will become in malnutrition that can be expressed through; normal body mass index (BMI), problems of skin and hair, swollen tongues, sores is surrounded the corners of mouth, poor vision at night, breathlessness and anemia. And for the severe malnourished children may become behavioral development and mental retardation. Even they are treated but it will be prolonged effect for the rest of life.

## **2.7 Prevention and control of malnutrition**

Generally, the malnutrition caused from poor nutrients intake that can detect by given appropriate amounts of fruits, vegetables, milk products, oils, meats and beans timely. There are three types of prevention following,

### **Primary prevention (Ray, A. 2011):**

- Provide the education to mothers on essential nutrition and hygiene
- Provide iron and vitamin A supplements
- Promote on essential breastfeeding
- Improve household income
- Educate family on birth spacing
- Improve family food consumption

### **Secondary prevention by early diagnosis and treatment (Ray, A. 2011):**

- Control nutrition surveillance
- Early screening for any growth failure
- Treatment of infection such as diarrhea
- Initiate supplement feeding programs for epidemic period
- Deworm regularly to school children

### **Third prevention (Ray, A. 2011):**

Provide rehabilitation nutrition services through seeking hospital for care, treatment and regular follow up case. The other prevention of malnutrition from the best practice principle and implementation guide, a local community approach 2013 through:

Raise awareness through families and health workers' education to prevent and treat malnutrition, particular dehydration case.

Collaborate in order to work and improve the communities through the organization framework.

Identify early malnutrition prevalence in the community.

Provide support on care and treatment every malnourished child.

Further preventive methods of acute malnutrition from actions against hunger international 2013 include Ready to Use Food for children discharged from therapeutic care in the community. Prevention can save millions of child life.

**WHO, UNICEF, World Bank recommends on feeding patterns, Vietnam MICS 2011:**

Education on breastfeeding both exclusive and continued breastfed from 6 months to two years onward, it could save 1.3 million lives of children.

The World Bank would suggest about the solution of malnutrition, the best way for all nations is to eliminate the poverty by leading economic growth, thus increasing money to access food in the market (Wikipedia, 2013).

Initiate early breastfeeding and continue exclusive breastfeeding till six months

Appropriate, adequate and safe complementary feeding started at 6 months sharp.

There was number of complementary feeding from two times per day from 6-8 months and three times per day from 9 to 11 months.

**The other recommendations on initiative breastfeeding within one hour of birth, the indicators of feeding patterns (Vietnam MICS, 2011),**

Initiate early breastfeeding within an hour of birth

Maintain exclusive breastfeeding rate below 6 months

Predominant breastfeeding rate below 6 months

Continuous breastfeeding rate until 1 year and up to 2 years

Duration of breastfeeding

Appropriate breastfeeding was from 0-23 months

Introduce solid, semi-solid and soft foods at 6-8 months

Minimum meal frequency 6-23 months

Milk feeding frequency for non-breastfeeding child from 6-23 months

Bottle feeding from 0-23 months

## 2.8 Management and treatment of malnourished children

World Vision International 2008 suggested that the community management of acute malnutrition is the best approach to improve and reduce the death.

Community based treatment: the malnourished children will be treated and cared in their communities and allowed their family members involved and continue to work normally without accompany for treatment. The more success is from the community participation into the program.

Active case finding: assisting health volunteer screen and monitor regularly for young child, then the malnourished children are detected and treated effectively.

Triage approach: the most of severe acute malnourished children can treat at home rather than in the hospital. But severe medical conditions need referring to the hospital and send back to their communities immediately.

Building community capacity: this can be managed and detected acute malnourished children because the communities may have their ownership in prevention, participation and treatment.

**Nutrition for Health and Development (NHD, 2001) suggests for detect nutrition hazard:**

Prevention of mental retardation by increase given iodization of salt

Vitamin A supplement and dietary intake can detect childhood blindness and save life.

Increase protein energy and proper breastfeeding can reduce millions of infant death worldwide.

**The other concepts from NHS-UK, 2013 for malnutrition treatment:**

Malnutrition in childhood can be treated by increase complementary nutrient intake, which contains a high energy and protein. But, the severe malnourished children need to be cared and treated, plus extra feeding and rehydration (NHS-UK, 2013).

**International Medical Corps 2013 recommends for detective malnutrition:**

Malnutrition may cause by direct and indirect prior to the inadequate feeding, poor care practice and infection. International Medical Corps suggests for detective malnutrition by education mothers/caregivers on nutrition, breastfeeding and good feeding practices in the communities (International Medical Corps, 2013).

**WHO recommends for severe acute malnutrition management:**

WHO recommends the communities and health volunteers given therapeutic food because this scheme has been implemented in Africa, South-East Asia and Western Pacific regions.

Increase community base management of severe acute malnutrition before referring child to the hospital for therapeutic food and medication. The Ready to Use Therapeutic Food can be also used and managed for many severe malnourished children age over 6 months without complications (WHO, 2013).

**WHO recommends the products used in the treatment of dehydration and acute malnutrition:**

Oral rehydration salts (ORS) is used for increase fluids loss (dehydration), so-called rehydration.

Resomal is a rehydration solution for malnutrition, which provides more potassium and glucose with less sodium. It is only used for severe acute malnutrition.

RUTF is a ready to use therapeutic food, which contain highly energy, minerals and vitamins with large nutrients for under-nutrition treatment.

BP100 is a ready to use therapeutic food that is used for severe acute malnutrition management.

CSB++ is a corn soya blend plus plus which has fortified mixed food containing of corn, soybeans, vitamins and minerals for moderate acute malnutrition management.

Micronutrients are consisting vitamins and minerals that are essential for optimal health.

MNPs-multiple micronutrient powders are used for children aged 6-24 months, for example Sprinkle which contains 15 types of micronutrients.

**2.9 Anthropometric measurements (WHO, UNICEF, 2011)**

The anthropometric measurements illustrate the nutritional status of children and the living conditions of households in the communities. Basically, poor nutritional conditions associate with insufficient and poor dietary intake and persisting infections. The malnutrition caused to be higher risk of morbidity and mortality. Furthermore, the measurements of weight and height of child's age and sex were used to find out three indicators of nutritional status in children: 1) weight for age, 2) weight for height and 3) height for age. Importantly, each of three nutritional

indicators is determined as standard deviation units (Z-scores) from the median of the reference population value recommended by the WHO.

Height for age is a measure for linear growth and is determined cumulative growth failure. It is caused by prolonged nutritional status and chronic childhood illness effects. Children are falling  $<-2SD$  from median, which is defined as short for age (stunting) and chronic malnutrition. And the children are  $<-3SD$  from the median are defined as severe stunting.

Weight for height describes the current nutritional status by compared body mass to body height of the WHO value. It is an essential measurement for the children who are falling  $<-2SD$  which is recognized as wasting and if the children are falling  $<-3SD$  is recognized to be severe wasting. The weight for age determines a short change in nutritional status and repeating illness. And the effectiveness of using instruments can identify the current food consumption.

Weight for age illustrates if the children are underweight because the short and long term effects in nutritional status. And if the children are  $<-2 SD$  from the reference population values are considered as underweight and if children are  $<-3SD$  are considered as severe underweight.

Anthropometric Measurements are quantitative techniques for measuring and analyzing body sizes includes:

Weight is presented in kilograms (kg)

Height is presented in centimeter (cm), measured when the child is in standing position and child aged from two years onward.

Length is presented in centimeter (cm); measured when the child is lying down, usually up to two years old.

Weight for height describes a child's weight compares to the weight of a child of the same length or height and sex in the WHO reference values. It is used to determine Wasting.

Weight for age describes a child's weight compares to the weight of a child of the same age and sex in the WHO reference values. It is used to determine Underweight.

Length or Height for age describes a child's length or height compares to the length or height of a child of the same age and sex in the WHO reference values. It is used to determine Stunting. It can be illustrated a low height for age also known as short for age. Stunting is an indicator of growth hazard due to the chronic

malnutrition in a prolonged time. If height for age Z-score  $<-2$  the child is stunted (chronic malnutrition).

This study will consider anthropometric measurements of the WHO reference to identify the nutritional status of children.

### **2.10 Sociocultural factors associated with malnutrition in Preah Vihear province**

Preah Vihear province where is one of the 23 provinces of Cambodia. It borders with the provinces of Oddar Meanchey and Siem Reap to the west, Kampong Thom to the south and Stung Treng to the east. It also has a boundary to the northern between Thailand and Loas international border. It has a capital called Phnom Tbeng Meanchey. The total populations are 166,975 (male 82,321, female 84654), with 36,309 households and the total of children aged under five are 27,589 (male 13,848, female 13,750) (Ministry of Planning Report, 2010).

The majority of inhabitant's occupations are farmer, agriculturist, animal husbandry, fishery, grocery, teacher and NGOs staff. And the population race is Cambodian and Buddhism as their religion with their main languages, Khmer. Further, there are the ethnic groups such as Phnong, Kuy, Steang, Tompoun, Kreung and Jarai living in some regions of the province (Ministry of Planning Report, 2010).

Based on the studies from World Vision Cambodia in Kandal province, where the similar region to Preah Vihear indicated that,

There were 89 percent of children 6-8.9 months received complementary feeding during the preceding day and 87 percent consumed solid foods along with breast milk. And the most of pregnant women had least ANC visit and only 28 percent increased extra meal during pregnancy. Therefore, about 13 percent of women decreased food intake due to the popular myth of a lower birth weight baby is easier to delivery (WVC survey, 2011). Another 53 percent of the childhood death was linked with diarrhea caused by malnutrition.

In Cambodia, food is the most important part of their life and there is a common saying that Khmer life is centered family, faith and food. The white rice takes roles as a main staple food for all families in Cambodia with additional favorite's fish, stir fried vegetables include eggplant, cauliflower, broccoli, string-beans, sweet potatoes and pumpkin. Cambodians prefer fish dishes more than meat.

Therefore, rice and fish dishes play a key role in Cambodian diet. And for Cambodian Elders prefer their own ethnic food than new cultural food because they

are not very comfortable tasting. During the meeting and other ceremonies, it is important to provide them with their own ethnic food because they thought their own ethnic food is a very important aspect of their life. Among Khmer Elders, rice porridge and sour fish soups are popular for themselves and their children.

Beside this Khmer culture believed that the pregnant mother may drink homemade rice wine and herbal medicines that thought to be healthy baby and they avoid taking shower at night and drinking milk during pregnancy because they believed these will make the baby fat and difficult to deliver (Cambodian cultural profile, 2008). Additional Khmer traditions, the pregnant women also respects variety of food taboos and avoid some situations; specially the people in rural areas in Cambodia.

Moreover, Cambodians categories the food into the two elements such as hot and cold. According to them these food elements can be hot or cool the body. For instance, they consider fruits and vegetables are cold natured. They believe the body functions in a delicate balance between two opposite elements which are hot and cold therefore an excess of hot or cold elements could disturb body and can cause illness or health related problems.

In Cambodia, women play a key role in preparing the food for their families; especially, food for their children. And the most of men thought that food preparation and feeding children is a women's job. Further the majorities of Khmer elderly women enjoy preparing and feeding child by their own meal rather than child meal such white rice with sauce, chewing rice with salt or rice with watery soup without mixed three food group such as protein, oil, vegetables and other nutrient sources during the day (Cambodian cultural profile, 2008).

To intervention and detection children malnutrition, there are many NGOs are implementing maternal child health and nutrition activities in Preah Vihear province include, child growth monitoring, cooking demonstration, formed baby-friendly community initiatives (BFCl), promote hygiene and sanitation, community integrated management of childhood illness (CIMCl), vitamin A, deworming and world breastfeeding campaign, promote sprinkle (micronutrient powder), screen for acute malnutrition in child 6-23.9 months, educate mothers/caregivers on nutrition, increase fully immunization for children, and promote iodization of salt for household, enhance ANC/PNC visits for pregnant women.

More importantly, there are some basic strategies and policies from the Royal Government of Cambodia set to achieve the Cambodia Millennium Development Goals (CMDG) (UNITED NATION, 2003) through,

Increase socioeconomic growth and reduce poverty that can sustain economy by expanding job opportunity, improve health care, nutrition and education program.

Promote social and cultural aspects for the poor access to education, health, water and sanitation and empower them.

Increase basic healthcare services coverage, strengthening and developing more human resources, attention on child health care and nutrition, introduce and value the culture aspects in the public health as well as increase health information to the public. Unfortunately, the sociocultural factors associated with malnutrition there was no previous study in some areas of Preah Vihear province, Cambodia.



## CHAPTER III RESEARCH METHODOLOGY

### 3.1 Introduction

This chapter consists of the research methodology include study design, study area, study population, sampling technique, sample size calculation, research instruments, data collection and data analysis, which was used to accomplish the study objectives. Further, the research considers the socio demographic, food relating factor, environment factor, household economic, and health status of mother/child and then the assessment of child nutritional status.

### 3.2 Research Design

It was a cross-sectional study to find out the association between sociocultural and other factors associated with underweight children age under-five in three sub-districts of Preah Vihear province. Based on Cambodia Demographic Health Survey 2010, the prevalence of under-five children was (56%) of stunting, (8%) of wasting and (37%) of underweight (CDHS, 2010).

The research methodology was a quantitative data used questionnaires consisting four aspects: socio demographic, food relating factor, environment factor, household economic status and health status of mother/child. The research also purposed to quantify the significance between sociocultural factors and underweight children age under-five.

### 3.3 Study Area

The study has been conducted in 3 selected sub-districts of Chhaeb district in Preah Vihear province. Chhaeb district has 8 sub-districts with the majority of inhabitants are Khmer and ethnic groups include *Phnorn*, *Kuy*, *Steang*, *Tompoun*, *Kreung* and *Jarai*. And the most of populations are Buddhists with their languages-Khmer (Ministry of Planning Report, 2010).

### 3.4 Study Population

The subject of study was the mother/closed-caregiver with children age under-five from three sub-districts of Chhaeb district in Preah Vihear province, Cambodia.

### 3.5 Sampling Techniques

The study has been randomly selected list of areas in the box and then selects 220 households among other households in the villages and among those

households, the study selected only 220 mothers/closed-caregivers that have child age under-five.

**This study used random sampling technique:**

-1<sup>st</sup> **stage:** purposive selection of Preah Vihear province (Province #4) from other 23 provinces in Cambodia.

-2<sup>nd</sup> **stage:** purposive selection of Chhaeb district (District # 2) from other 8 districts in Preah Vihear province.

-3<sup>rd</sup> **stage:** purposive selection 3 sub-district from Chhaeb district include Chhaeb Pir, Sangkae Pir, Mlu Prey Pir (Chhaeb Pir # 2, Sangkae Pir # 4, Mlu Prey Pir # 6) from other 8 sub-district.

-4<sup>th</sup> **stage:** purposive selection all 9 villages in above three sub-districts (Chhaeb Pir =4 villages, Sangkae Pir =3villages, Mlu Prey Pir=2 villages).

-5<sup>th</sup> **stage:** select list of households with children age under-five by simple random sampling.

**3.5.1 Inclusion criteria**

-The mother/closed-caregiver with children age under-five living in that three studied sub-districts.

-The mother/closed-caregiver with children age under-five whom are willing to participate

For the mother/closed-caregiver that has more than one child age under-five, the study selected only the youngest one due to the study aimed to identify the recall memory of mothers during their last pregnancy.

**3.5.2 Exclusion criteria**

-The mother/closed-caregiver with child age under five is mental disability who cannot communicate.

-The mother/closed-caregiver with child age under five who plan to leave within a week during the study

**3.6 Sample Size Calculation**

The Cochran formula was selected to calculate the sample size for the questionnaire data due to the study population size is finite and large.

-Equation 1:

$$n_0 = \frac{Z^2 pq}{e^2}$$

Through,

-n0 is the sample size

-Z is the confident interval

-p is the estimated proportion (37% = 0.37). And (37%) was the prevalence of underweight children in Preah Vihear province in 2010, Cambodia Demographic Health Survey 2010 (CDHS, 2010).

-q = 1-p (1-0.37) = 0.63

-e is allowable error (0.05)

The estimated proportion was used to calculate the proportion of household with children under-five involved in the study.

So that

$$n_0 = \frac{(1.64)^2 * (0.37) * (0.63)}{(0.05)^2} = 250.77$$

Since the study will affect a total of 1000 households, then we use additional equation to calculate the final sample size.

-Equation 2:

$$-n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

-n is the sampled size effect of the study

-n0 is the sample size

-N is the population size that affects the study

$$n = \frac{250.77}{1 + \frac{(250.77 - 1)}{1000}} = 200 \text{ households}$$

By adding (10% of 200) to address missing or incomplete data, the sample size will be 200+20= 220 households with child age under-five. Therefore, the sample size was not generalized to the whole prevalence of the malnourished children age under-five in Preah Vihear province.

### 3.7 Research Instruments

**There are two types of instruments were used:**

The questionnaires contained five aspects: socio demographic characterization, food relating factor, environment factor, household economic status, and health status of mother/child, which associated with underweight children age under-five.

The anthropometric measurements were used scale and meter to measure three indicators of weight for age, weight for height and height for age to assess the nutritional status of children.

### **3.7.1 Reliability test of the instrument**

The research was used model questionnaires from MICS Thailand 2006, CDHS 2010 and MICS Vietnam 2006. And, the piloted questionnaire was conducted at three sub-districts of Chhaeb in Preah Vihear province to test the goodness. Therefore the selection of the respondents was from different villages and groups of the sample population.

### **3.7.2 Validity test of the instrument**

The content validity, the questionnaires were submitted to 3 public health experts, modification and translation in Khmer language for a convenient understanding.

## **3.8 Data Collection**

The study has been served questionnaires with trained research assistant and interviewed mother/closed-caregiver with children age under-five by face to face in the community. And the researcher assessed the nutritional status of children age under-five by using anthropometric measurements (scales and meters).

## **3.9 Data Analysis Method**

The data was analyzed with SPSS version 16 indicated the descriptive statistics include frequency, percentage, mean and standard deviation subjected to each factor. And another inferential statistics was analyzed Crosstabulation and tested by chi-square test to identify association among these variables,

- Socio demographic characterizations
- Food relating factors: food preparation, food culture, food belief, food prejudice and food availability
- Environment factors
- Household economic status
- Health status of mother/child

Moreover, the anthropometric measurements were used weight for height to determine the prevalence of wasting, weight for age to determine underweight and height for age to determine stunting for children 0-59.9 months in the community. Therefore, the underweight was classified in normal and underweight (moderate and

severe) based on the WHO growth reference. Normal means the children Z-score is equal 0 or  $>1$  SD, and the underweight defines Z-score is  $<-2$  SD and  $<-3$  SD.

### **3.10 Ethical Consideration**

The study was approved and applied to the Chulalongkorn University, department of public health and ethical research committees. Therefore, the participants were informed about their voluntary participation and they can exit from the study any time if they do not want to continue. And the study provided gift to the participants for the compensation of their time loss after the interview.

### **3.11 Study Limitations**

Therefore, the outcomes of this study were not generalized to the public in this country, as it was not representative of the whole prevalence of malnourished children age under-five.

### **3.12 Expected Benefits**

The findings of this study were presented to the mothers/closed-caregivers in the study areas regarding to the prevalence of malnutrition among under-five children and the sociocultural and other factors that influenced the nutritional status of children. Similarly, the findings were also presented to World Vision Cambodia in Preah Vihear province and the provincial health department bureau there.

## CHAPTER IV

### RESULT

#### 4.1 Introduction

The purpose of this chapter is to summarize the data collection and to present the relevant statistical analysis. The descriptions of the mothers/closed-caregivers prior to the socio demographic characterization are presented first. Then the descriptive (frequency) of the food relating factors, environment factors, household economic status and health status of mother and child and the result of the anthropometric measurement (frequency distribution, means and standard deviations) of the children are presented next. Lastly, the association between the socio demographic characterization of the mothers/closed-caregivers and the anthropometric measurement of the children are presented by using the Chi-square test at 0.05 of significance level. The final participants are 220 of mothers/closed-caregivers with children age under-five.

#### 4.2 Socio demographic characterization of mothers/closed-caregivers

Table 1 indicated the frequency and percentage distribution relevant basic information of mothers/closed-caregivers included age, education, occupation, household members, child's age, total under-five children and ethnicity.

##### **Age in year (mother/closed-caregiver):**

The age range of mothers/closed-caregivers was divided into 4 categories. The survey indicated that the majority age group of mothers/closed-caregivers (47.2%) aged 25-34 and followed by (35.9%) aged 15-24 years. And that was very few (4.09%) of the mother/closed-caregiver aged beyond 44 years. The mean was 27.99 and SD was 7.17.

##### **Mother's education:**

The education was (63.7%) of mother/closed-caregiver completed the primary school while (33.6%) of the mothers/closed-caregivers had no schooling. And the secondary school attainment, very few (2.7%) of the mothers/closed-caregivers.

##### **Occupation:**

The majority occupation was (95.3%) of the mothers/closed-caregivers are farmers. And there was very few of the mother/closed-caregiver employed in the government service, made own account and unskilled labor.

**Total members of the Household:**

There was (45.0%) of the households had members between 5-7 people. Though (39.1%) of the household had below 4 people in their household. Very few (2.70%) of the household had more than 10 people. The mean was 5.44 and SD was 2.13.

**Total under-five children of the household:**

There was (70.5%) of the household had 1 living child and followed by (24.1%) of the household had 2 living children in their households during the interviewed day. And very few (5.00%) of the household had more than 3 living children. The mean was 1.35 and SD was 0.61.

**Child's age:**

There was (19.5%) of all the children aged 12-17 months and followed by (17.7%) of the children aged more than 35 months during the survey. Similarly, (16.8%) of the children aged 24-29 months and (15.4%) aged 6-11 months. And there was only (10.9%) of the children aged 0-5 months. The mean was 21.99 and SD was 1.33.

**Child's sex:**

Over half (52.3%) are male children and only (47.7%) are female children that participated in the survey.

**Religion:**

The survey indicated that almost all the mothers/closed-caregivers (99.1%) are Buddhist and a very few (0.9%) of the mothers/closed-caregivers are Christian.

**Ethnicity:**

There was (86.8%) of the mothers/closed-caregivers are Khmer people and only (13.2%) of the mothers/closed-caregivers are Kuy ethnic minority whom participated the survey.

Table 1: Socio demographic characterization of mothers/closed-caregivers

Socio demographic characterization	Number (n)	Percentage
<b>Mother's age in year (n=220)</b>		
15-24	79	35.9
25-34	104	47.2
35-44	28	12.7
>44	9	4.09
Mean= 27.99 , SD=7.17		
Min=15, Max=54		
<b>Education (n=220)</b>		
No schooling	74	33.6
Primary school	140	63.7
Secondary school	6	2.70
<b>Mother's occupation (n=220)</b>		
Farmer	210	95.3
Housewife	7	3.20
Government service/employee	1	0.50
Own account	1	0.50
Unskilled labor	1	0.50
<b>Total members of the household (n=220)</b>		
<4 people	86	39.1
5-7 people	99	45.0
8-10 people	29	13.2
>10 people	6	2.70
Mean=5.44, SD=2.13		
Min=3, Max=14		
<b>Total under-five children of the household (n=220)</b>		
1	156	70.9
2	53	24.1
>3	11	5.00
Mean=1.35, SD=0.61		
Min=1 Max=5		
<b>Child's age in months (n=220)</b>		
0-5	24	10.9



Socio demographic characterization	Number (n)	Percentage
6-11	34	15.4
12-17	43	19.5
18-23	24	10.9
24-29	37	16.8
30-35	19	8.65
>35	39	17.7
Mean= 21.99, SD=1.33		
Min=0, Max=59.5		
<b>Child's sex (n=220)</b>		
Male	115	52.3
Female	105	47.7
<b>Mother's religion (n=220)</b>		
Buddhist	218	99.1
Christian	2	0.9
<b>Mother's ethnicity (n=220)</b>		
Khmer	191	86.8
Kuy	29	13.2

#### 4.3 Sociocultural and food relating factors

The findings illustrated the frequency and percentage distribution of food preparation practice, food prejudice, food culture, food beliefs and food availability that mother/closed-caregiver have given their children.

**Table 2: Food prejudice and beliefs of the mother/closed-caregiver**

No.	Statement	Frequency (Percentage)		
		Yes	No	Don't know
1.	Household has enough money to buy food last 2 weeks	112(50.9)	107(48.6)	1(0.5)
2.	Believed first breast milk caused child diarrhea or sickness	93(42.3)	101(45.9)	26(11.8)
3.	Believed feeding only rice with sauce caused child good growth	63(28.6)	97(44.1)	60(27.3)
4.	Had ever feeding child the complementary food (high nutrient food).	64(29.1)	151(68.6)	5(2.3)

Table 2 presented the frequency and percentage distribution of food belief and food availability. There was (50.9%) of the household had adequate money, while (48.6%) of the household did not have enough money to buy food during the last 2 weeks. And very few (0.5%) of the respondents (*answer don't know*) did not remember whether they had enough money or not during the last 2 weeks.

Basically, there was (42.3%) of the respondents still thought the first breast milk caused child diarrhea or sickness meanwhile (45.9%) of the respondents did not believe toward the first breast milk caused diarrhea or sickness. Therefore (11.8%) of the respondents (*answer don't know*) was not sure whether the breast milk caused diarrhea/sickness or not.

Regarding to feeding child only rice with sauce to good growth, there was (28.6%) of the respondents still thought that feeding resulted in good growth while (44.1%) of the respondents did not thought. Another (27.3%) of the respondents (*answer don't know*) was not sure toward this thought.

Moreover, (29.1%) of the respondents had ever fed complementary food to their children while (68.6%) of the respondents had never fed the complementary food with the high nutrient to the meet all the growing child's needs. And very few (2.3%) of the respondents (*answer don't know*) did not recognize toward this feeding practice.

**Table 3: Food availability of the mother/closed-caregiver**

No.	Statement	Frequency	Percentage
<b>1. Usually the place of child food from</b>			
	Market	2	0.9
	Cook at home	218	99.1
<b>2. Giving child extra snacks (cake, fruit, milk..) each meal during the day</b>			
	Yes	130	59.1
	No	90	40.9
<b>3. Number of times feeding food/breastfeeding a day</b>			
	1-3 times	190	86.3
	4-6 times	14	6.36
	7-9 times	5	2.28
	>9 times	11	5.0
Mean=3.51, SD=1.82, Min=1, Max=12			

Table 3 indicated that almost all (99.1%) of the children food cooked at home meanwhile only (0.9%) of the children food got from the market. In addition, there was (59.1%) of the mothers/closed-caregivers gave the complementary snacks to their children meanwhile (40.9%) of the mothers/closed-caregivers did not feed child extra snacks during the day.

Therefore, the number of times feeding/breastfeeding child a day, (86.3%) of the mothers/closed-caregivers fed their children 1-3 times and there was only (6.36%) of the mothers/closed-caregivers fed 4-6 times. And very few (2.28%) of the mothers/closed-caregivers breastfed 7-9 times and only (5.0%) breastfed child more than 9 times a day.

**Table 4: Food children ate yesterday during the day and night, either separately or combined with other food**

No.	Statement	Frequency (Percentage)		
		n=206		
		Yes	No	Not responded
1.	Rice/porridge child ate yesterday	196(89.1)	10(4.5)	14(6.4)
2.	Bread child ate yesterday	60(27.3)	146(66.4)	14(6.4)
3.	Noodles child ate yesterday	24(10.9)	182(82.7)	14(6.4)
4.	Food made from grains child ate yesterday	10(4.5)	196(89.1)	14(6.4)

**\*Note: not responded refers the small baby who was very young to feed**

Table 4 indicated the frequency and percentage distribution toward the carbohydrate food group that mother/closed-caregiver fed their children yesterday during the day and night, either separately or combined with other food.

Regard to the rice/porridge, (89.1%) of the children ate yesterday during the day and night while very few (4.5%) of the children did not eat. And there was (6.4%) of the children (*not responded*) because they were still breastfeeding (0-6 months).

Eating bread, (27.3%) of the children ate yesterday compares to (66.4%) of the children did not consume. Another (6.4%) of the children (*not responded*) because some of the children were still breastfeeding (0-6 months), another children did not prefer eating bread as well as bread was rarely sold in their communities. Similarly, eaten noodles only (10.9%) of the children ate while (82.7%) of the children did not eat yesterday during the day and night. Another was (6.4%) of the children (*not responded*) due to their ages are under the breastfeeding 0-6 months as well as the noodles are not their basic food.

Basically, food made from grains, very few (4.5%) of the children consumed while (89.1%) of the children did not consume yesterday during the day and night. Another (6.4%) of the children (*not responded*) due to their ages are under the breastfeeding age 0-6 months as well as the grains food are seldom made or cooked by their mothers. Another reason is that our cultures are rarely cooked and consumed the grains food.

**Table 5 Food children ate yesterday during the day and night, either separately or combined with other food: (continued)**

No.	Statement	Frequency (Percentage)		
		n=206		
		Yes	No	Not responded
1.	Beef child ate yesterday	10(4.5)	196(89.1)	14(6.4)
2.	Pork child ate yesterday	58(26.4)	148(67.3)	14(6.4)
3.	Chicken child ate yesterday	26(11.8)	180(81.8)	14(6.4)
4.	Egg child ate yesterday	105(47.7)	101(45.9)	14(6.4)
5.	Fish child ate yesterday	163(74.1)	43(19.5)	14(6.4)
6.	Frog child ate yesterday	19(8.6)	187(85.0)	14(6.4)
7.	Shell fish child ate yesterday	8(3.6)	198(90.0)	14(6.4)
8.	Duck child ate yesterday	2(0.9)	204(92.7)	14(6.4)
9.	Birds child ate yesterday	2(0.9)	204(92.7)	14(6.4)

**\*Note: not responded refers the small baby who was very young to feed**

Table 5 indicated the frequency and percentage distribution of protein food group that mother/closed-caregiver fed their children yesterday during the day and night.

Generally, (74.1%) of the children consumed fish and almost half (47.7%) of the children ate egg yesterday during the day and night because fish and egg are cheap and they can easily get in the community. And (26.4%) of the children ate pork. Other food items, (8.6%) of the children ate frog, very few (4.5%) ate beef, (3.6%) ate shell fish and (1.8%) of the children ate duck and birds yesterday during the day and night.

Therefore, (92.7%) of the children did not consume duck and birds, (90.0%) of the children did not eat shell fish, (89.1%) of the children did not eat beef and (81.8%) of the children did not eat chicken yesterday during the day and night because these food items are rarely sold and expensive cost to get them.

Another (6.4%) of the children (*not responded*) due to their ages are under the breastfeeding age 0-6 months as well as their families could not afford the expensive food cost.

**Table 6 Food children ate yesterday during the day and night, either separately or combined with other food: (continued)**

No.	Statement	Frequency (Percentage)		
		n=206		
		Yes	No	Not responded
1.	Pumkin child ate yesterday	23(10.5)	183(83.2)	14(6.4)
2.	Carrots child ate yesterday	2(0.9)	204(92.7)	14(6.4)
3.	Squash child ate yesterday	6(2.7)	200(90.9)	14(6.4)
4.	Potatoes child ate yesterday	2(0.9)	204(92.7)	14(6.4)
5.	Orange child ate yesterday	2(0.9)	204(92.7)	14(6.4)
6.	Cassava child ate yesterday	0(0)	206(93.6)	14(6.4)
7.	Mango child ate yesterday	30(13.6)	176(80.0)	14(6.4)
8.	Papaya child ate yesterday	18(8.2)	188(85.5)	14(6.4)
9.	Beans child ate yesterday	9(4.1)	197(89.5)	14(6.4)
10.	Leafy vegetables child ate yesterday	147(66.8)	59(26.8)	14(6.4)
11.	Food made from roots child ate yesterday	16(7.3)	190(86.4)	14(6.4)

**\*Note: not responded refers the small baby who was very young to feed**

Table 6 indicated the frequency and percentage distribution of vegetable/fruit food group that mother/closed-caregiver fed children yesterday during the day and night.

In overall, (66.8%) of the children consumed leafy vegetables, (13.6%) ate mango and followed by (10.5%) of the children ate pumpkin yesterday during the day and night. Similarly, very few (1.8%) of the children ate potatoes and orange, (2.7%) ate squash and another (0.9%) ate carrots yesterday during the day and night.

Therefore, almost all of the children did not eat all food items because these foods are hardly sold in the community, belief of hot food and they could not afford the expensive food.

Another (6.4%) of the children (*not responded*) due to their ages are under the breastfeeding age 0-6 months as well as their families could not find that food in the community.

**Table 7 Food children ate yesterday during the day and night, either separately or combined with other food: (continued)**

No.	Statement	Frequency (Percentage)		
		n=206		
		Yes	No	Not responded
1.	Sugar child ate yesterday	53(24.1)	153(69.5)	14(6.4)
2.	Cakes child ate yesterday	131(59.5)	75 (34.1)	14(6.4)
3.	Candies child ate yesterday	81(36.8)	125(56.8)	14(6.4)
4.	Pastries child ate yesterday	71(32.3)	135(61.4)	14(6.4)
5.	Solid food child ate yesterday	3(1.4)	203(92.3)	14(6.4)
6.	Soft food child ate yesterday	10(4.5)	196(89.1)	14(6.4)
7.	Food made with oil/fat child ate yesterday	59(26.8)	147(66.8)	14(6.4)

**\*Note: not responded refers the small baby who was very young to feed**

Table 7 indicated the frequency and percentage distribution of sweets food group that mother/closed-caregiver fed their children yesterday during the day and night.

In general, (59.5%) of the children ate cakes, (36.8%) ate candies, (32.3%) ate the pastries, and followed by (24.1%) ate sugar yesterday during the day and night due to this food are easy to find in the community. Similarly, only (26.8%) of the children ate food made with oil/fat because this food is seldom made and sold in the community. Therefore, very few (4.5%) of the children ate soft food and (1.4%) ate solid food yesterday during the day and night.

Therefore, almost all of the children did not eat soft/solid food, oil/fat food, pastries and sugar because of the prices and uneasy to find in their communities. Another (6.4%) of the children (*not responded*) due to their ages are under the breastfeeding age 0-6 months as well as their families could not find that food in the community.

**Table 8: Food relating factors (food culture and beliefs)**

No.	Statement	Frequency (Percentage)		
		Yes	No	Don't know
1.	Belief eating fish caused parasite	121(55.0)	49(22.3)	50(22.7)
2.	Belief eating eggs caused diarrhea	52(23.6)	110(50.0)	58(26.4)
3.	Belief feeding child the complementary food	57(25.9)	92(41.8)	71(32.3)

No.	Statement	Frequency (Percentage)		
		Yes	No	Don't know
	caused diarrhea			
4.	Belief eating shell/crabs caused parasite	32(14.5)	77(35.0)	111(50.5)
5.	Belief ripen mango and vegetable caused diarrhea	77(35.0)	97(44.1)	46(20.9)

Table 8 indicated the frequency and percentage distribution of the food belief of mother/closed-caregiver.

Over half (55.0%) of the mothers/closed-caregivers believed that child ate fish caused parasite and (22.3%) of the mothers/closed-caregivers had no that belief. Another (22.7%) of the mothers/closed-caregivers (*answered don't know*) were not sure about that belief.

Eaten mango and vegetable, (35.0%) of the mothers/closed-caregivers thought to diarrhea while (44.1%) of the mothers/closed-caregivers did not have that belief. Another (20.9%) (*answered don't know*) were not sure about that belief.

Similarly, (25.9%) of the mothers/closed-caregivers believed feeding the complementary food caused child diarrhea and followed by (23.6%) child ate egg caused diarrhea. The other mothers/closed-caregivers had no that belief; (41.8%) confirmed no diarrhea by eating the complementary food and only half (50.0%) of the mothers/closed-caregivers thought no diarrhea by eating the egg.

Besides the other mothers/closed-caregivers; (50.5%) confirmed (*don't know*) toward parasite caused by eating crabs, (32.3%) of the mothers/closed-caregivers (*don't know*) were not sure the diarrhea caused from the complementary food and another similarity (26.4%) and (22.7%) of the mothers/closed-caregivers confirmed no diarrhea and parasite caused by eating fish and egg.

#### 4.4 Environment factors

The findings illustrated the frequency and percentage distribution toward main source of drinking water, type of toilet facility, shared toilet with others and treated water for under-five children during the last 2 weeks. Especially, the health behavior of mother/closed-caregiver related to the clean water and well-heated food preparation and hand washing practice.

Table 9: Environment factors (drinking water source, latrine)

No.	Statement	Frequency	Percentage
<b>1.Main source of drinking water for child</b>			
	Pipe into yard	44	20.0
	Protect/unprotect well	143	65.0
	Surface water	31	14.1
	Bottle water	2	0.9
<b>2.Child's drinking water treatment</b>			
	Boiled water	74	33.6
	Unboiled water	127	57.7
	Filtered water	19	8.7
<b>3.Type of toilet facility for child</b>			
	Pit latrine with slab	2	0.9
	Pit latrine with open pit	1	0.5
	No latrine-bush or field	206	93.6
	Lavatory septic tanks	11	5.0

In overall, (65%) of the drinking water source for children was protect/unprotect well and followed by (20%) of the pipe into yard, another (14.1%) of the surface water. And very few (0.9%) of the children were drinking the bottle water.

Therefore, (57.7%) of the child's drinking water treatment was unboiled water and followed by (33.6%) of boiled water, another (8.7%) was the filtered water.

Regard the toilet facility, (93.6%) of the households had no latrine. And (5.0%) of the household had lavatory septic tanks and another (1.4%) had pit latrine with slab and pit latrine with open pit in their households.

Table10 Environment factors (hand washing practice, shared toilet):(continued)

No.	Statement	Frequency	Percentage
<b>1.Mother hand washing before eating</b>			
	Always	170	77.3
	Often	24	10.9
	Sometimes	22	10.0
	Never	4	1.8
<b>2. Mother hand washing after toilet</b>			
	Always	127	57.7
	Often	32	14.5



No.	Statement	Frequency	Percentage
	Sometimes	38	17.3
	Never	23	10.5
<b>3.Mother used clean water and well-heated food preparation for complementary food</b>			
	Yes	155	(70.5
	No	59	(26.8)
	Don't know	6	(2.7)
<b>4.Child shared toilet with other households</b>			
	Yes	2	0.9
	No	218	99.1

Table 10 indicated the frequency and percentage distribution toward the health behavior on hand washing practice of the mother/closed-caregiver.

There was (77.3%) of the mothers/closed-caregivers practice hand washing always before eating and (10.9%) of the mothers/closed-caregivers practice hand washing often before eating. And there was (10.0%) of the mothers/closed-caregivers practice hand washing sometimes before eating. Very few (1.8%) of the mothers/closed-caregivers never practice hand washing.

Another was (57.7%) of the mothers/closed-caregivers practice hand washing always after toilet and (17.3%) of the mothers/closed-caregivers practice hand washing sometimes. And (14.5%) of the mothers/closed-caregivers practice hand washing often while (10.5%) of the mothers/closed-caregivers never practice hand washing after toilet.

Moreover, (70.5%) of the mothers/closed-caregivers had used clean water and well-heated food preparation for their children complementary feeding while (26.8%) of the respondents did not practice.

Regard the toilet (0.9%) of the children shared toilet with other households. Though almost all (99.1%) of the children did not share the toilet to or with other households because of their communities normally defecated free in the bush or field. Another reason related to the Community Led Total Sanitation (CLTS), most of the people did not understand about CLTS due to their culture, experience, knowledge as well as the poverty and inadequate health care system promotion in the community.

#### 4.5. Household economic status of mothers/closed-caregivers

The findings illustrated the frequency and percentage distribution of household income and expenditure in year of all the members related to food expense, materials purchasing and other traditional culture ceremony in their communities.

**Table 11: Household economic status (income, expenditure)**

No.	Statement	Frequency	Percentage
<b>1.Total income a year of the household members</b>			
	<600,000KHR (<150 USD)	32	14.5
	600,000-1,400,000KHR (150-350USD)	63	28.7
	>1,400,000KHR (>350 USD)	125	56.8
	Mean=1,990,600KHR(496USD), SD=1,593,650KHR(397USD) Min=100,000KHR (25USD) , Max=10,000,000KHR(2490USD)		
<b>2.Expenditure of the household in year</b>			
	<600,000KHR (<150 USD)	6	2.7
	600,000-1,400,000KHR (150-350USD)	26	11.8
	>1,400,000KHR (>350 USD)	188	85.5
	Mean=5,493,436KHR(1,368USD), SD=7,615,580KHR(1897USD) Min=60,000KHR (15USD) , Max=54,000,000KHR(13,454USD)		
<b>3.Household used iodine salt in food cooking</b>			
	Yes	48	21.8
	No	172	78.2

Regard to the income, (56.8%) of the household had income beyond 350USD a year while (28.7%) of the household had income between 150-350USD. And (14.5%) of the household had income below 150USD in a year. In contrast, there was (85.5%) of the household expensed over 350USD a year and another (11.8%) of the household expensed between 150-350USD a year as well. By compares between the household made income and the household expenditure, there was higher among the households expensed (85.5%) than the household produced income (56.8%).

Therefore, there was (78.2%) of the household did not have the iodine salt for food cooking while (21.8%) of the household served the iodization of salt in food cooking. That was because many households had an insufficient income, no selling

iodine salt in the community as well as the lack of knowledge and their food culture of the mother/closed-caregiver.

#### 4.6 Health status of mother/child

The findings illustrated the frequency and percentage distribution toward the health status of mother/child during pregnancy and after delivery, breastfeeding, complementary feeding, and childhood illness management of the mother/closed-caregiver among their children age under-five.

##### 4.6.1 Health status of mother/closed-caregiver

The findings indicated the frequency and percentage distribution toward the care of mother/closed-caregiver during the last pregnancy.

**Table 12: Health status of mother/closed-caregiver during pregnancy**

No.	Statement	Frequency	Percentage
<b>1.Mother's age at birth</b>			
	<20	29	31.18
	20-34	168	76.37
	35-49	23	10.45
	Mean=26.05, SD=6.70		
	Min=17, Max=49		
<b>2.Mother first ANC during pregnancy</b>			
	Early missed period	121	55.0
	Within 16 weeks	70	31.8
	Within 28 weeks	5	2.3
	Within 32 weeks	4	1.8
	No ANC	20	9.1
<b>3.Consumed iron tablet during pregnancy</b>			
	Regular	115	52.3
	Sometimes	60	27.3
	Hardly	13	5.9
	Never	32	14.5
<b>4.Mother ate meal during pregnancy</b>			
	Normal eating	152	69.1
	Increase eating	64	29.1
	Don't know	4	1.8

Table 12 indicated the frequency and percentage distribution toward mother health during the last pregnancy.

There was (76.37%) of the mothers/closed-caregivers aged 20-34 years during the last pregnancy and (31.18%) of the mothers/closed-caregivers aged below 20 years. And there was (10.45%) of the mothers/closed-caregivers aged between 35-49 years during the last pregnancy. The mean was 26.05 and SD was 6.70.

There was over half (55.0%) of the mothers/closed-caregivers received antenatal care (ANC) from the health personnel as early as after missing period and (31.8%) of the mothers/closed-caregivers received antenatal care within 16 weeks of the pregnancy. Very few (2.3%) of the mothers/closed-caregivers received antenatal care within 28 weeks while (1.8%) of the mothers/closed-caregivers received antenatal care within 32 weeks of the pregnancy. Therefore, only (9.1%) of the mothers/closed-caregivers did not receive any antenatal care during the last pregnancy.

Moreover, (52.3%) of the mothers/closed-caregivers consumed iron tablet regular and (27.3%) of the mothers/closed-caregivers consumed sometimes while (14.5%) of the mothers/closed-caregivers never consumed the iron tablets during their last pregnancy.

Regard to the meal consumption, (69.1%) of the mothers/closed-caregivers ate normal meal, (29.1%) of the mothers/closed-caregivers increased eating and a very few (1.8%) of the mothers/closed-caregivers could not recall (*answered don't know*) their memories whether their food consumption increased or not during their last pregnancy.

**Table 13 Health status of mother (chronic diseases before and during the pregnancy of this child) (diagnosis by medical doctor: (continued)**

No.	Statement	Frequency (Percentage)		
		Yes	No	Don't know
1.	Diabetes before and during pregnancy	0(0)	220(100)	0(0)
2.	Hypertension before and during pregnancy	2(0.9)	218(99.1)	0(0)
3.	Heart disease before and during pregnancy	0(0)	220(100)	0(0)
4.	Anemia before and during pregnancy	57(25.9)	163(74.1)	0(0)
5.	Thalassemia before and during pregnancy	0(0)	220(100)	0(0)

Table 13 illustrated the frequency and percentage distribution of chronic diseases of the mothers before and during the pregnancy.

As the result, there was (25.9%) of the mothers had anemia during the pregnancy because some of the mothers even received the iron tablets from the skilled birth personnel but they did not consume all the iron tablets follow the advice because they thought that their previous child birth had no any iron tablet intake, but they were very healthy both mother and child, while some of the mothers decided to throw away the tablets due to they felt nausea because of smell and taste. And a very few (0.9%) of the mothers had hypertension before and during the last pregnancy as diagnosis by the medical doctor.

#### 4.6.2 Health status of children

The findings illustrated the frequency and percentage distribution relevant to the child breastfeeding, complementary food and child's weight at birth as well as childhood illness management by the mother/closed-caregiver.

**Table 14: Health status of children (child breastfed)**

No.	Statement	Frequency	Percentage
<b>1.Child breastfed after delivery</b>			
	Yes	185	(84.1)
	No	26	(11.8)
	Don't know	3	(1.4)
	Not responded	6	(2.7)
<b>2.Continued breastfeeding child up to 2 years or plan to breastfeed (n= 199)</b>			
	Yes	112	(50.9)
	No	58	(26.4)
	Don't know	21	(9.5)
	Not responded	29	(13.2)
<b>3.Feeding child complementary food alongside the breastfeeding</b>			
	Yes	124	(56.4)
	No	93	(42.3)
	Don't Know	1	(0.5)
	Not responded	2	(0.9)

Table 14 described the frequency and percentage distribution of child breastfeeding .There was (84.1%) of the mothers initiated first breastfeeding while (11.8%) of the mothers did not breastfeed child after the delivery. Another (1.4%) of the mothers (*answered don't know*) did not remember whether they breastfed or

not during that time. Therefore (2.7%) of the mothers did not respond because their children aged beyond 2 years old and they could not recall their memories as well.

Moreover, (50.9%) of the mothers continued breastfeeding their children up to 2 years while (26.4%) of the mothers did not give breastfeeding up to 2 years and (9.5%) of the mothers (*answered don't know*) were not sure whether they breastfed up to 2 years or not. Similarly, (13.2%) of the mothers did not respond because their children aged below 6 months.

In general, over half (56.4%) of the mothers gave complementary food alongside the breastfeeding and (42.3%) of the mothers did not give the complementary food alongside the breastfeeding due to the child was too young to feeding and discarding breastfeeding while provided the complementary food. A very few (0.5%) of the mothers (*answered don't know*) were not sure whether breastfeeding along with the breast milk or not. Another (0.9%) of the mothers did not respond because their children have never given the complementary food.

**Table 15: Health status of children (child illness during last 2 weeks)**

No.	Statement	Frequency (Percentage)		
		Yes	No	Don't know
1.	Child diarrhea during last 2 weeks	118(53.6)	101(45.9)	1(0.5)
2.	Child fever during last 2 weeks	192(87.3)	28(12.7)	0
3.	Child fever with cough during last 2 weeks	191(86.8)	29(13.2)	0

Table 15 indicated the frequency and percentage distribution of childhood illness. There was (45.9%) of the children had no diarrhea, therefore, over half (53.6%) of the children had diarrhea in the last 2 weeks. And was only (0.5%) of the mothers (*answered don't know*) did not remember prior to her child had diarrhea or not in the last 2 weeks. And (87.3%) of the children had fever while only (12.7%) of the children had no fever. Similarly, (86.8%) of the children had fever with cough and only (13.2%) had no fever, no cough during the last 2 weeks.

**Table 16 Health status of children (breastfed period, complementary feeding and treatment diarrhea): (continued)**

No.	Statement	Frequency	Percentage
<b>1.Child's weight after delivery</b>			
	<2.5kg	24	10.9
	2.5 kg or more	120	54.5
	Not weight	76	34.5
	Mean=2.23, SD=0.63		
	Min=2.2 Max=3		
<b>2.Time of initial first breastfeeding child</b>			
	Immediately after delivery	114	51.8
	Less than 1 hour	32	14.5
	Within 24 hours	24	10.9
	More than 24 hours	44	20.0
	Not responded	6	2.7
<b>3.Duration of child breastfeeding</b>			
	Less than 6 months	67	30.5
	Birth to 6 months	13	5.9
	7 to 12 months	44	20.0
	13 to 24 months and more	87	39.5
	Not responded	9	4.1
<b>4.Past 24 hours breastfeeding child 0-6months (n=30)</b>			
	Breastfeeding alone	8	3.6
	Breastfeeding with medicine	6	2.7
	Breastfeeding with water	9	4.1
	Breastfeeding with food	7	3.2
	Not responded	190	86.4
<b>5.Time of initial child complementary feeding</b>			
	Before 6 months	67	30.5
	At 6 months	66	30.0
	After 6 months	81	36.8
	Not responded	6	2.7
<b>6. Treatment of child diarrhea with ORS and Zinc</b>			
	Yes both	37	16.8
	Yes only ORS	37	16.8

No.	Statement	Frequency	Percentage
	Only Zinc	7	3.2
	Nothing given	27	12.3
	Don't know	10	4.5
	Not responded	102	46.4

Therefore in these questions, some of the respondents did not respond due to the different age group of the children. Table 16 illustrated the frequency and percentage distribution of the child health status.

Over half (54.5%) of the children's weight 2.5kgs or more after the delivery. And (10.9%) of the children's weight was below 2.5kgs after the delivery. Therefore (34.5%) of the children did not weight after delivery because they delivered at home. The mean was 2.23 and SD was 0.63.

Regard to the initial first breastfeeding, over half (51.8%) of the mothers initiated immediately breastfeeding after the delivery and followed by (20.0%) of the mothers initiated breastfeeding after 24 hours. Only (14.5%) of the mothers had breastfed child less than one hour after the delivery. Very few (2.7%) of the mothers did not respond because they could not remember that recall.

Therefore the duration of breastfeeding, (39.5%) of the mothers had breastfed child from birth to 13 months and up to 24 months and more. And (30.5%) of the mothers had breastfed child less than 6 months and followed by (20.0%) of the mothers had breastfed child from birth to 7 months and up to 12 months. Very few (4.1%) of the mothers did not respond because they could not recall their memories, their children aged beyond 2 years.

Regard to past 24 hour's breastfeeding child 0-6 months, (4.1%) the mothers breastfed with water. And (3.6%) of the mothers had breastfed alone, (3.2%) had breastfed with food, (2.7%) had breastfed with medicine and the rest (86.4%) of the mothers did not respond because their children aged beyond 6 months.

The initiation of complementary feeding, (36.8%) of the mothers initiated giving the complementary food to their children after 6-month and followed by (30.5%) of the mothers gave the complementary feeding before 6-month. Similarly, (30.0%) of the mothers started complementary feeding at 6-month. Very few (2.7%) of the mothers did not respond because they could recall their memories.

Treated child diarrhea by ORS and Zinc package, (16.8%) of the mothers gave both ORS and Zinc during the diarrhea while another (16.8%) of the mothers treated



only with ORS package. And (12.3%) of the mothers did not give any treatment prior to the diarrhea. Therefore, very few (3.2%) of the mothers gave only Zinc for treatment the diarrhea. There was (4.5%) of the mothers (*answered don't know*) were not sure whether they treated their children with ORS and Zinc or not. And (46.4%) of the mothers did not respond because their children did not have diarrhea during the last 2 weeks.

#### 4.7 Nutritional status of children age under-five

Table 17 indicated the prevalence of malnourished children aged under-five. That was (77.3%) of the underweight children (33.6% of moderate, 43.7 of severe) and (60.9%) of the stunting children (33.6% of moderate, 27.3% of severe). Another was (61.4%) of the wasting children (36.4% of moderate, 25.0% of severe).

Table 17: Prevalence of malnourished children age under-five

No.	Statement	Frequency	Percentage
<b>1.Nutritional status (underweight n=220)</b>			
	normal	50	22.7
	<b><i>underweight</i></b>	<b>170</b>	<b>77.3</b>
	-moderate	74	33.6
	-severe	96	43.7
<b>2.Nutritional status (stunting n=220)</b>			
	normal	86	39.1
	<b><i>stunting</i></b>	<b>134</b>	<b>60.9</b>
	-moderate	74	33.6
	-severe	60	27.3
<b>3.Nutritional status (Wasting n=220)</b>			
	normal	85	38.6
	<b><i>wasting</i></b>	<b>135</b>	<b>61.4</b>
	-moderate	80	36.4
	-severe	55	25.0

#### 4.8 The Association between socio demographic characterizations of the mothers/closed-caregivers and underweight children age under-five

##### **Crosstabulation Analysis:**

Table 18 illustrated the association between the socio demographic characterizations includes age, occupation, education, religion, ethnicity and household with total under five-children distribution and the underweight children was tested by using Chi-square test. The level of significant relationship was set at P-value =0.05.

##### **Mother's age:**

The mother's age was ranged in 3 categories and compared with the level of underweight children (normal, underweight). It was found that the total mother's age group was in underweight. And (79.7%) of the mother's aged 15-24 was the highest in underweight. The statistics showed that the association between mother's age group and the underweight, the P-value was 0.806; this mean there is a weak association between the mother's age and the underweight children.

##### **Education:**

The mothers who completed primary and secondary school was in underweight higher than the mother's had no schooling (81.5% and 68.9%), and the P-value was equal to 4.431 and  $\chi^2$  was equal 0.035, the value showed the strong association between the mother's education and the underweight children.

##### **Occupation:**

The mothers who are farmers were in underweight higher than the mothers worked in government and other jobs (77.6% and 70.0%). The statistics showed that the association between mother's occupation and underweight, the P-value was 0.574; this mean there is a weak association between the mother's occupation and underweight children.

##### **Total members of the household:**

The total members of the household were in underweight. But the household had below 4 members was the highest in underweight (79.1%). The statistics showed that the association between the total members of the household and underweight, the P-value was 0.866; this mean there is a weak association between the total household members and the underweight children.

**Mother's ethnicity:**

The mothers were Kuy ethnicity was in underweight higher than the mothers were Khmer people (82.8% and 76.4%), in contrast, the mothers were Khmer people was in normal higher than the mothers were Kuy ethnicity (23.6%). The statistics showed that the association between the mother's ethnicity and underweight, the P-value was 0.449; this mean there is a weak association between the mother's ethnicity and the underweight children.

**Religion:**

The mother's religion was the most of all their religions in underweight. But the mothers who were Christian were in underweight higher than the mothers who were Buddhist (100% and 77.1%). The statistics showed that the association between the mother's religion and underweight, the P-value was 0.441; this mean there is a weak association between the mother's religion and the underweight children.

**Total under-five children of the household:**

The household had 1-2 living children were in underweight higher than the household had 3-5 living children (78.0% and 63.6%). Though the statistics showed that the association between the household with under-five children and underweight, the P-value was 0.268; this mean there is a weak association between the household with under-five children and the underweight children.

**Child's sex:**

The female children were in underweight higher than the male children (78.1% and 76.5%), but the statistics showed that the association between the child's sex and underweight, the P-value was 0.781; this mean there is a weak association between the child's sex and the underweight children.

**Child's age:**

The children aged 0-5 months was the highest in underweight (87.5%), therefore, the child's aged beyond 17 months was the highest in normal (24.4%). the P-value was 0.652; this mean there is a weak association between the child's age and the underweight children.

Table18: Association between socio demographic characteristic of mother/closed-caregiver and underweight children aged under-five

Characteristics	Underweight children		Total	X <sup>2</sup>	P vare
	normal	underweight (moderate/ severe)			
	n(%)	n(%)			
<b>1.Age in year (n=220)</b>				0.431	0.806
15-24	16(20.3)	63(79.7)	79(100)		
25-34	25(24.09)	79(76.0)	104(100)		
>35	9(24.3)	28(75.7)	37(100)		
<b>2.Education</b>				4.431	<b>0.035</b>
No schooling	23(31.1)	51(68.9)	74(100)		
Primary school and secondary school	27(18.5)	119(81.5)	146(100)		
<b>3.Occupation</b>				0.316	0.574
Farmer	47(22.4)	163(77.6)	210(100)		
Unskilled labor, housewife, own account, and government service	3(30.0)	7(70.0)	10(100)		
<b>4.Total members of the household</b>				0.288	0.866
<4	18(20.9)	68(79.1)	86(100)		
5-7	24(24.2)	75(75.8)	99(100)		
>7	8(22.9)	27(77.1)	35(100)		
<b>5.Mother's ethnicity</b>				0.572	0.449
Kuy	5(17.2)	24(82.8)	29(100)		
Khmer	45(23.6)	146(76.4)	191(100)		
<b>6.Religion</b>				0.594	0.441
Buddhist	50(22.9)	168(77.1)	218(100)		
Christian	0(0)	2(100.0)	2(100)		

Characteristics	Underweight children		Total	X <sup>2</sup>	P-value
	normal	underweight (moderate/ severe)			
	n(%)	n(%)			
<b>7.Total under-five children of the household</b>				1.226	0.268
1-2	46(22.0)	163(78.0)	209(100)		
3-5	4(36.4)	7(63.6)	11(100)		
<b>8.Child's sex</b>				0.077	0.781
Male	27(23.5)	88(76.5)	115(100)		
Female	23(21.9)	82(78.1)	105(100)		
<b>9. Child's age (months)</b>				1.623	0.652
0-5	3(12.5)	21(87.5)	24(100)		
6-11	8(23.5)	26(76.5)	34(100)		
12-17	10(23.3)	33(76.7)	43(100)		
>17	29(24.4)	90(75.6)	119(100)		

\*Significant by Chi-square test.

#### 4.9 The Association between food relating factors of the mothers/closed-caregivers and underweight children aged under-five

Table 19: Food availability of mother/closed-caregiver and underweight children

Characteristics	Underweight children		Total	X <sup>2</sup>	P vale
	normal	underweight (moderate/ severe)			
	n(%)	n(%)			
<b>1. Household had enough money to buy food last 2 weeks</b>				3.185	0.074
Yes	31(27.7)	81(72.3)	112(100)		
No	19(17.6)	89(82.4)	108(100)		
<b>2. Place of child food from</b>				0.594	0.441
Home	50(22.9)	168(77.1)	218(100)		
Market	0(0)	2(100.0)	2(100)		
<b>3. Feeding child complementary food</b>				1.577	0.209
Yes	11(17.2)	53(82.8)	64(100)		
No	39(25.0)	117(75.0)	156(100)		
<b>4. Number of time feeding/breastfeeding child a day</b>				27.449	<b>.000</b>
<3 times	1(9.1))	10(90.9)	11(100)		
3-6 times	37(19.2))	156(80.8)	193(100)		
>6 times	12(75.0)	4(25.0)	16(100)		
<b>5. Giving child extra snack during the day</b>				4.587	<b>0.032</b>
Yes	23(17.7)	107(82.3)	130(100)		
No	27(30.0)	63(70.0)	90(100)		

\*Significant by Chi-square test.

Table 19 illustrated the food availability of the mother/closed-caregiver have fed to their children during the day.

The household did not have enough money to buy food was in underweight higher than the household had enough money (82.4% and 72.3%), but the statistics showed that the association between the household had enough money and

underweight, the P-value was 0.074; this mean there is a weak association between this characteristic and the underweight children. The children food from the market was in underweight higher than the children food from home (100.0% and 77.1%), but the children food cooked at home in normal higher than the children food from the market (22.9%). And the P-value was 0.441; this mean there is a weak association between the children food place and the underweight children.

The children fed the complementary food were in underweight higher than the children were not fed the complementary food (82.8% and 75.0%), but the children were not feeding the complementary food was in normal higher than the children gave the complementary food (25.0%). And the P-value was 0.209; this mean there is a weak association between the children fed the complementary food and the underweight children.

Regard to the children feeding/breastfeeding below 3 times was the highest times in underweight (90.9%), but the children feeding/breastfeeding beyond 6 times a day was the highest times in normal (75.0%). And the P-value ( $<0.05$ ) and  $\chi^2$  was equal 27.449, the values showed the strong association between the number of times feeding/breastfeeding and the underweight children.

Therefore, the children received feeding extra snacks during the day were in underweight higher than the children did not feed the extra snacks (82.3% and 70.0%). And the P-value was equal to 0.032 and  $\chi^2$  was equal 4.587, the values showed the strong association between the children received extra snacks feeding and the underweight children.

**Table 20 Food availability children ate yesterday during the day and night: (continued)**

Characteristics	Underweight children		Total	$\chi^2$	P vare
	normal	underweight			
	n(%)	(moderate/ severe) n(%)			
<b>1.Food group 1</b>				19.357	<b>.000</b>
(carbohydrate)			201(100)		
Eating	38(18.9)	163(81.1)	19(100)		
Don't eat	12(63.2)	7(36.8)			
<b>2.Food group 2 (protein)</b>				14.667	<b>.000</b>
Eating	34(18.2)	153(81.8)	187(100)		

Don't eat	16(48.5)	17(51.5)	33(100)		
<b>3.Food group 3</b> (vegetal/fruit)				7.765	<b>0.05</b>
Eating	30(18.2)	135(81.8)	165(100)		
Don't eat	20(36.4)	35(63.6)	55(100)		
<b>4.Food group 4</b> (sweets)				18.234	<b>.000</b>
Eating	31(17.1)	150(82.9)	181(100)		
Don't eat	19(48.7)	20(51.3)	39(100)		

**\*Significant by Chi-square test.**

Table 20 illustrated toward the food availability distribution that children ate yesterday during the day and night and the underweight children aged under-five.

The children ate carbohydrate food group was in underweight higher than the children did not eat (81.1% and 36.8%), but the children did not eat the carbohydrate food group was in normal higher than the children ate (63.2%). And the P-value ( $<0.05$ ) and  $\chi^2$  was equal 19.357, the values showed the strong association between the children ate carbohydrate food group and the underweight.

The children ate protein food group was in underweight higher than the children did not eat (81.8% and 51.5%), but the children did not eat the protein food group was in normal higher than the children ate (48.5%). And the P-value ( $<0.05$ ) and  $\chi^2$  was equal 14.667, the values showed the strong association between the children ate protein food group and the underweight.

Moreover, the children ate vegetable/fruit group was in underweight higher than the children did not eat (81.8%, 63.6%) meanwhile the children did not eat the vegetable/fruit group was in normal higher than the children eat (36.4%). Therefore the P-values was 0.05 and  $\chi^2$  was equal to 7.765, the values showed the closed association between the children consumed vegetable and fruit group and the underweight.

Regard to the children ate sweets food was in underweight higher than the children did not eat (82.9% and 51.3%), and the children did not eat the sweets food was in normal higher than the children ate (48.7%). And the P-value ( $<0.05$ ) and  $\chi^2$  was equal 18.234, the values showed the strong association between the children consumed sweets food and the underweight.



Table 21 Food prejudice and beliefs of the mother/closed-caregiver and underweight children aged under-five: (continued)

Characteristics	Underweight children		Total	$\chi^2$	P vare
	normal	underweight (moderate/ severe)			
	n(%)	n(%)			
<b>1. Believed child ate fish caused child parasite</b>				0.235	0.628
Yes	26(21.5)	95(78.5)	121(100)		
No	24(24.2)	75(75.8)	99(100)		
<b>2. Believed child ate egg caused child diarrhea</b>				0.683	0.409
Yes	14(26.9)	38(73.1)	52(100)		
No	36(21.4)	132(78.6)	168(100)		
<b>3. Believed feeding child the complementary food caused diarrhea</b>				0.000	0.987
Yes	13(22.8)	44(77.2)	57(100)		
No	37(22.7)	126(77.3)	163(100)		
<b>4. Believed child ate crabs caused parasite</b>				0.621	0.431
Yes	9(28.1)	23(71.9)	32(100)		
No	41(21.8)	147(78.2)	188(100)		
<b>5. Believed child ate vegetable/mango caused diarrhea</b>				0.028	0.866
Yes	17(22.1)	60(77.9)	77(100)		
No	33(23.1)	110(76.9)	143(100)		
<b>6. Believed feed child first breast milk caused diarrhea/sickness</b>				0.002	0.965
Yes	21(22.6)	72(77.4)	93(100)		
No	29(22.8)	98(77.2)	127(100)		
<b>7. Believed feeding rice with sauce caused child for good growth</b>				0.220	0.639

Yes	13(20.6)	50(79.4)	63(100)
No	37(23.6)	120(76.4)	157(100)

**\*Significant by Chi-square test.**

Table 21 illustrated the food belief distribution of the mother/closed-caregiver and the underweight children aged under-five.

The mothers thought that child ate fish caused parasite was in underweight higher than the mothers did not thought (78.5% and 75.8%). And the P-value was 0.628; this mean there is a weak association between the beliefs of mother on child ate fish caused parasite and the underweight children.

And the mothers did not believe that child ate egg caused diarrhea was in underweight higher than the mothers believed (78.6% and 73.1%). But the mothers thought that child ate egg caused diarrhea was in normal higher than the mothers did not thought (26.9%). And the P-value was 0.987; this mean there is a weak association between the beliefs of mother on child ate egg caused diarrhea and the underweight children.

Moreover, the mothers did not believe that feeding child the complementary food caused diarrhea was in underweight higher than the mothers believed (77.3% and 77.2%) while the mothers thought feeding child the complementary food caused diarrhea was in normal higher than the mothers did not believe (22.8%). The P-value was 0.987; this mean there is a weak association between the beliefs of mother on feeding child the complementary food caused diarrhea and the underweight children.

The mothers did not believe that child ate crabs caused parasite was in underweight higher than the mothers believed (78.2% and 71.9%). And the P-value was 0.431; this mean there is a weak association between the mothers believed child ate crabs caused parasite and the underweight children.

Therefore, the mothers thought that child ate vegetable/mango caused diarrhea was in underweight higher than the mothers did not believe (77.9% and 76.9%). The P-value was 0.866; this mean there is a weak association between the mothers believed child ate vegetable and mango caused diarrhea and the underweight children.

Importantly, the mothers thought that child fed the first breast milk caused diarrhea /sickness was in underweight higher than the mothers did not thought (77.4% and 77.2%). And the P-value was 0.965; this mean there is a weak association

between the mothers believed first breastfeeding child caused diarrhea/sickness and the underweight children.

Lastly, the mothers thought that feeding child with rice and sauce resulted in good growth was in underweight higher than the mother did not think (79.4% and 76.4%). And the P-value was 0.639; this mean there is a weak association between the mothers believed feeding child only rice with sauce resulted child good growth and the underweight children.

#### 4.10 The Association between environment factors and underweight children aged under-five

Table 22: Toilet facility, drinking water source and hand washing

Characteristics	Underweight children		Total	$\chi^2$	P vale
	normal	underweight (moderate/ severe)			
	n(%)	n(%)			
<b>1.Main source of child drinking water</b>				1.6297	0.523
Pipe into yard	11(25.0)	33(75.0)	44(100)		
Protect/unprotect well	34(23.8)	109(76.2)	143(100)		
Surface and bottle water	5(15.2)	28(84.8)	33(100)		
<b>2.Child drinking water treatment</b>				6.640	<b>0.036</b>
Boiled water	24(32.4)	50(67.6)	74(100)		
Unboiled water	24(18.9)	103(81.1)	127(100)		
Filtered water	2(10.5)	17(89.5)	19(100)		
<b>3.Toilet facility for child</b>				0.607	0.436
Pit latrine with slab, open pit and lavatory	2(14.3)	12(85.7)	14(100)		
No latrine(bush, field)	48(23.3)	158(76.7)	206(100)		
<b>4.Child shared toilet with others (n=14)</b>				0.389	0.533
Yes	0(0)	2(100)	2(100)		
No	2(16.7)	10(83.3)	12 (100)		
<b>5.Mother hand washing before meal</b>				3.212	0.201
Always	42(24.7)	128(75.3)	170(100)		

Characteristics	Underweight children		Total	$\chi^2$	P vare
	normal	underweight (moderate/ severe)			
	n(%)	n(%)			
Often	2(8.3)	22(91.7)	24(100)		
Sometimes and never	6(23.1)	20(76.9)	26(100)		
<b>6.Mother hand washing after toilet</b>				0.634	0.728
Always	28(22.0)	99(78.0)	127(100)		
Often	9(28.1)	23(71.9)	32(100)		
Sometimes and never	13(21.3)	48(78.7)	61(100)		
<b>7.Mother used clean water and well-heated food preparation</b>				0.074	0.785
Yes	36(23.2)	119(76.8)	155(100)		
No	14(21.5)	51(78.5)	65(100)		
<b>8.Household iodine salt for cooking</b>				0.001	0.972
Yes	11(22.9)	37(77.1)	48(100)		
No	39(22.7)	133(77.3)	172(100)		

\*Significant by Chi-square test.

Table 22 illustrated the child drinking water source, toilet facility, hand washing, complementary food preparation and iodine salt distribution and underweight children aged under-five.

The children whose their drinking water source from the surface and bottle water was the highest in underweight (84.8%) while the children water source from pipe into yard was the highest in normal (25.0%). And the P-value was 0.523; this mean there is a weak association between the main source of drinking water for children and the underweight children.

The children drinking filtered water treatment were the highest in underweight (89.5%). But the children drinking boiled water treatment was the highest in normal (32.4%). And the P-value was equal 0.036 and  $\chi^2$  was equal 6.640, the values showed the strong association between the children drinking water treatment and the underweight children.

The children who used the toilet like pit latrine and lavatory was in underweight higher than the children had not latrine (85.7% and 76.7%), but the

children had no latrine was in normal higher than the children used latrine (23.3%). And the P-value was 0.436; this mean there is a weak association between the child toilet facility and the underweight children.

Regard to the children shared toilet was in underweight higher than the children did not share the toilet (100.0% and 83.3%). And the P-value was 0.533; this mean there is a weak association between the child shared toilet with others and the underweight children.

The mothers practiced hand washing often before meal was the highest in underweight (91.7%), but the mother's practice hand washing always before meal was the highest in normal (24.7%). And the P-value was 0.201; this mean there is a weak association between the mothers practiced hand washing before meal and the underweight children.

The mothers practiced hand washing sometimes and never after toilet were the highest in underweight (78.7%), and the mother's practice hand washing often after toilet was the highest in normal (28.1%). And the P-value was 0.728; this mean there is a weak association between the mothers practiced hand washing after toilet and the underweight children.

Regard the mothers who did not serve clean water and well-heated food preparation was in underweight higher than the mothers served clean water and well-heated food preparation for the complementary food (78.5% and 76.8%). And the P-value was 0.785; this mean there is a weak association between the mothers used clean water and well-heated food preparation for the complementary food and the underweight children.

Importantly, the household did not have iodine salt for food cooking was in underweight higher than the household served the iodine salt (77.3% and 77.1%). And the P-value was 0.972; this mean there is a weak association between the household iodine salt for food cooking and the underweight children.

#### 4.11 The Association between household economic status of the mothers/closed-caregivers and underweight children aged under-five

Table 23: Household economic status and level of underweight children

Characteristics	Underweight children		Total	$\chi^2$	P vare
	normal	underweight (moderate/ severe)			
	n(%)	n(%)			
<b>1.Income of household a year</b>				0.359	0.836
<600,000KHR (<150 USD)	7(21.9)	25(78.1)	32(100)		
600,000-1,400,000KHR (150-350USD)	16(25.4)	47(74.6)	63(100)		
>1,400,000KHR (>350 USD)	27(21.6)	98(78.4)	125(100)		
<b>2.Expense of household a year</b>				0.568	0.753
<600,000KHR (<150 USD)	2(33.3)	4(66.7)	6(100)		
600,000-1,400,000KHR (150-350USD)	5(19.2)	21(80.8)	26(100)		
>1,400,000KHR (>350 USD)	43(22.9)	145(77.1)	188(100)		

#### \*Significant by Chi-square test

Table 23 illustrated the household income and expenditure in year of the mothers and the underweight children aged under-five.

The household had income beyond 350 USD a year was the highest in underweight (78.4%), in contrast, the household had income between 150-350 USD was the highest in normal underweight (25.4%). And the P-value was 0.836; this mean there is a weak association between the household income and the underweight children.

Similarly, the household expensed between 150-350 USD a year was the highest in underweight (80.8%), in contrast, the household expensed below 150 USD was the highest in normal underweight (33.3%). And the P-value was 0.753; this mean there is a weak association between the household expenditure and the underweight children.

#### 4.12 The association between health status of mother/child and the underweight children aged under-five

##### 4.12.1 Health status of mother/closed-caregiver:

Table 24: Health status of mother during pregnancy and underweight children

Characteristics	Underweight children		Total	X <sup>2</sup>	P value
	normal	underweight (moderate/severe)			
	n(%)	n(%)			
<b>1.Mother access to health facility</b>				0.267	0.605
Yes	30(24.0)	95(76.0)	125(100)		
No	20(21.1)	75(78.9)	95(100)		
<b>2.Mother's age during giving child birth (year)</b>				2.881	0.237
<20	7(24.1)	22(75.9)	29(100)		
20-34	41(24.4)	127(75.6)	168(100)		
>34	2(8.7)	21(91.3)	23(100)		
<b>3.Mother's weight at 0-3 months (kg) (n=125)</b>				2.408	0.300
<45	14(20.3)	55(79.7)	69(100)		
45-50	6(14.6)	35(85.4)	41(100)		
>50	5(33.3)	10(66.7)	15(100)		
<b>4.Mother's weight at 9 months (kg) (n=125)</b>				3.419	0.181
<45	14(23.7)	45(76.3)	59(100)		
45-50	4(10.3)	35(89.7)	39(100)		
>50	7(25.9)	20(74.1)	27(100)		
<b>5.Mother received first ANC visit during pregnancy</b>				1.040	0.595
Early missed period	30(24.8)	91(75.2)	121(100)		
Within 16, 28 and 32 weeks	17(21.5)	62(78.5)	79(100)		
No ANC	3(15.0)	17(85.0)	20(100)		

Characteristics	Underweight		Total	X <sup>2</sup>	P v ale
	normal	underweight (moderate/ severe)			
	n(%)	n(%)			
<b>6.Mother consumed iron tablet during pregnancy</b>				1.469	0.832
Regularly	28(24.3)	87(75.7)	115(100)		
Sometimes	13(21.7)	47(78.3)	60(100)		
Hardly and never	9(20.0)	36(80.0)	45(100)		
<b>7.Mother ate meal during pregnancy</b>				0.401	0.818
Normal eating	34(22.4)	118(77.6)	152(100)		
Increase eating	16(48.4)	52(51.6)	68(100)		
<b>8.Mother with chronic disease before and during the pregnancy</b>				0.022	0.882
Yes	13(22.0)	46(78.0)	59(100)		
No	37(23.0)	124(77.0)	161(100)		

**\*Significant by Chi-square test**

Table 24 illustrated the health status of mothers include access to health facility, weight at birth, first ANC accessibility, iron tablet intake and meal consumption during their pregnancy distribution and the underweight children aged under-five.

Regard to the mothers did not access to the health facility during their pregnancies was in underweight higher than the mothers accessed to the health facility (78.9% and 76.0%), but the P-value was equal to 0.605; this mean there is a weak association between the mothers access to health facility during pregnancy and the underweight children.

The mothers aged beyond 34 years during their giving a child birth was the highest in underweight (91.3%) while the mothers aged 20-34 years during giving a child birth was the highest in normal (24.4%). Therefore, the P-value was 0.237; this mean there is a weak association between the mother's age during giving a child birth and the underweight children.

Moreover, the mother's weight between 45-50 kgs during pregnant 0-3 months was the highest in underweight (85.4%), but the mother's weight beyond 50 kgs was the highest in normal (33.3%). And the P-value was 0.300; this mean there is a weak



association between the mother's weight during pregnant 0-3 months and the underweight children.

Similarly, , the mother's weight between 45-50 kgs during pregnant 9 months was the highest in underweight (89.7%), but the mother's weight beyond 50 kgs was the highest in normal (25.9%). And the P-value was 0.181; this mean there is a weak association between the mother's weight during pregnant 9 months and the underweight children.

Mainly, the mothers had no ANC visit during their pregnancies was the highest in underweight (85.0%) meanwhile the mothers received ANC visit early after missed period was the highest in normal (24.8%). Therefore, the P-value was 0.595; this mean there is a weak association between the mothers received first ANC visit during pregnancy and the underweight children.

And the mothers who consumed iron tablets hardly and never was the highest in underweight (80.0%) and the mothers who consumed iron tablets regularly was the highest in normal (24.3%). But the P-value was 0.832; this mean there is a weak association between the mothers consumed iron tablets during pregnancy and the underweight children.

Basically, the mothers who ate normal eating during their pregnancies were in underweight higher than the mothers ate an increase eating (77.6% and 51.6%), while the mothers who ate an increase eating were the highest in normal (48.4%). And the P-value was 0.818; this mean there is a weak association between the mothers ate meal during pregnancy and the underweight children.

Lastly, the mothers who had the chronic disease before and during pregnancy were in underweight higher than the mothers who had no chronic disease (78.0% and 77.0%). And the P-value was 0.882; this mean there is a weak association between the mothers with chronic disease before and during pregnancy and the underweight children.

## 4.12.2 Health status of children:

Table 25: Child breastfed, complementary feeding, child illness and the underweight children

Characteristics	Underweight children		Total	X <sup>2</sup>	P vale
	normal	underweight (moderate/ severe)			
	n(%)	n(%)			
<b>1.Child's weight after delivery (n=144)</b>				2.496	0.114
<2.5kg	2(8.3)	22(91.7)	24(100)		
2.5kg or more	27(22.5)	93(97.5)	120(100)		
<b>2.Child breastfed after delivery (n=214)</b>				0.608	0.436
Yes	44(23.8)	141(76.2)	185(100)		
No	5(17.2)	24(82.8)	29(100)		
<b>3.Initial child first breastfeeding after delivery (n=214)</b>				0.432	0.806
Immediately after delivery	28(24.6)	86(75.4)	114(100)		
Less than 1 hour	8(25.0)	24(75.0)	32(100)		
Within 24 hours and more than 24 hours	14(20.6)	54(79.4)	68(100)		
<b>4.Duration of child breastfeeding (n=211)</b>				0.038	0.846
Less than 6 months and birth to 6 months	18(22.5)	62(77.5)	80(100)		
7-12months and 13-24months onward	31(23.7)	100(76.3)	131(100)		
<b>5.In past 24 hours child breastfeeding 0-6 months (n=30)</b>				0.136	0.712
Breastfeeding alone	1(12.5)	7(87.5)	8(100)		
Breastfeeding with medicine, water and food	4(18.2)	18(81.8)	22(100)		
<b>6.Continued child breastfeeding up to 2 years (n=191)</b>				0.067	0.796
Yes	21(18.8)	91(81.2)	112(100)		
No	16(20.3)	63(79.7)	79(100)		

Characteristics	Underweight		Total	X <sup>2</sup>	P v ale
	normal	underweight (moderate/ severe)			
	n(%)	n(%)			
<b>7.Time initiating child complementary feeding (n=214)</b>				1.372	0.503
Before 6 months	16(23.9)	51(76.1)	67(100)		
At 6 months	16(24.2)	50(75.8)	66(100)		
After 6 months	14(17.3)	67(82.7)	81(100)		
<b>8.Feeding child complementary food alongside breastfeeding(n=218)</b>					
Yes	24(19.4)	100(80.6)	124(100)	1.609	0.205
No	25(26.6)	69(73.4)	94(100)		
<b>9.Child diarrhea during last 2 weeks (n=220)</b>				1.517	0.218
Yes	23(19.5)	95(80.5)	118(100)		
No	27(26.5)	75(73.5)	102(100)		
<b>10.Give child ORS/Zinc for diarrhea treatment (n=118)</b>				3.922	0.270
Yes both (ORS, Zinc)	7(18.9)	30(81.1)	37(100)		
Yes only ORS and yes only Zinc	9(20.5)	35(79.5)	44(100)		
Nothing given	7(51.1)	30(48.9)	37(100)		
<b>11.Child fever during last 2 weeks</b>				0.624	0.430
Yes	42(21.9)	150(78.1)	192(100)		
No	8(28.6)	20(71.4)	28(100)		
<b>12.Child fever with cough during last 2 weeks</b>				4.397	<b>0.036</b>
Yes	39(20.4)	152(79.6)	191(100)		
No	11(37.9)	18(62.1)	29(100)		

**\*Significant by Chi-square test**

Table 25 illustrated the child breastfeeding, child's weight, complementary feeding, child illness and diarrhea treatment distribution and the level of underweight children aged under-five.

Regard to the children's weight 2.5kg or more after delivery was in underweight higher than the children's weight less than 2.5kg (97.5% and 91.7%), but the P-value

was 0.114; this mean there is a weak association between the children's weight after delivery and the underweight children.

The children were not breastfed after delivery was in underweight higher than the children breastfed (82.8% and 76.2%). And the P-value was equal 0.436; this mean there is a weak association between the children breastfed after delivery and the underweight children.

The children who were initiated first breastfeeding within 24 hours and later times was the highest in underweight (79.4%), but the P-value was 0.806; this mean there is a weak association between the children initiated first breastfeeding after delivery and the underweight children.

Basically, the children breastfed below and up to 6 months was in underweight higher than the children breastfed one year and up to 2 years (77.5% and 76.3%) and the children breastfed one year and beyond was in normal higher than the children breastfed less than 6 months (23.7%), but the P-value was 0.846; this mean there is a weak association between the duration of children breastfed and the underweight children.

Moreover the children breastfed alone in the past 24 hours was in underweight higher than the children breastfed with medicine, water and food (87.5% and 81.8%), but the P-value was 0.712; this mean there is a weak association between the child breastfed in the past 24 hours and the underweight children.

Therefore, the children received the continued breastfeeding up to 2 years was in underweight higher than the children did not receive the continued breastfeeding (81.2% and 79.7%), but the P-value was 0.796; this mean there is a weak association between the children received the continued breastfeeding up to 2 years and the underweight children.

Additionally the children were initiated the complementary feeding after 6 months was the highest in underweight (82.7%) while the children received the complementary feeding at 6 months was the highest normal (24.2%), though the P-value was 0.503; this mean there is a weak association between the time of children were initiated the complementary feeding and the underweight children.

The children received the complementary feeding alongside the breastfeeding was in underweight higher than the children did not receive the complementary feeding alongside the breastfeeding (80.6% and 73.4). Therefore the P-value was

0.205; this mean there is a week association between the children received the complementary feeding alongside the breastfeeding and the underweight children.

Chiefly, the children had diarrhea during the last 2 weeks was in underweight higher than the children had no diarrhea (80.5% and 73.5%), but the children had no diarrhea was in normal higher the children had diarrhea (26.5%). And the P-value was equal 0.218; this mean there is a week association between the children with diarrhea during the last 2 weeks and the underweight children.

In contrast, the children were treated with both ORS and Zinc package during the diarrhea was the highest in underweight (81.1%). But P-value was 0.270; this mean there is a week association between the children treated diarrhea with ORS and Zinc package during the last 2 weeks and the underweight children.

Importantly, the children had fever during the last 2 weeks was in underweight higher than the children had no fever (78.1% and 71.4%). And P-value was 0.430; this mean there is a week association between the children fever during the last 2 weeks and the underweight children. Therefore, the children had fever with cough was in underweight higher than the child had no fever with cough (79.6% and 62.1%), and the children had no fever, no cough was in normal higher than the child had (37.9%). Though the P-value was equal to 0.036 and  $\chi^2$  was equal 4.397, this mean the strong association between the children had fever with cough during the last 2 weeks and the underweight children.

## CHAPTER V DISCUSSION, CONCLUSION AND RECOMMENDATIONS

### 5.1 Discussion

This study was a cross sectional study to identify the sociocultural and other factors associated with the underweight children aged under-five in Preah Vihear province, Cambodia.

Malnutrition was the underlying causes of 20 million children aged under-five death and serious illness (WHO, 2012). In Cambodia, the death of under-five children was 118 deaths per 1,000 live births and 56 percent of stunting, 8 percent of wasting and 37 percent of underweight due to the complex interaction between food consumption and the overall health status and care practices. The numerous socioeconomics and cultural factors influenced decision on pattern of feeding and nutrition (CDHS, 2010).

Therefore in this study implicated the child nutritional status prevalence of under-five children, (77.3%) of underweight, (60.9%) of stunting and (61.4%) of wasting that was higher than the National health survey (CDHS, 2010), due to this study conducted in the community where the most of mothers were (13.2%) of **Kuy** ethnic minority, (56.8%) of the household income below 350USD in a year and (63.7%) of the mothers in lower education. Similarly, compares to another studied in Vietnam among the ethnic minorities, the prevalence of malnourished children aged under-five, (29.3%) of underweight, (28.3%) of stunting and (10.0%) of wasting (Le Thi Huong & Vu Thi Thu Nga, 2013).

#### **Socio demographic characteristic of the mother/closed-caregiver**

The study replicated that the majority of mother's age (47.2%) between 25-34 years and followed by (35.9%) aged 15-24 years, but in this study could not find out the association between mother's age and underweight. Therefore, the similar studied prevalence of malnutrition associated factors among the pre-school children in Dadhikot village Bhaktapur district rural areas of Nepal (Kamjorn, 1994) indicated that the age of mother is very significant association with the malnourished children under-five years of age. In addition, the educational level obviously (63.7%) of the mothers completed only primary school and (95.3%) of the mother/closed-caregivers' occupation are farmers whom lived depend on the crops production.

Moreover, (45.0%) of the households had 5-7 people. And there was (19.5%) of all the children aged 12-17 months, (52.3%) of male and (47.7%) of female children.

Regard to the child's sex, the studied revealed that (78.1%) of the underweight among the female children higher than the male children. In the contradict studied by Cambodia Ministry of Planning (2003), found that girls have slightly lower rates of moderate and severe malnutrition than boys, due to the gender disparity and some of the cultural aspects in Cambodia. Similarly to the studied in Zambian culture, a boy needs to eat food with a father. While eating with father may get less food than the female child who always stays with mother, she may pass on whatever she has herself through the day. Furthermore, the boy may expense more energy because of playing, which could attribute to the higher prevalence of malnutrition in the boy than girl (Rudatsikira, E. et al, 2011).

### **Factors associated with the level of underweight children aged under-five**

#### **Socio demographic characteristics (mother's education):**

The findings indicated the mother's education, (63.7%) of the mothers studied only primary school, and this educational level was strongly associated with the underweight children aged under-five with ( $p$ -value=0.035). And the finding was analogous to the studied of the factors affecting prevalence of malnutrition among children under three-years of age in Botswana; found that the prevalence of underweight decreased significantly ( $p < 0.01$ ) when the level of the mother's education increased (Salah E.O, 2006). Similarly report from the national demographic health survey revealed that the mother's education level was negatively correlated with the likelihood that the child was underweight. Additional studied in Bangladesh, factors causing malnutrition among under five children, the main contributing factors for underweight children aged under-five were found to the parent's education (Israt Rayhan et al, 2006). Additional similar studied about the demographic, cultural and environment factors associated with frequency and severity of malnutrition among Zambia children less than five years of age, the low level of the mother's education was associated with underweight (Selestine H. Nzala et al, 2011). From national family health survey India, (Fred Arnold et al, 2009). The percentage of children was underweight almost three times higher for the children whose mothers have no education or lower education.

#### **Number of times feeding/breastfeeding:**

In this study, the findings revealed that children feeding/breastfeeding below 3 times a day, it was strongly associated with the underweight children aged under-five, ( $p$ -value=0.05). Similar report from the national demographic health survey (2010),

the children need more frequency of times feeding with the appropriate quantity and quality due to the transition period (ages 6-23 months), the prevalence of malnutrition increased substantially because the increased infection and the poor feeding practices (CDHS, 2010). Vitaly, UNICEF and WHO recommends the introduction of solid food to infants at appropriately the age of 6 months due to the breast milk alone is not sufficient to pertain the child's optimal growth. Further the complementary feeding should be safe, appropriate and adequate foods as well as the frequency of complementary feeding, 2 times per day for children 6-8 months and 3 times per day for children 9-11 months (MICS Thailand, 2006). Therefore another breastfeeding should be "on demand", as often as the child wants day and night and the bottles feeding should be avoided (WHO, 2014). In this study proved that (30.0%) of the children were introduced complementary food at 6 months. Importantly, UNICEF and WHO recommends that early initiation of breastfeeding is encouraged because first breast milk contains colostrum which contains highly nutrient and has antibodies that protect the newborn from diseases. By the way, in this study indicated that only (51.8%) of the children were breastfed immediately after delivery.

#### **Giving child extra snacks feeding:**

The findings revealed that the children received feeding extra snacks during the day were in underweight, that was strongly associated with the underweight children ( $p < 0.05$ ). Similarly, CDHS (2010) reporting that underweight children began to increase at the age when normal complementary feeding starts due to the inappropriate or inadequate feeding practices. This finding was analogous to the study of Kiribati (2009), child and maternal nutrition survey found that poor nutrition due to not eating enough nutritious food, eating too much food that is high in fat and sugars, and other socio-cultural factors. The evident resulted (59.5%) of the children consumed cakes and (36.8%) of candies during the day and night. In contrast (30.8%) of the children received the complementary feeding with nutritional adequate, appropriate and safe food at six months to complement breastfeeding. This was due to the mothers/caregivers misunderstood that the extra snack feeding was appropriate for their children growth. Also, fed frequently not enough according to ICYF feeding recommendations and not fed a sufficient variety of foods.

#### **Food relating factors (food availability):**

The findings revealed that the children ate carbohydrate food was in underweight ( $p < 0.05$ ), was strongly associated with the underweight children. Also,



the children ate protein food group was in underweight ( $p < 0.05$ ), and the children ate vegetable/fruit group was in underweight ( $p = 0.05$ ) and the children ate sweets food was in underweight ( $< 0.05$ ). That was because of the food culture and beliefs of the mothers fed the children only separately food rather than the combined food groups. And the solid foods, such as mashed fruits and vegetables, should be introduced to complement breastfeeding for up to two years or more. Due to the traditional cultural food practices, cassava, mango, beans squash are sparingly consumed by the children. The studied was analogous to a study of effect of cultural beliefs and forbidden foods on the ABCD parameters of nutrition among some children in Nigeria in 2008. Another previous study by Peter O. Ogunjuyigbe (2002), Ebenezer O. Ojofetimi (2007), found that cultural food habits and infant feeding practices were identified as major causes of childhood malnutrition. The cultural food habits and children feeding food practice were identified as major causes of childhood malnutrition. For example, from the culture point of view, among some major ethnic groups and Khmer people, the concept of healthy child was taking to meaning 'fat baby'.

#### **Food prejudice and beliefs:**

In this study, the food prejudice and beliefs of the mother/closed-caregiver was not significant association with the level of underweight children ( $p > 0.05$ ). In contrast, the studied by Innocent Onyesom (2008), "effect of cultural beliefs and forbidden foods on the ABCD parameters of nutrition among some children in Nigeria". It found that food prejudice and prohibition was strong factors accountable for under nutrition of children in the rural communities (Onyesom et al 2008). The studied also revealed that cultural attitudes of parents toward certain foods may contribute to children's under nutrition prior to the food prejudice and beliefs.

#### **Environment factor (child drinking water treatment):**

The findings revealed that child drinking water treatment were associated in underweight ( $P\text{-value} = 0.036$ ), that was strongly associated with the underweight children. This finding was analogous to the studied on the influence of socio-economic factors on nutritional status of children in rural community of Nigeria, found that there was no association between the source of drinking water and malnutrition ( $p = 0.568$ ), (Senbanjo I.O at al, 2007).

Therefore, the report from UNICEF, the way treating water at home to make safer to drink includes boiling and using a water filter were considered proper

methods treatments for drinking water (MICS Vietnam, 2006). The studied in Nigeria (2011), using anthropometric measures to analyze how sources of water and sanitation affect children health in Nigeria, found that the increasing access to safe drinking water for households will be highly reduced the high incidence of underweight among the children in Nigeria (Olabisi Adewara and Martine Visser, 2011).

#### **Health status of child (child fever with cough):**

The finding revealed that the children had fever with cough was in underweight higher than the child had no fever with cough ( $p$ -value=0.036), that was strongly associated with the underweight children under-five years of age. The findings from WHO (2009), the children who were malnourished may have higher risk of infection, morbidity and mortality than the well-nourished children (WHO, 2009). Further findings from UNICEF (1991), due to the inadequate feeding and care, the children became malnourished and high risk of infection and disease (UNICEF, 1991).

Fever is a primary manifestation of acute infections in children. Fever can contribute to high levels of malnutrition and mortality (CDHS, 2010). The prevalence of fever varied by the age of the child 6-11 months and 12-23 months were more commonly sick. In addition to that the mothers/caretakers are recommended to bring their children to the health facility for treatment as soon as possible. Fever can attribute to the malnutrition; especially the underweight children may loss body fluid, so then treating by giving more fluid to drink, giving the complementary food if the children are beyond 6 months olds. Therefore if the children aged 0-6 months under the exclusive breastfeeding, the mothers/caretakers provide more frequently breastfeeding time during the day and in addition to the treatment (CDHS, 2010). Another report from Cambodia anthropometric survey (2008), found that the prevalence of children diarrhea, fever, ARI has not been improved over the decade (2000 to 2010), due to the lowest wealth assets and either sanitation or longer-term of under nutrition of the household food and livelihood crisis and the exposure to repeated infection as the malnutrition conceptual frame work of UNICEF (1991).

#### **Another factors related to the underweight children aged under-five:**

Regard to the belief of first breast milk caused child diarrhea (42.3%) due to the mothers still believed that the first breast feeding caused to child diarrhea, thus need to educate mother/closed-caregiver to understand about this essential breast milk substances. And the food group consumption, the food items provided most of the children consumed very few of protein, vegetable and carbohydrate food but

consumption more in sweets group. These findings need to do health education to the mother/closed-caregiver to aware about the protein is essential benefits for child growth, vegetable/fruit food for detection of infection disease as well as should be avoiding the sweets consumption. Therefore, protect/unprotect well (65.0), due to the finding over half (65.0%) of the children drinking water source from protect and unprotect well, that was improved water, then need to provide health education to the mother/closed-caregiver to understand and aware about the drinking water source. And another of child drinking water treatment, over half (57.7%) of unboiled water are drinking by the children that recognized to be unsafe drinking water with the high exposure of infection and disease, especially diarrhea, so that the health education needs to be provide among the mothers/closed-caregivers in the community. Similarly, there was no latrine (93.6%) all most of the household with higher risky to have diarrhea and another communicable disease. The finding needs to provide health education and promote CLTS in the community. Therefore the hand washing practice was (57.7%) of the mothers practice hand wash regular after the toilet. The finding the mothers/caretakers are lack understanding about the hygiene and sanitation, the health education to the communities are very important to consider. Basically, the first ANC visit during ANC only over half (55.0%) of the mothers, the finding was very high compares to the national health report and the recommends by World Health Organization. The health education and counseling to the pregnant mothers about the essential ANC visit for both mother and child during the pregnancy. In addition, the iron tablets consumption only (52.3%) of the mothers, the findings need to provide health education and counseling to the mothers understands the benefits and consequences of the iron deficiency for both mother and child during the pregnancy. Regard to the breastfeeding, only (50.9%) of the children breastfed while the another half percent of mothers did not provide the breastfeeding due to the lack of understanding with the increase of formula milk promotion in the free market. The health education and campaign needs to be considered and implemented to the mothers and relevant stakeholders. As the basic component for the child optimal growth, the complementary feeding needs to provide timely and adequately amount due to the children age transition between 6-24 months need more energy and food for their growth and development. In this study found (56.4%) of the children received the complementary food, so that needs to provide health education to the mothers and relevant children care takers aware about this vital message.

As the result of above mentions, the children are longer-term exposure to the repeated infections of diarrhea (53.6%), fever (87.3%) and fever with cough (86.8%) and resulting revealed the high prevalence of under nutrition children in the communities. This findings need to address through health and nutrition education, ANC and breastfeeding counseling, implementing law to reduce the infant formula products promotion as well as the increase complementary feeding through the baby friendly community-initiative in the community.

## 5.2 Limitation

-Strength: community (mother/children/local authority) actively participated in the survey and the provincial health department and World Vision Cambodia provide a good support and collaboration during the data collection process. Importantly, the questionnaire used for this study was modified from MICS UNICEF 2006 in Thailand and Vietnam countries.

-Weakness: the study focused on a small sample population from only 3 sub-districts of Chhaeb district, Phreah Vihear province, Cambodia. Another related to time was very limited, statistical analysis used only Chi-square to find out the association, the study focused only underweight level of malnutrition and some parts of the questionnaires was a bit difficult to understand by research assistant and the mothers during the survey.

## 5.3 Conclusion

From the findings can be summarized that, the prevalence of malnourished children aged under-five in Preah Vihear province, Cambodia was very high compares to the national health survey 2010 ( 77.3% in this study and 28.3% from national survey).

In this study, the significant result revealed the mother's education, number of times feeding/breastfeeding, giving child extra snacks feeding, food relating factors in term of food availability, environment factor and health status of children (child illness). Therefore the result from sociocultural factors in term of food culture and beliefs of the mother/closed-caregiver as following,

Regard to the mother's education level that was very low educated, so that the mothers are lack of understanding to care themselves during the pregnancy, for instance, the mothers did not increase their meal and received ANC visit properly follow the ANC guideline. Further the mothers provided inadequate feeding their

children to have a good optimal growth as they just fed children of the same families' food regardless the appropriate and adequate amount of the infant and young children feeding guidelines.

Moreover, the frequency times of children feeding/breastfeeding, due to the traditional culture most of the mothers discarded the first breast milk (colostrum) by providing sweeten water or juice to the baby instead during the first three days after delivery. The mothers recognized that their newborns are very thirsty and hungry thus feeding some food to stop their crying. Therefore many mothers breastfed their newborns more during the day than at night while the other mothers just left out their baby with the caretakers without breastfeeding. In some perspectives, the most of mothers just considered feeding their children triple times a day rather than giving anything to eat and made a decision to discard the breastfeeding while the feeding food period.

Basically due to age transition, the children need more calories and energy food to maintain their optimal growth and development. Therefore during this change, most of the mothers start giving their children extra snacks during the day. Though most of their children snacks noticed that are sweets food and bottles feeding rather the complementary food with combined nutrient composition. And those of the mothers are giving the extra snack during the day within the times of feeding food during the day. Some of the children will not appetite after they already received the beyond snacks than meal as the basis.

As the finding identified that most of the household members and their children were drinking unboiled and filtered water rather than the boiling water, that was due to the traditional and culture of the people in the community as well as the ethnic groups recognized that the drinking water treatment was not vital concept to change the well-being of the children and own selves. So they just thought to keep this habit from the past up to now. Another reason due to the health care system in Preah Vihear province was still very limited to cover the health education to all their population that revealed the most of health behavior among the communities are very limited and unchangeable to their previous habits practices.

Mainly, the children illness of fever and cough are resulted from the lack of health care and the feeding practices from the mother/caregiver due to the lack of knowledge, understanding, poverty, food insecurity, hygiene and sanitation, sociocultural and the old habits practice influences of the old parents to the young mothers. The children are more exposed to the repeated infection and disease

while the mothers are unable to improve the household food security, income and child care practice include understanding of essential breastfeeding, complementary feeding, childhood illness management and enhancing their mothers health during the pregnancy as well.

Another finding revealed food culture and beliefs, over half the mothers/closed-caregivers thought that child ate fish caused to parasite; indeed, fish was the most popular food in Cambodian traditional culture. In the community, the people can easily get fish from the river or pond nearby their houses. As the result of the parents still had that food belief, thus their children consumed less protein food during the day and night. Similarly, the food belief of fruits/vegetables in term of mango, the most of the mothers/closed-caregivers thought that child consumed that food can cause diarrhea due to the belief of hot food. In fact, that food contains micronutrients and vitamin that could detect children from the infection. More importantly, over half of the mothers thought that first breast milk caused child to diarrhea or sickness due to their food beliefs. That was because of the mothers were lack of understanding about this essential first breast milk that can detect child from the infection disease, especially diarrhea. Due their food beliefs there were many children under five years of age exposed to the underweight in the community.

## **5.4 Recommendation**

### **5.4.1 Recommendation for policy makers:**

The findings indicated that malnourished children aged under-five due to the mother's education, number of time feeding/breastfeeding, feeding child extra snacks, child drinking water, childhood illness and diverse food group consumption. These indications were due to the inadequate health care service coverage and the understanding of the mother/closed-caregiver toward to the maternal and child health issues. So readdressing of this issues, the policy and strategy related to health and nutrition should be implemented from the national to the community level. And all the relevant health stakeholders (national and international organizations) should also be implemented these strategies following the ministry of health guidelines to improve the maternal child health and nutrition in the community as well.

To improve this maternal child health and nutrition effectively, both implementing organization, health care provider and the mother/caregiver should

participate in implementing health and nutrition education includes train capacity of health volunteers, implementing baby friendly community-initiative (BFCI), community integrated management of childhood illness (CIMCI), promoting breastfeeding and hygiene and sanitation, promoting complementary feeding, screening acute malnutrition and ANC counseling for the pregnant women in the community.

#### **5.4.2 Recommendation for further studies:**

It was a cross sectional study and tested the association by Chi-square test among the 220 respondents, can only tell the association or not. Therefore, other studies should focus on multiple logistic regressions for more association both variables.

In this study has been implemented in Chhaeb district of Preah Vihear province, so that cannot generalize as whole prevalence of malnutrition among under-five children in Cambodia. Other studies should undertake in some provinces and urban in comparison of the prevalence.

This study finds out only the association between underweight children. Other studies should focus further association between stunting and wasting variables.

## REFERENCES

- Adoption Nutrition. Contributing factors to malnutrition. [Online]. 2013. Available from: <http://adoptionnutrition.org/what-every-parent-needs-to-know/contributing-factors-to-malnutrition/> [2013, September]
- Action against Hunger International (ACF). Hunger or under-nutrition resulted from the insufficient intake of macro/micro nutrients. [Online]. 2013. Available from <http://www.actionagainsthunger.org/hunger> [2013, December]
- Kim Fleischer Michaelsen. Complementary Feeding of Young Children in Developing Countries: a Review of Current Scientific Knowledge. **American Journal of Clinical Nutrition**; 2000, 4(2):605-606
- CDC. Report on social determinants of health. [Online]. 2013. Available from: <http://cdc.gov/socialdeterminants/Definition/html> [2013, December]
- Childinfo.org. Report on statistics by areas of child nutrition. [Online]. 2013. Available from: [http://www.childinfo.org/malnutrition\\_progress.html](http://www.childinfo.org/malnutrition_progress.html) [2013, September]
- Cambodia Demographic and Health Survey (CDHS). Ministry of Planning & Ministry of Health. [Online]. 2010. Available from [www.nis.gov.kh/nis/CDHS/CDHS\\_2010\\_Key\\_Findings.pdf](http://www.nis.gov.kh/nis/CDHS/CDHS_2010_Key_Findings.pdf) [2013, November]
- Cambodia Anthropometrics Survey. UNICEF Cambodia 2008. [Online]. Available from [http://www.unicef.org/socialpolicy/Cambodia\\_Anthropometrics\\_Survey.pdf](http://www.unicef.org/socialpolicy/Cambodia_Anthropometrics_Survey.pdf) [2013, October]
- Caulfield LE., de Oni M., Blossner M., Black RE. Under nutrition as an underlying cause of child deaths associated with diarrhea, pneumonia, malaria, and measles. **Am Journal of Clinic Nutrition**; 2004, 7(4):193-8
- Cambodia Human Development Report. Ministry of Planning [Online]. 2003. Available from [www.mop.gov.kh/LinkClick.aspx?fileticket=B1f%2B3xcXSi0%3D...](http://www.mop.gov.kh/LinkClick.aspx?fileticket=B1f%2B3xcXSi0%3D...)
- Detrveller.(1987). Complementary feeding of young children in developing countries. 118.
- Selestine H. Nzala et al. Demographic, cultural and environment factors associated with frequency and severity of malnutrition among Zambia children less than five years of age. Department of Public Health, School of Medicine, University of Zambia, Lusaka, Zambia. **Journal of Public Health and Epidemiology** ;2011, 3(8): 362-370



- Ebenezer O. Ojofetimi. **Report on Culture and feeding practices: Major underlying causes of childhood malnutrition in developing countries.** Institute of Public Health, College of Health Sciences Obafemi Awolowo University, Ile-Ife Osun State, Nigeria, 2007
- Israt Rayhan, M. Sekander Hayat Khan. Factor causing malnutrition among under-five children in Bangladesh. Institute of Statistical Research and Training, University of Dhaka, Dhaka-1000, Bangladesh. *Pakistan Journal of Nutrition*;2006: 8(6) 558-62
- Howard, M. Socioeconomic causes and cultural explanation of childhood malnutrition among the Chagga of Tanzania. *Soc. Sci. Med*;1994 38 (2):239-51
- Kenya, Ministry of Health. (2011). Beliefs and attitudes around infant and young child feeding in Kenya Rapid qualitative assessment (pp. 45 ).Kenya PATH, NARESA, Infant and Young Child Nutrition (IYCN) Project.
- Kiribati Demographic and Health Survey Report (2009). Child and maternal nutrition.
- Mary, M., Report on Spien Sokhapeap baseline assessment. World Vision Cambodia (September 2011): 23-25.
- Merriam Webster Online: Dictionary and Thesaurus. [Online]. 2013. Available from <http://www.merriam-webster.com/> [2013, November]
- Mother and Child Nutrition. Management of malnutrition in children under five years. [Online]. 2013. Available from: <http://motherchildnutrition.org/malnutrition-management/integrated-management/taking-the-weight-for-height-length.html> [2013, October]
- Steven M. Fishman, Laura E. Caulfield, Mercedes de Onis, Monika Blössner, Adnan A. Hyder, Luke Mullany and Robert E. Black. Child hood and maternal underweight.1998: 42-49
- Madusolummuo MA, Akogun OB. Sociocultural factors of malnutrition among under-fives in Adamawa state, Nigeria. *Journal of Nutrition and Health*; 1998, 12(4):257-62
- Ananya, M. Symptoms of malnutrition. [Online]. 2013
- OXFAM. What causes bad nutrition, not enough power or not enough vitamins.
- Onyesom In, Onyesom Chi, Ofili, Isi. Mar., Anyanwu Ebi. Blai., Uzuegbu, U. (2008). Effect of Cultural Beliefs and Forbidden Foods on the ABCD Parameters of Nutrition among Some Children in Nigeria: Findings from *Middle-East Journal of Scientific Research*;2008, 6(3):53-56.
- Polivy, J. & Herman, C.P. Etiology of binge eating: *Journal of Annual Rev Psychol* 2002; 53(4):187-213

Peter O. Ogunjuyingbe. **Report on Culture and feeding practices:**

**Major underlying causes of childhood malnutrition in developing countries.**

Department of Demography and Social Statistics Obafemi Awolowo University, Ile-Ife Osun State, Nigeria, 2002

Subba Rao, G. M., Sudershan, R. V., Rao, P., Vishnu Vardhana Rao, M., & Polasa, K. (2007). Food safety knowledge, attitudes and practices of mothers: studies in South India. *Appetite, Journal appet*; 2007, 49(2): 441-49

Salah E.O. Mahgoub, Maria Nnyepi, Theodore Bandeke. **The Factors are affecting prevalence of malnutrition among children under three-years of age in Botswana.** Online: *African Journal of Food Agriculture Nutrition and Development*;2006 6 (1):521-45

Thailand Multiple Indicator Cluster Survey (MICS). UNICEF Thailand 2006

The Hindu. Report on malnutrition causes 45 percent of child under five deaths. [Online]. 2013. Available from <http://www.thehindu.com/news/national/malnutrition-causes-45-per-cent-of-deaths-of-underfive-%20children-report/article4788613.ece> [2013, September]

UNICEF, WHO, World Bank. Global database on child growth and malnutrition. [Online]. 2011. Available from <http://www.who.int/nutgrowthdb/estimates/en/> [2013, November]

UNICEF. Definition of malnutrition. [Online]. 2013. Available from <http://www.unicef.org/progressforchildren/2006n4/malnutritiondefinition.html> [2013, November]

UNICEF. Nutrition in Emergencies. [Online]. 2010. Available from: <http://www.unicef.org/nutrition/training/index.html> [2013, November]

United Nations. An Overview of Millennium Development Goals.

Vietnam Multiple Indicators Cluster Survey (MICS). UNICEF Vietnam. [Online] 2006. Available from [www.childinfo.org/files/MICS\\_booklet\\_in\\_Eng.pdf](http://www.childinfo.org/files/MICS_booklet_in_Eng.pdf) [2013, November]

WHO. Physical status: the use and interpretation of anthropometry. WHO Technical Report Series No. 854. Geneva 1997.

WHO. Food and Nutrition Needs in Emergencies. Geneva Switzerland, 1998.

WHO. Complementary feeding of young children in developing countries: A Review. [Online]. 1998. Available from: [http://www.who.int/nutrition/publications/infantfeeding/WHO\\_NUT\\_98.1/en](http://www.who.int/nutrition/publications/infantfeeding/WHO_NUT_98.1/en) [2013, September]

WHO, UNICEF. Report on child growth standards and the identification of severe acute malnutrition in infants and children. [Online]. 2011. Available from:

<http://www.who.int/nutrition/publications/severemalnutrition/9789241598163/en/> [2013, September]

WHO. Nutrition for Health and Development (NHD) Sustainable Development and Healthy Environments (SDE). [Online]. 2001. Available from

<http://www.who.int/nutrition/topics/malnutrition/en/> [2013, September]

WHO. Report on infant and young child feeding-tools and materials; 2009

WHO. Child growth standards.[Online]. 2013. Available from

<http://www.who.int/childgrowth/en/index.html> [2013, October]

WHO. Report on under-five mortality. [Online]. 2013. Available from

[http://www.who.int/gho/child\\_health/mortality/mortality\\_under\\_five/en/index.html](http://www.who.int/gho/child_health/mortality/mortality_under_five/en/index.html) [2013, September]

WHO. Reducing child mortality. [Online]. 2013. Available from

<http://www.who.int/mediacentre/factsheets/fs178/en/> [2013, October]

World Bank. Report on mortality rate of under-five (per 1,000 live births).

[Online].2013. Available from:

<http://data.worldbank.org/indicator/SH.DYN.MORT> [2013, October]

World Vision International. Community-based management of acute malnutrition mode. WHO program. [Online]. 2012. Available from

<http://wvi.org/nutrition/project-models/cmam> [2013, November]



APPENDIX

จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY

## APPENDIX A: Administration and Time Schedule

No	Research Activities	2013							2014				
		Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
1	Literature review	←————→											
2	Proposal writing and submission					←————→							
3	Ethical consideration							←————→					
4	Data collection									←————→			
5	Data Analysis									←————→			
6	Report Writing									←————→			
7	Thesis presentation and final submission									←————→			

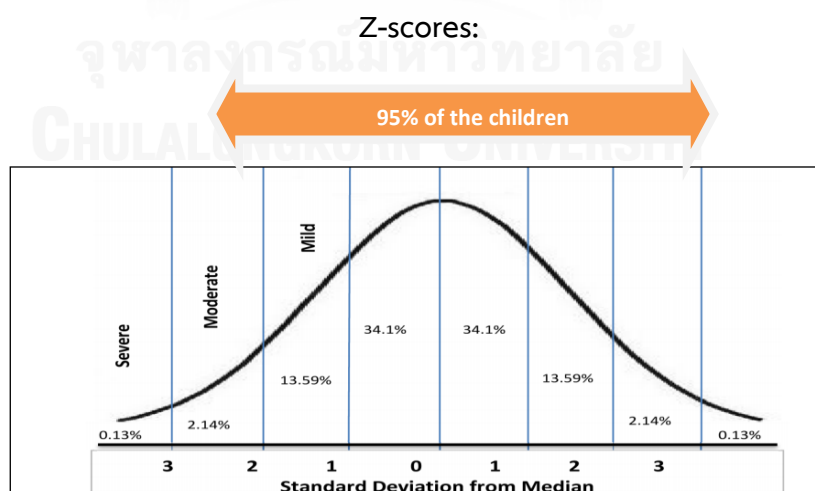
## APPENDIX B: Estimation Budget Plan

No	Descriptions	Total budget (Baht)
1	Pretest process:	
	1. Print and copy questionnaires	1200
2	Data collection process:	
	2. Print and copy questionnaires	1400
	3. Gifts for respondents	5000
	4. Research assistant per diem	9000
	5. Transportation fee	4000
	6. Accommodation fee	5400
	7. Anthropometric materials (scales & meters)	4000
	<b>Grand Total:</b>	<b>30,000Baht</b>

## APPENDIX C: Anthropometric measurement

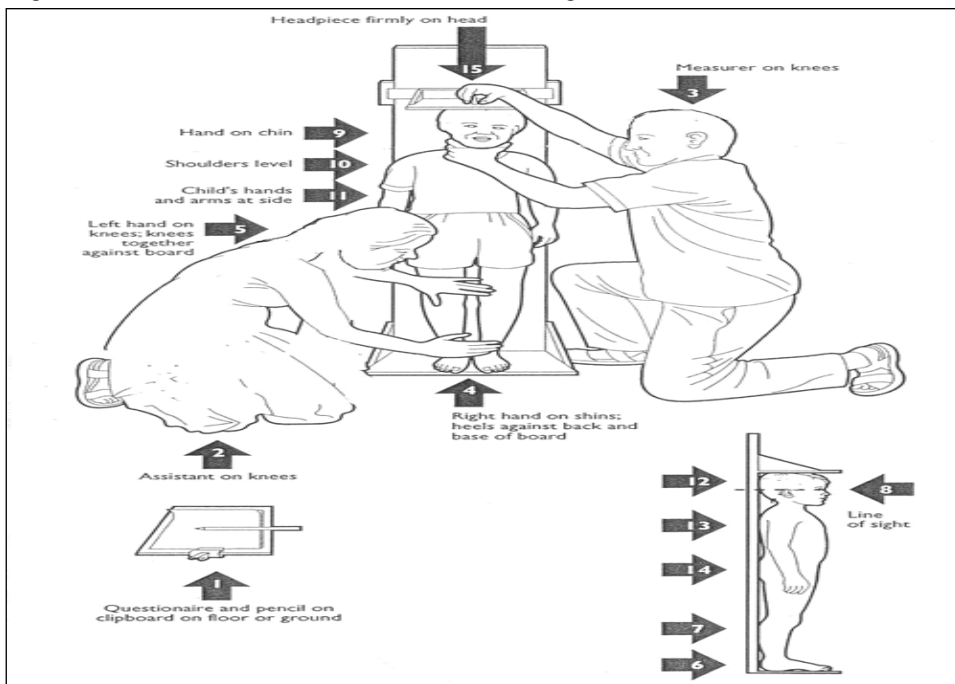
Each of three nutrition indicators describes in standard deviation (Z-scores) from the median of the WHO reference value.

Figure 7: Z-score:



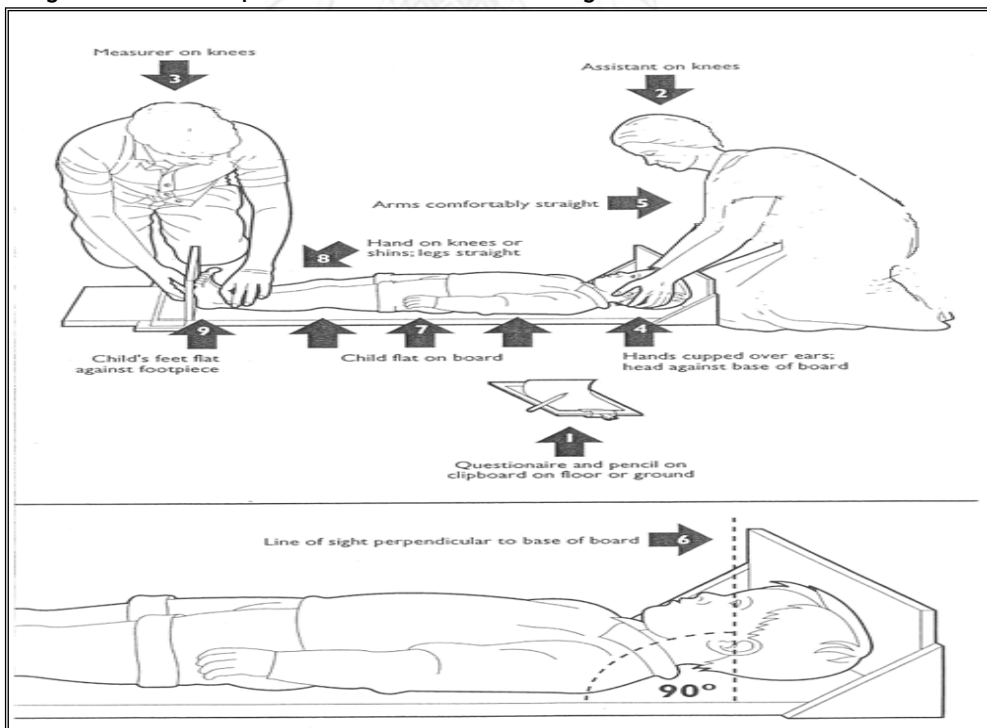
Source: WHO, 2011 (Mean or Median Z-score)

Figure 8: Anthropometric measure of height



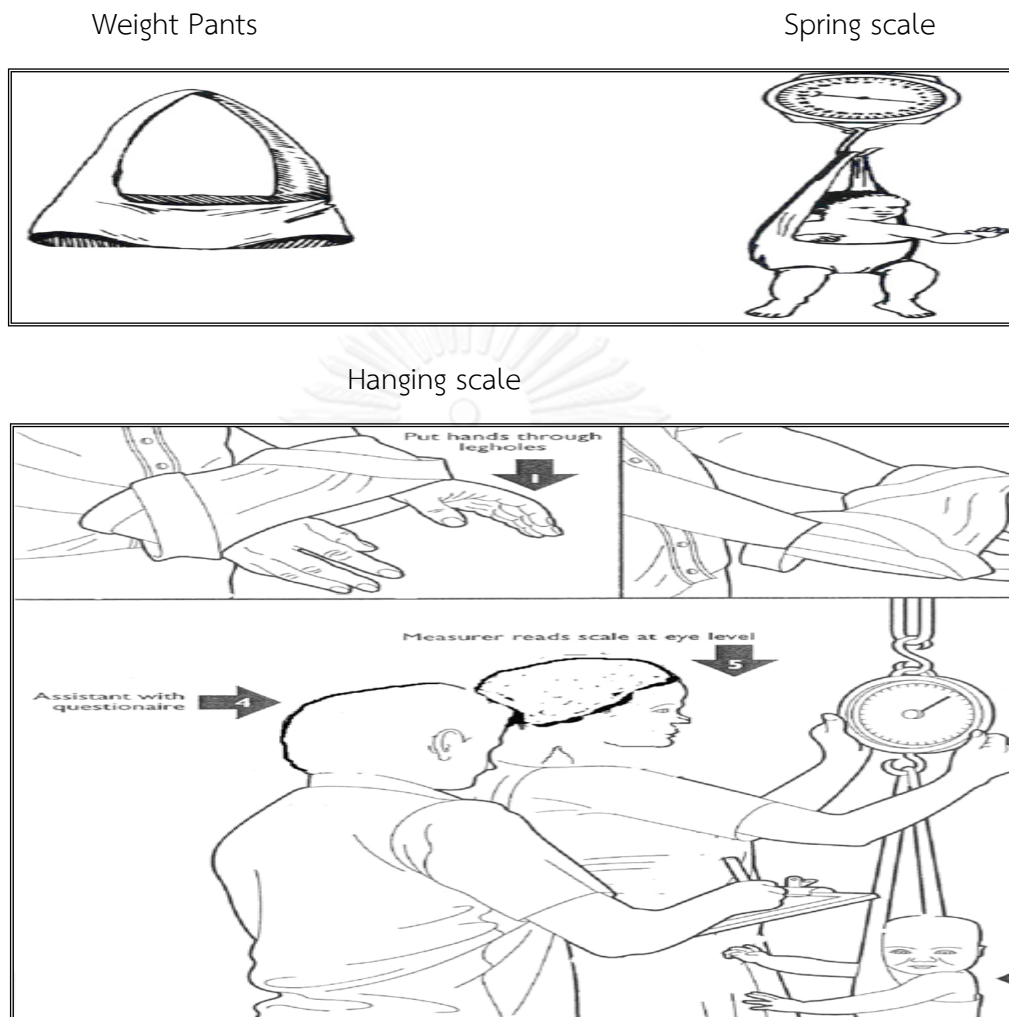
Source: WHO, UNICEF, 2013

Figure 9: Anthropometric measure of length



Source: WHO, UNICEF, 2013

Figure 10: Anthropometric measure of weight



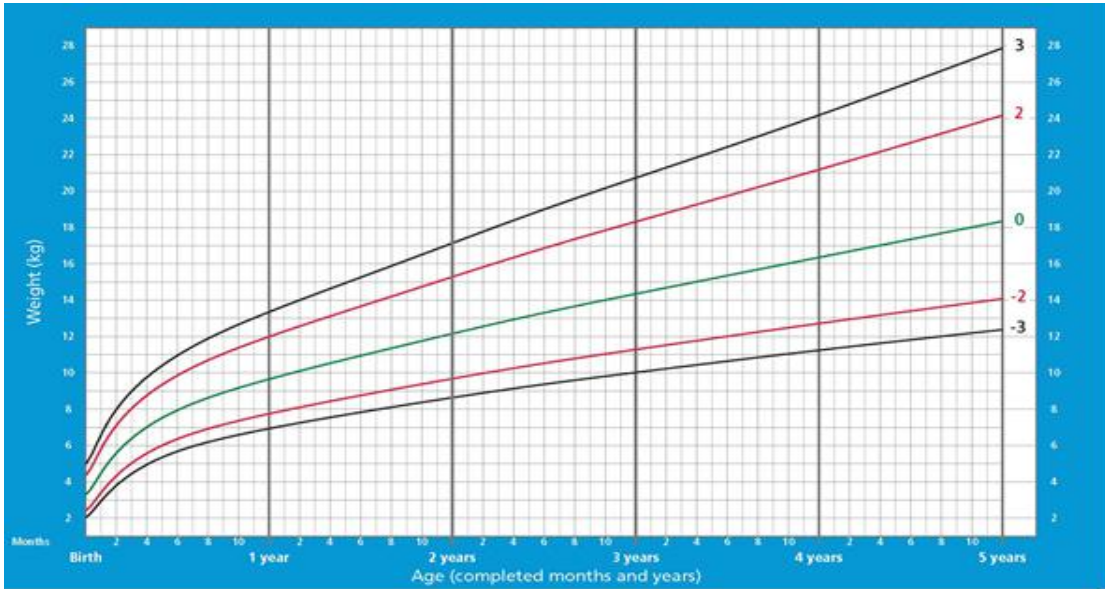
Source: WHO, UNICEF, 2013

จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY



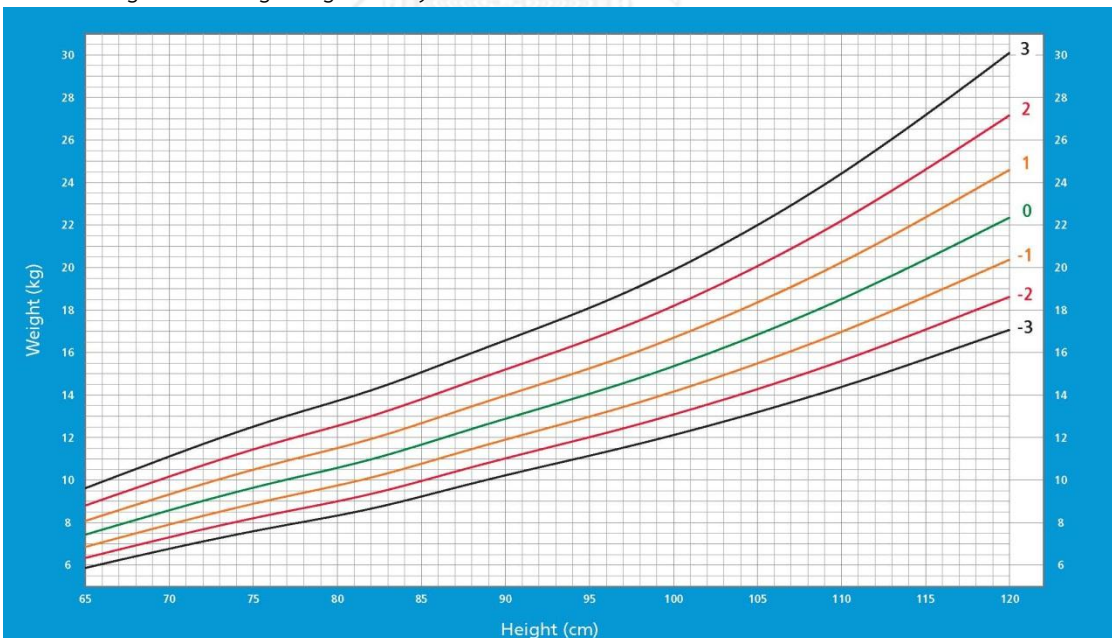
Figure 11: Child growth standards of the boys

Weight for age 0-5 years, (-2, -3 SD moderate & severe malnutrition of Red and Black line).



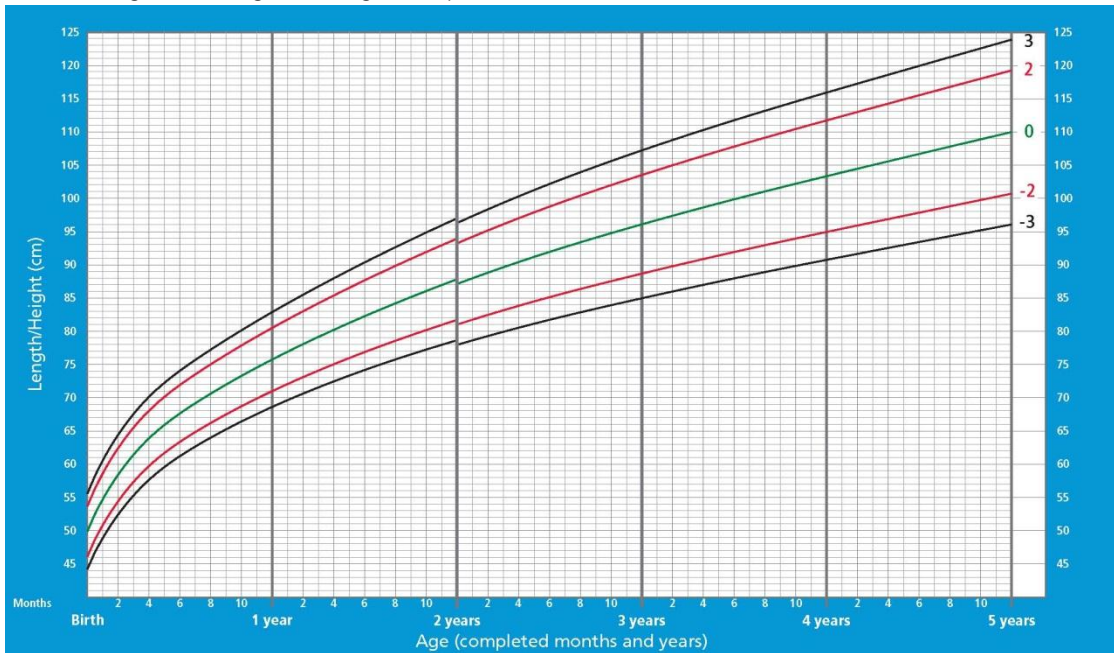
Source: WHO child growth standards, 2010

Weight for height age 2- 5 years



Source: WHO child growth standards, 2010

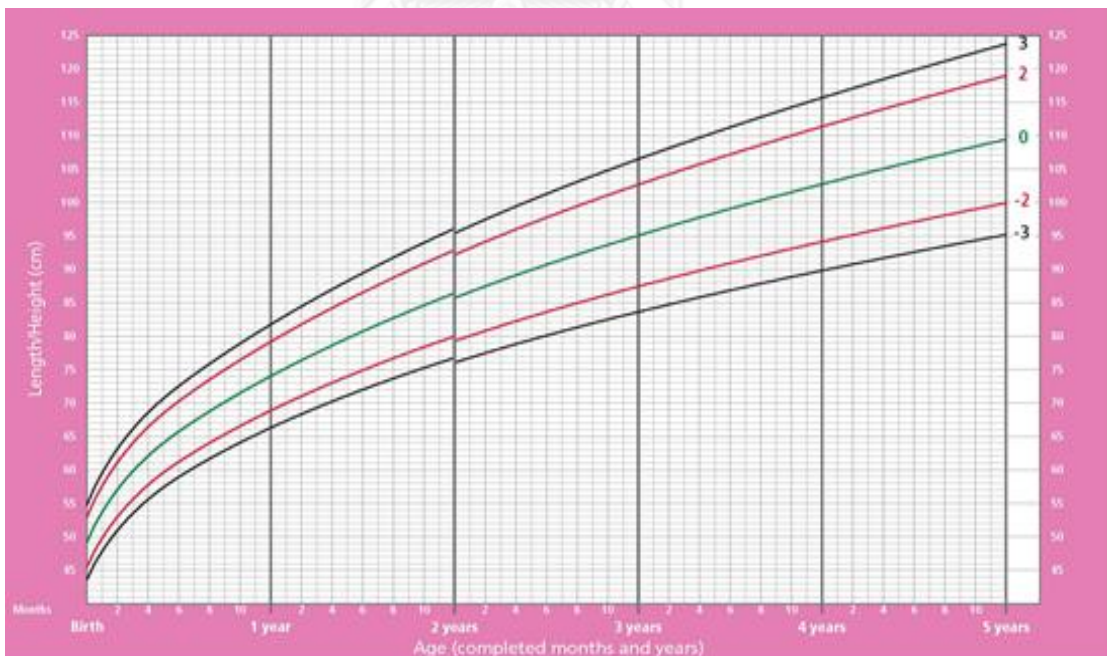
Length or height for age 0-5 years



Source: WHO child growth standards, 2010

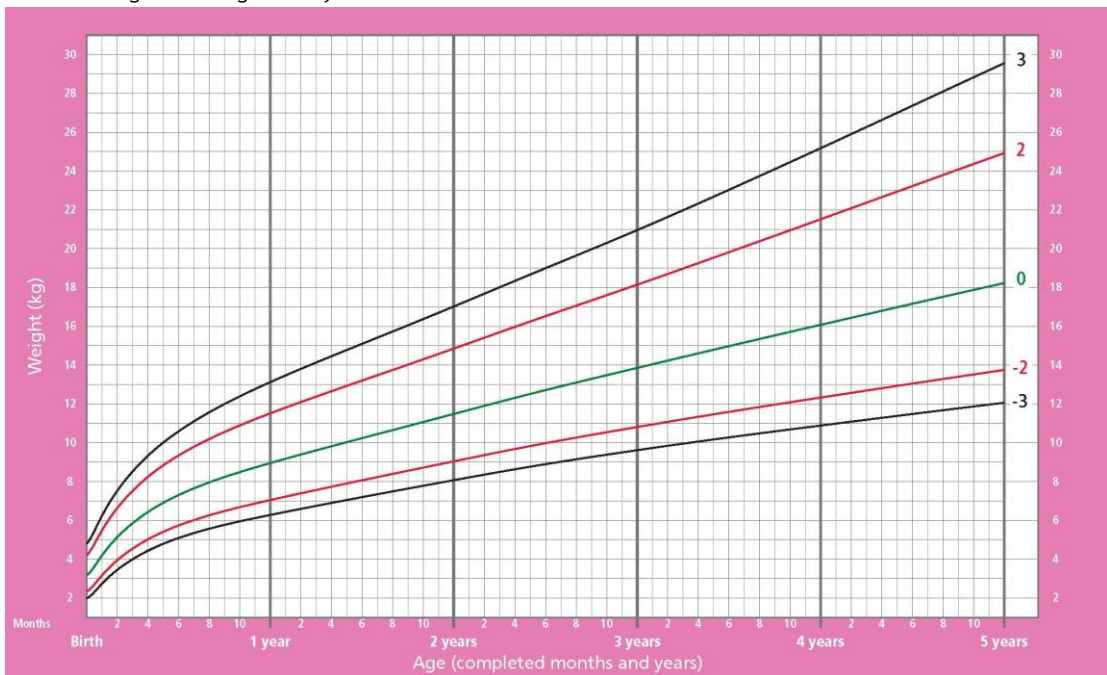
Figure 12: Child growth standards of the girls

Length for age or height for age 0- 5years



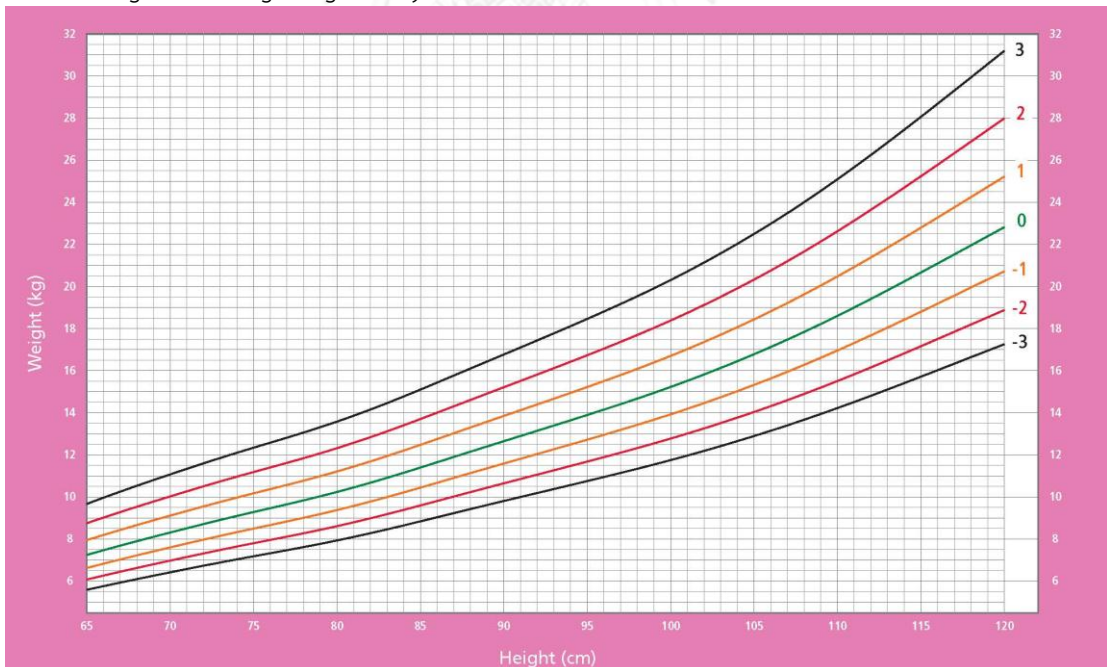
Source: WHO child growth standards, 2010

Weight for age 0-5 years



Source: WHO child growth standards, 2010

Weight for height age 2-5 years



Source: WHO child growth standards, 2010

APPENDIX D  
INFORMED CONSENT FORM

I who have signed here below.....agree to participate in this study.

I have been informed and understand about rational and objective (s) of the research is to find out the sociocultural and other factors associated with underweight children under-five years of age in Preah Vihear, Cambodia.

I **clearly understand with satisfaction** and willingly **agree** to participate in the research and response to the questionnaires which will take about thirty minutes to complete with no risks and harm to me for this participation.

I have **the right to withdraw** from this study at any time as wished without giving the any reason; either my withdrawal or refusal to answer certain questions **will not have any negative impact upon me.**

Researcher has guaranteed that the procedure(s) which will be acted upon me would be exactly the same as indicated in the information. Any personal information will be **kept confidential**. Any personal information which could be able to identify myself or part of my family will not appear in this report.

Researcher's signature.....

Name.....

Participant's signature.....

Name.....

Witness's signature.....

Name.....

จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY

**APPENDIX E**  
**Questionnaire**

ID Code: \_\_\_\_\_

Interview date: \_\_\_\_\_

Name of commune: \_\_\_\_\_ village: \_\_\_\_\_

Part I: Demographic characteristics of respondents

 **Ask child's mother:**

1. Mother's age: \_\_\_\_\_

2. Child's age: \_\_\_\_\_

3. Mother's education attainment:

1  No schooling

2  Primary school

3  Secondary school

4  High school

5  College

6  Other (Specify) \_\_\_\_\_

4. Mother's occupation:

1  Government service /employee    2  Government enterprise

3  Private employee

4  Private enterprise/own account

5  Farmer

6  General employee/unskilled labor

7  Housewife

8  Other(specify) \_\_\_\_\_

5. Total number of household members? \_\_\_\_\_

6. How many children aged 0-15 years in your household? \_\_\_\_\_

7. How many children aged under-five? \_\_\_\_\_

8. Mother's religion:

1  Buddhist

2  Islam

3  Christian

4  Other religion (specify) \_\_\_\_\_

5  No religion

## 9. Ethnicity of the mother:

- 1  Phnorng      2  Kuy      3  Steang      4  Jarai  
 5  Kreung      6  Tompoun      7  Other(specify)\_\_\_\_\_

## Part II: Food relating factors

## ☞ Ask child's mother:

1. During the last 2 weeks, did your household have enough money to buy food?

- 1  Yes      2  No      3  Don't know

2. Answer the following food for your child (&lt;5 years who will be in the study) ate yesterday during the day or at night, either separately or combined with other foods.

(You can answer more than one)

- Porridge/rice made from grain       Bread       Noodles       Foods  
 Other (specify)\_\_\_\_\_

Food group2:

- Beef       Pork       Chicken       Egg  Fish  
 Frog       Shell fish       Duck       Birds  
 Other (specify)\_\_\_\_\_

Food group3:

- Pumpkin       Carrots       Squash       Potatoes  
 Orange       Cassava       Ripen mangoes  
 Papayas       Beans       Leafy vegetables  Food  
made from roots       Other (specify)\_\_\_\_\_

Food group4:

- Sugar       Cake       Candies       Pastries  
 Solid food       Soft food       Food made with oil or fat  
 Other (specify)\_\_\_\_\_

3. Do you believe that colostrum or first breast milk substances cause to child (<5 years who will be in the study) diarrhea or sick?

1  Yes (specify)\_\_\_\_\_ 2  No 3  Don't know

4. Do you believe that feeding child (<5 years who will be in the study) only rice with sauce without beef, pork and mixed vegetables...etc. is good for child growth?

1  Yes (specify)\_\_\_\_\_ 2  No 3  Don't know

5. Where is usually the food of your child (<5 years who will be in the study) come from?

1  Market (specify) 2  Cook at home 3  Other places\_\_\_\_\_

6. Have you ever fed Special Borbor (complementary food) to your child (<5 years who will be in the study)?

1  Yes (specify)\_\_\_\_\_ 2  No 3  Don't know

7. Do you believe that eating the following food cause your child (<5 years who will be in the study) diarrhea or sick? (You can answer more than one)

	1=Yes	2=No	3=DK
Fish causes to parasite	_____	_____	_____
Eggs cause to diarrhea	_____	_____	_____
Complementary food cause to diarrhea	_____	_____	_____
Crab cause to parasite or worm	_____	_____	_____
Vegetables & mango cause to diarrhea	_____	_____	_____
Other (specify)_____			

8. How many times did you feed food to your child during a day (<5 years who will be in the study)?

1  Number of times\_\_\_\_\_

9. Did you give your child (<5 years who will be in the study) extra snacks each meal during the day?

1  Yes (specify)\_\_\_\_\_

2  No

### Part III: Environment factors

👉 Ask child's mother:

1. What is the main source of drinking water for your child (<5 years who will be in the study)?

1  Pipe into dwelling  
well/unprotect well

2  Pipe into yard

3  Protect

4  Rain water collection

5  Tanker truck

6  Surface water (river, stream, lake, pond)

7  Bottle water

8  Other (specify)\_\_\_\_\_

2. What is your child drinking water? (You can answer more than one)

1  Boiled water

2  Un-boiled water

3  Filtered water

4  Other (specify)\_\_\_\_\_

3. What type of toilet facility does your child (<5 years who will be in the study) usually use? (If you answer 3, please continue to question 5).

1  Pit latrine with slab

2  Pit latrine with open pit

3  No latrine, bush or field

4  Lavatory septic tanks

5  Other(specify)\_\_\_\_\_

4. Does your child (<5 years who will be in the study) share this toilet facility with others?

1  Yes (specify)\_\_\_\_\_

2  No



5. How often have you washed your hand before eating?

- 1  Always                      2  Often                      3  Sometimes  
 4  Never                      5  Other (specify) \_\_\_\_\_

6. How often have you washed your hand after toilet?

- 1  Always                      2  Often                      3  Sometimes  
 4  Never                      5  Other (specify) \_\_\_\_\_

7. Do you use clean water and well heated food preparation for complementary food?

- 1  Yes                      2  No                      3  Don't know

#### Part IV: Household economic status

👉 Ask child's mother:

1. Total income a year of all household members

\_\_\_\_\_ (KHR)

2. How much did your household expense monthly?

Eating out food, amount \_\_\_\_\_ (KHR)

Food eating at home, amount \_\_\_\_\_ (KHR)

3. Does your household use iodine salt in food cooking?

- 1  Yes (specify) \_\_\_\_\_                      2  No                      3  Don't know

## Part V: Health status of mother and child

☞ Ask child's mother:

- **Mother health:**

1. Did you go to health facility during pregnancy of this child (<5 years who will be in the study)?

1  Yes (specify) \_\_\_\_\_ 2  No 3  don't know

2. Mother's age when giving birth? \_\_\_\_\_ (year)

3. Mother's weight:

From 0-3 month \_\_\_\_\_ (kg)

At 9 months \_\_\_\_\_ (kg)

4. When was your first ANC during pregnancy of this child (<5 years who will be in the study)?

1  Early after missed-period 2  Within 16 weeks

3  Within 28 weeks 4  Within 32 weeks

5  Other(specify) \_\_\_\_\_

5. During the pregnancy of your child (<5 years who will be in the study) how often have you taken iron tablets?

1  Regularly 2  Sometimes 3  Hardly

4  Never 5  other (specify) \_\_\_\_\_

6. How was your eating meal during pregnancy of your child (<5 years who will be in the study)?

1  Normal eating 2  Increase eating 3  Don't know

7. Have you ever had chronic diseases (diagnosis by medical doctor) before and during the pregnancy of this child (<5 years who will be in the study)?

- 1  Diabetes                      2  Hypertension                      3  Heart diseases  
4  Anemia                      5  Thalassemia                      6  Other(specify)\_\_\_\_\_

● **Child health:**

1. What was your child's weight (<5 years who will be in the study) after delivery?

Weight \_\_\_\_\_ (kg)

2. Did you breastfeed your child (<5 years who will be in the study) after delivery?

*(Only child 2 years)*

- 1  Yes (specify)\_\_\_\_\_                      2  No                      3  Don't know

3. How long did you initiate first breastfeeding (<5 years who will be in the study)?

*(Only child 2 years)*

- 1  Immediately after delivery                      2  Less than 1 hour  
3  Within 24 hours                      4  More than 24 hours  
5  Other (specify)\_\_\_\_\_

4. How long did you breastfeed your child (<5 years who will be in the study)? (only child 2 years)

- 1  Birth to 6 months                      2  Less than 6 months  
3  7 to 12 months                      3  13 to 24 months  
4  Other (specify)\_\_\_\_\_

5. In the past 24 hours do you breastfeed (ask mother with child 0-6 months)?

- 1  Breastfeeding alone                      2  Breastfeeding with medicine  
3  Breastfeeding with water                      4  Breastfeeding with food

6. Did you continued breastfeeding to your child (<5 years who will be in the study) up to two years?

*(Asking only child age beyond 2 years)*

1  Yes (specify) \_\_\_\_\_ 2  No 3  Don't know

7. When did you initiate feeding Special Borbor (complementary food) to your child (<5 years who will be in the study)? (Asking only child age 6 months up)

1  Before 6 months 2  At 6 months 3  After 6 months  
4  Other (specify) \_\_\_\_\_

8. Did you give Special Borbor (complementary food) to your child (<5 years who will be in the study) alongside the breastfeeding? (Asking only child age 6 months up)

1  Yes (specify) \_\_\_\_\_ 2  No 3  Don't know

9. Did your child (<5 years who will be in the study) have diarrhea in the last two weeks?

1  Yes (specify) \_\_\_\_\_ 2  No (skip to question11)  
3  Don't know

10. Was your child (<5 years who will be in the study) given ORS and Zinc at the time start having the diarrhea?

1  Yes, both 2  Yes, only ORS 3  Yes, only Zinc  
4  Nothing given 5  Don't know

11. Was your child ill (<5 years who will be in the study) with fever at any time in the last two weeks?

1  Yes (specify) \_\_\_\_\_ 2  No 3  Don't know

12. Has the child (<5 years who will be in the study) had an illness with cough in the last two weeks?

1  Yes (specify) \_\_\_\_\_ 2  No 3  Don't know

#### Part VI: Child Nutritional Status Assessment

1. Date of birth: \_\_\_\_\_ (month)

2. Sex: 1  male 2  female

3. Length/ height: \_\_\_\_\_ (cm)

• If child under two years old, measuring length with lying down Length (cm)

• If child aged two years or up, measuring height with standing up Height (cm)

4. Weight: \_\_\_\_\_ (Kg)

5. Interpretation:

1  Normal

2  Underweight:

1  Moderate

2  Severe

3  Stunting:

1  Moderate

2  Severe

4  Wasting:

1  Moderate

2  Severe

**Note:** *Be informed mother/closed-caregiver brings child's health book while coming for interview.*

**THANK YOU FOR VALUE TIME..!**

## VITA

Name: Mr. Sin Vorn

Date of birth: 10 September 1984

Place of birth : Koh Andet district, Takeo province, Cambodia

Nationality: Cambodian

Education: BA Psychology, MD candidate, Diploma in English education  
(ACE).

Work experience:

Coordinator for maternal child health and nutrition (WVC) from 2010-2013

Coordinator for child mental disability center (DTC) from 2008-2010

Health educator for happy child project (Handicap International) from 2007-  
2008

Interpreter for Medem project (JICA) 2008

Research assistant (Coventry university USA) 2007



จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY