MINISTRY OF HEALTH

UNIVERSITY OF HEALTH SCIENCES, FACULTY OF PUBLIC HEALTH

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MINISTRY OF EDUCATION AND TRAINING - MINISTRY OF HEALTH

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SENGOUTHAI PHOUTTHAVONG

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MASTER THESIS

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Food Consumption Patterns of Inpatient Children Aged 3 to 5 Years with Diarrhea in Khammuane Province Hospitals Lao PDR, 2019

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CONTENTS

ABBREVIATIONS AND ACRONYMS

AED	Academy for Educational Development
AWD	Acute Water Disease
BMC	BioMed Central
FANTA-II	Food and Nutrition Teachnical Assistance II Project
FCPs	Food Consumption Patterns
IFPRI	International Food Policy Research Institute
IMCI	the Integrated Management of Childhood Illness
IYCF	Infant and Young Child Feeding
KPH	Khammuane Provincial Hospital
LSIS	Lao Social Indicator Survey
ORS	Oral Rehydration Salts
ORT	Oral Rehydration Therapy
SDGs	Sustainable Development Goals
UCDAVIS	the University of California DAVIS
UN	United Nations
UNICEF	United Nations Children's Fund
UNIGME	the United Nation Inter-agency Group for Child Mortality Estimation
USAID	United States Agency for International Development
WB	World Bank
WFP	the World Food Programme
WHO	World Health Organization

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ABSTRACT

Nutritious dietary diversity is associated with improved appropriate food consumption for children. Diarrhea is the most common childhood illness and causes hospitalization especially in low and middle income countries; it accounts for about 8% of all child deaths worldwide. However, these problems can be stopped by continuing to give nutrient rich foods during and after diarrhea. The objectives of this study were to describe the food consumption patterns and determine the factors associated with the food consumption patterns of the inpatient children aged 3 to 5 years with diarrhea in hospitals in Khammuane province during 2019.

A cross sectional study was conducted in mothers/caregivers of 130 inpatient children aged 3 to 5 years presenting with diarrhea in hospitals in Khammuane province using a quantitative questionnaire. A qualitative survey was also conducted with 15 healthcare providers in these hospitals.

The results showed that 29.2% of children had inappropriate food consumption patterns and 70.7% had an appropriate food consumption patterns. Factors associated significantly with inpatient children's food consumption patterns were the caregiver's age (AOR=0.3, 95% CI=0.1-0.9), the caregiver's knowledge (AOR=5.1, 95% CI=1.1-22.2) and the caregiver's perception (AOR=0.2, 95% CI=0.1-0.7). Language was the main barrier for the provision of good practices and meaningful consultations.

In order to improve inpatient children's food consumption, there is a need to have a guidelines for the food consumption of children for medical staff, nutrition education programs for caregivers in hospitals and the community, and to raise the awareness of families and communities about the health benefits of a proper diet, especially during diarrhea.

Keywords: Food Consumption Patterns(FCPs) / Inpatient Children/ Diarrhea / Hospital / Khammuane province

INTRODUCTION

Food consumption patterns (FCPs) diversity has been associated with an improved nutritional status for children (Nti, 2014). Nutrition impacts the mental and physical development of children. An appropriate dietary intake benefits the national economy directly by reducing public health expenses in health care and indirectly through the improvement of the community's health (Hoddinott, Maluccio, Behrman, Flores, & Martorell, 2008). Healthy foods help to prevent malnutrition in all forms (WHO, 2018a).

Malnutrition affects cognitive function and contributes to poverty by hindering the ability of the child to create a productive life (Black et al., 2008). Furthermore, it is estimated globally that more than one-third of deaths under five years are due to malnutrition (Liu et al., 2012). Malnutrition accounts for 54% of mortality cases in children age under five years in developing countries (UNICEF, 2013). Consequent annual economic losses related to malnutrition in the Lao PDR in 2013 were nearly US$ 200 million constituting 2.4 % of Gross Domestic Product (GDP) (UNICEF & National Economic Research Institute, 2013). Undernourished children are more likely to die from common childhood ailments such as pneumonia, diarrhea, etc., and for those who survive, they have recurring sicknesses and faltering growth.

Acute diarrhea is the most common childhood illness and causes hospitalization in low and middle-income countries; diarrhea as a disease continues to be a major cause of avoidable death, and accounts for about 8% of all child deaths worldwide (Liu et al., 2012; UNICEF, WHO, WB, & UN, 2018). Meanwhile, it accounts for approximately 11% of all child deaths associated with diarrhea in the Lao PDR (WHO, 2015). During the period of getting diarrhea, children suffer from a reduced food intake, decreased nutrient absorption, and increased nutrient requirements that cause weight loss and a failure to grow normally. The child's nutritional status declines and any pre-existing malnutrition is made worse. In turn, malnutrition contributes to diarrhea which is more severe, prolonged, and possibly more frequent in malnourished

children. However, these conditions can be stopped by continuing to give nutrient rich foods during and after diarrhea. When these steps are followed, malnutrition can be prevented and the risk of death from a future episode of diarrhea is much reduced (UNICEF & WHO, 2009; WHO, 2005b).

In order to prevent and treat children with acute water diarrhea the WHO and UNICEF guidelines on the management and treatment of children's diarrhea strongly recommend preventing dehydration through the early administration of increased amounts of appropriate fluids, continued feeding alongside the administration of oral rehydration solutions, plus zinc therapy. Zinc supplementation is a utility to decrease the duration and severity of diarrhea and the likelihood of future diarrhea episodes in the 2-3 months following supplementation (USAID, UNICEF, & WHO, 2005; WHO/UNICEF, 2004).

In Khammuane province, child feeding practices while suffering diarrhea showed a low percentage of children were given more to drink and eat, nearly 40% and only 34% respectively. Four percent of all children under five got diarrhea in 2017 (MOH, 2017). In addition, there are some influential factors affecting food consumption among children with diarrhea in Khammuane province such as maternal knowledge and family finances (Lao Statistics Bureau, 2018).

RESEARCH OBJECTIVES

- **Specific Objectives**:

1 To describe the food consumption patterns of inpatient children aged 3 to 5 years with diarrhea in Khammuane province hospitals during 2019.

2 To determine the factors affecting the food consumption patterns of inpatient children aged 3 to 5 years with diarrhea in Khammuane province hospitals during 2019.

Chapter 1

LITERATURE REVIEW

1. Basic concepts and definitions

1.1. Definitions

- ***Food consumption patterns(FCPs)***: the combination of food which constitutes an individual's usual dietary intake which includes daily and longer cyclical variations. Food consumption patterns include repetitive, consistent decision-making and behavior about food selection and use (National Research Council, 1981).
- ***Diarrhea*** is defined as the passage of three or more loose or liquid stools per day (or more frequent passage than is normal for the individual). There are three clinical types of diarrhea:

  1. Acute watery diarrhea – lasts several hours or days, and includes cholera.
  2. Acute bloody diarrhea – also called dysentery; and
  3. Persistent diarrhea – lasts 14 days or longer (WHO, 2017b).
- ***Dehydration*** occurs when the amount of water leaving the body is greater than the amount being taken in, and the body does not have enough water and other fluids to carry out its normal functions. If the body does not replace lost fluids, the child will get dehydrated or lose water and dissolved salts from the body, occurring for instance, as a result of diarrhea.
- ***Oral Rehydration Solution (ORS)*** is a liquid preparation developed by the World Health Organization that can decrease fluid loss in persons with diarrhea.
- ***Oral Rehydration Therapy (ORT)*** means the administration of fluid by mouth to prevent or correct dehydration that is a consequence of diarrhea.
- ***Mother/caretaker:*** a person who is involved with the provision of child care.
- ***Children:*** children in this study referred to any person who was aged 3 to 5 years

- ***Inpatient children:*** children aged 3 to 5 years admitted to hospitals in Khammuane province during the period of collecting data.

1.2. Food consumption patterns and nutrition for children aged 3 to 5 years

Micronutrient deficiency still continues to impact people around the world. It is a significant cause of morbidity, mortality and reduces the development of human resources. Over two billion people are estimated to be deficient in key vitamins and minerals of whom most live in low income and developing countries. Deficiencies occur when people do not have access to micronutrient-rich foods such as fruits, vegetables, animal products, and fortified foods. Usually, this is because they are too expensive to buy or are unavailable locally. Micronutrient deficiencies increase the general risk of infectious illness and of dying from diarrhea, measles, malaria, and pneumonia. These conditions are among the ten leading causes of disease in the world today (WHO, 2002).

Adequate nutrition is essential in early childhood. It is necessary to ensure that infants and children have adequate nutrition as an important step towards healthy growth, proper organ formation and function, a strong immune system and neurological and cognitive development (UNICEF, WHO, & WB, 2012). While inadequate child nutrition can lead to malnutrition, malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients (WHO, 2018b), Even if children get enough to eat, they can develop malnutrition if the food they eat does not provide the proper amounts of micronutrients to meet daily nutritional requirements (WFP, 2015).

The human diet at all life stages is mainly based on cereals, meats, and vegetables. Rice (glutinous, polished, and steamed rice) is the staple food of most people in the Lao PDR and as a result, it is consumed more than other foods. People consume at least two serves a day with an average intake of approximately 130g per meal. Other food items were eaten every day but in a small amounts (Douangvichit, 2017). Poor quality diets and infections are the main causes of childhood malnutrition.

Poor quality diets are low in calories and the most essential nutrients. A variety of foods have been recognized by nutritionists as key elements of a high quality diet (Ruel, 2003). Child nutrition in the Lao PDR is a reflection of overall health, children under five years with malnutrition are estimated to have a stunting prevalence of 33 %, underweight 21 % and wasting 9% (Lao Statistics Bureau, 2018).

- **A food consumption patterns** supports a child's normal growth and development. It provides enough total energy and meets or exceeds the recommended daily allowances for all nutrients. For children these are shown as follows:
  - **Energy** (calories) should be sufficient for growth and development, and access or maintenance of desired body weight. The energy consumption of children needs 100 calories per 1 kg of weight or approximately 1000-1200 calories per day. Children aged 3-5 years need a lot of energy to use for growth, which is fast in this phase (American Academy of Pediatrics, 2014). This energy is derived from five main food groups namely carbohydrates (such as rice, maize, wheat), proteins (e.g. milk, fish, pork, chicken), vitamins and minerals (such as vegetables, fruits), and fats.
  - **Fat (Lipids)** children should eat foods low in poly saturated fat, and trans-fat, and should keep the total fat intake between 30 to 35 percent of calories consumed for children; Most fats come from sources of poly-unsaturated and mono-unsaturated fatty acids, such as fish, nuts and vegetable oils. It is estimated about 30-35% or 1000-1100 (female) and 1000-1200 (male) kilocalories need to be absorbed per day (kcal/d) for children aged 3 to 5 years.
  - **Calcium** has an important role in muscle contraction, transmitting messages through the nerves, and the release of hormones. If people are not getting enough calcium in their diet, the body takes calcium from the bones to ensure normal cell function, which can lead to weakened bones. Therefore, it is recommended to receiving 700-800 mg per day for children aged 3 to 5 years (National Academy of Sciences, 2018).

- **Iron** is an important component of hemoglobin, the substance in red blood cells that carries oxygen from your lungs to throughout your body. Hemoglobin represents about two-thirds of the body's iron. If you do not have enough iron, your body can not make enough healthy oxygen-carrying red blood cells. Therefore, a lack of iron eventually results in iron-deficiency anemia.
- **Iodine** is a mineral found in some foods. The body needs iodine to make thyroid hormones. These hormones control the body's metabolism and many other important functions. The body also needs thyroid hormones for proper bone and brain development during pregnancy and infancy.
- **Carbohydrates**. Children need to eat a wide variety of nutritious carbohydrates for a healthy and balanced diet. It is beneficial to eat more of the lower glycemic index foods such as, legumes, fruits, and vegetables, dairy foods, and to choose whole grain cereals as these provide more fiber, vitamins and minerals, and contain more natural sugars. Therefore, it is recommended to receive 19-22 g per day (Academy of Nutrition and Dietetics, 2018).
- **Protein** is required to synthesize enzymes and hormones that regulate body processes and stimulate growth. There is protein in fish, pork, chicken, eggs and animal livers, but eggs are an especially good source of protein. A recommended protein intake is approximately 4 g per 1kg of weight or around 60-85 g per day for children aged 3-5 years (American Academy of Pediatrics, 2014).
- **Grains**: Whole grains: brown rice, buckwheat, bulgur (cracked wheat) and refined oatmeal are recommended with an intake of approximately 4-5 ounces or 110-140 g per day for children aged 3-5 years.
- **Vegetables**: Dark green vegetables such as broccoli, collard greens, spinach; Red and orange vegetables such as carrots, pumpkins, potatoes, tomatoes, and tomato juice. Other vegetables: artichokes, asparagus, avocados, bean sprouts,

beets, Brussels sprouts, cabbages, cauliflowers, celery, cucumbers, eggplants, mushrooms, onions, beans, tomatoes, vegetable juices.

- **Milk / Dairy** 1½-2 serves of dairy for children aged 3-5 years, for example, 1 serve = 1 cup of milk, or yogurt or a slice of cheese. Calcium-fortified soymilk (soy beverage) is also part of the dairy group (along with almonds, hazelnuts).
- **Fruit**: Apples, bananas, berries, figs, fruit juices (unsweetened), grapefruit, grapes, kiwi fruits, mangoes, watermelons, oranges. Many of these can be offered as dried fruits as well (Serrano & Powell, 2013).

1.3. Diarrhea in children

Diarrhea is not to frequently pass formed stools, nor is the passing of loose, "pasty" stools by breastfed babies (WHO, 2017b). Severe and fatal diarrhea occurs when depleted body fluids are not replenished, leading to severe dehydration. The major causes of diarrhea in less developed countries include a variety of bacterial, viral and parasitic organisms. Infection is spread through the oral-fecal route by contaminated food or drinking water or from person-to-person as a result of poor hygiene (Lanata et al., 2013; WHO, 2017b).

In children under the age of five years, rotavirus is the leading cause of acute water diarrhea (AWD) globally and contributes to 38.3% of the hospitalization for diarrheal types diseases (Lanata et al., 2013). Globally, there are nearly 1.7 billion cases of childhood diarrheal disease, and the diarrheal disease kills around 525 000 children under five each year. However, it is both preventable and treatable. A significant proportion of diarrheal disease can be prevented through safe drinking water and adequate sanitation and hygiene (WHO, 2017b).

Numerous diarrhea deaths are caused by dehydration. An important development has been the discovery that dehydration from acute diarrhea of any etiology can be safely and effectively treated in over 90% of cases by the simple method of oral rehydration using a single fluid. Glucose and several salts in a mixture known as Oral Rehydration Salts (ORS) are dissolved in water to form the ORS

solution. Important elements in the management of the child during diarrhea are the provision of oral rehydration therapy, continued feeding, and the use of antimicrobials but only for those with bloody diarrhea, severe cholera cases, or serious non-intestinal infections. However, mothers or caregivers of children should also be taught about feeding and hygiene practices that reduce diarrhea morbidity (USAID et al., 2005; WHO, 2005b). In addition, the treatment of children with diarrheal by oral rehydration therapy (ORT) and zinc is well established in children (Dutta et al., 2011). Zinc and oral rehydration salts are standard therapies in the treatment of acute diarrhea and recommended in the World Health Organization (WHO) guidelines (UNICEF & WHO, 2009).

Most importantly according to WHO guidelines is that all children with diarrhea are correctly assessed and classified and receive appropriate rehydration and care, including continued feeding. Particularly, inpatient children with diarrheal diseases: the healthcare worker should have a written, up-to-date clinical protocol for identifying and managing children with diarrhea; use standard guidelines to assess, document and appropriately manage children with diarrhea and dehydration or dysentery; adequate supplies for diarrhea management (IV fluids, oral rehydration salts [ORS], zinc, antibiotics) for the expected caseload without stock-outs in the past three months; an appropriate designated space with safe, clean water and adequate supplies for preparing ORS for children with diarrhea and dehydration(WHO, 2018c). As well as mothers or caregivers knowledge about better health awareness for diarrhea must be reinforced in other areas for example continued feeding, enhance the nutritional status, using ORT/ORS, and zinc supplementation (offer children with 20 mg per day of zinc supplementation for 10–14 days and 10 mg per day for infants under six months of age) into a comprehensive diarrhea management plan. In addition, healthcare workers should provide counseling to mothers or caregivers to give them an understanding of when to begin administering suitable available fluids, and treating dehydration with

ORS solution as well as emphasizing continued feeding and using antibiotics only when appropriate upon the onset of diarrhea in a child (WHO/UNICEF, 2004).

In children, a highly nutritional intake depends on the mother or caregiver who controls the types of foods, quantities, and quality of food the child receives. In a study, researchers compared the maternal perceptions of the true quality of a child's diet and found that 86% of mothers overestimated the quality of their child's diet despite the fact that the diet was poor or needed improvement. This had a severe impact because the perception of mothers is an important factor in determining the children's diet (Kourlaba, Kondaki, Grammatikaki, Roma-Giannikou, & Manios, 2009). In another study, on maternal dietary counseling in the first year of life, it showed that mothers who received counseling, clearly improved the overall quality of their child's diet (Vitolo, Rauber, Campagnolo, Feldens, & Hoffman, 2010).

Due to children's diarrheal episodes, the child's dietary intake and absorption of nutrients are decreased whereas nutritional requirement is increased (Islam, Roy, Begum, & Chisti, 2008), therefore there has been a lot of research about dietary management during children diarrheal episodes. This has shown that about 11.3% of mothers reduced the volume of fluids given to their children and nearly 23% of mother fed less food (Bani, Saeed, & Othman, 2002). In addition, research about feeding practices of caregivers of infants and young children at children's hospital revealed the factors affecting feeding practices were an insufficient knowledge of breastfeeding and complementary feeding of infants and young children among mothers. Other factors were socio-economic especially low income (Imran, Jabeen, & Khatoon, 2017), and that parents or caregivers were illiterate and lived in a remote areas where everyone was affected by poor dietary practices (Shah & Naqeeb, 2016).

1.4. Nutrition in the treatment of diarrhea

Worldwide, there has been accelerated progress in reducing the under five mortality rate. More than half of under five child deaths are due to diseases that are preventable and treatable through simple and affordable interventions. Strengthening health

systems to provide such interventions for all children will save many young lives. However, malnutrition can be both a cause and a consequence of illnesses among children under five years. Malnourished children, particularly those with severe acute malnutrition, have a higher risk of death from common childhood illnesses such as diarrhea, pneumonia, and malaria. Thus, in order to reduce under five mortalities, global authorities have set up the strategic plan known as the Sustainable Development Goals (SDGs). In particular, SDG 2 which is getting to zero hunger by reducing the prevalence of stunting from the current status of 40%. ASEAN leaders declared they would eliminate all forms of malnutrition. The third SDG is promoting good health and well-being so as to reach the target of reducing the mortality rate of children under five at least as low as 25 per 1,000 live births in every country (WHO, 2017a).

Diarrheal and respiratory infections are the most frequent childhood illnesses and causes of attendance at health services in low-income and middle-income countries (Walker et al., 2013) where there are ongoing problems with poor nutrition and sanitation and access to safe water. Diarrhea is common, so a vicious cycle of diarrhea and under nutrition is set up, with dire consequences in developing and developed countries (Thapar & Sanderson, 2004). It is well noted that diarrhea is a major cause of malnutrition. Malnourished children are at a higher risk for infection and severe illness. Meanwhile, it is widely accepted that infection affects nutritional status through reduced food intakes and absorption in the intestine, increased catabolism by pathogens in the GI tract, and the collection of nutrients necessary for tissue synthesis and growth (Brown, 2003).

Knowing the importance of optimal Infant and Young Child Feeding (IYCF) practices for child survival, growth and development is critical, so the World Health Organization (WHO) launched the Global Strategy for IYCF which was issued in 2003 in the Guiding Principles for Complementary Feeding of Breastfed and Non- Breastfed Children (WHO & UNICEF, 2003). These global frameworks highlight the importance of optimal IYCF practices during and after common childhood illnesses such as

diarrhea and pneumonia, and emphasize the need to increase fluid intakes during illness while feeding is maintained and increased food intakes occur during convalescence. In addition, appropriate IYCF during and after illness is a part of the WHO-led Global Strategy for the Integrated Management of Childhood Illnesses (WHO, 2005a). Consequently, there was a study that showed the duration of the recovery period was greater than 50% in patients with lower energy intakes than in those with higher intakes (Islam et al., 2008) When inadequate nutrition limits recovery, there is an increased risk of permanent under nutrition (Batool, Butt, Sultan, Saeed, & Naz, 2015). This is especially true with children who are one of the main vulnerable groups to diseases and malnutrition. Those children aged under five years are more vulnerable because they are at a stage of rapid growth and development and their immune system is not fully developed to fight infections (Black, Brown, & Becker, 1984).

In order to successfully treat children with diarrhea in the hospital, they need to be characterized by adequate dietary intakes and weight gains because during the diarrhea period children increase their fecal frequency and there is a failure to establish daily weight gains within a seven-day period. As a result, the child who responds satisfactorily should be given additional fresh fruit and well cooked vegetables as soon as an improvement is confirmed. Then they should resume an appropriate diet for their age, including milk that provides at least 110 Kcal/kg/day(WHO, 2005b).

1.5. Situation of the FCPs for children aged under five with diarrhea: around the world and Laos.

There has been research to show the harmful practices which predominate during the child diarrhea period but these vary in their degree of severity across cultures. They include fluid and food restriction, and inappropriate medication use. The inappropriate management of diarrhea episodes can result in a higher risk of mortality through increased levels of dehydration or lasting health consequences as a result of undernutrition or prolonged diarrheal illness (Carter, Bryce, Perin, & Newby,

2015). There was a systematic review which found no evidence to advocate that early compared to delayed feeding in acute diarrhea increases the risk of complications when children experience diarrhea (Gregorio, Dans, & Silvestre, 2011). Continued feeding is important for limiting the nutritional consequences of decreased intake, digestion and absorption of essential nutrients during diarrheal illnesses, especially among children in low and middle-income countries, where the dual burden of diarrhea and malnutrition often causes death (Gaffey, Wazny, Bassani, & Bhutta, 2013). The foods administered to children should be easily digested and absorbed, blandly, flavored but also appetizing. They do not need to have a deleterious effect on the illness. This is because some kinds of foods can irritate the bowels and the digestive system even more. There remains some argument regarding the optimal diet or dietary ingredients for a rapid recovery and maintaining the nutritional status in children with diarrhea (Duggan & Nurko, 1997).

The Lao PDR suffer from low personal incomes, low education levels, and inadequate healthcare services. The country was estimated to have 900,000 children aged under five in 2014. Approximately 44% of them were stunted, 27% were underweight and 6% were wasting. Among the poor people, mostly ethnic minorities and those living in high plateau areas, 61% of children were stunted and 13% were wasted (Chaparro, Oot, & Sethuraman, 2014). The Lao PDR has showed some progress in reducing its child mortality rates (CMR), but the problem is still very serious and the CMR remains above regional averages. The children aged under five years in Laos experience 63 deaths per 1000 live births, compared to 26 deaths per 1000 live births for all of Southeast Asia (UNIGME, 2018). The Lao PDR is seriously off track with respect to nutritional status targets set by the WTO's Millennium Development Goals (MDG). The MDG time frame is in its final stages and unmet and ongoing challenges worldwide are being tackled in 17 Sustainable Development Goals (SDG). The Lao National Nutrition Strategy seeks to achieve SDG to "end hunger, achieve food security, improved nutrition and promote sustainable agriculture" (GoL,

2015). Furthermore the Lao PDR has planed at strategy for achieving progress toward the SDG 3.2 (to end preventable deaths of newborns and children under 5 years of age with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under five mortality to at least as low as 25 per 1,000 live births.) (MOFA & UN Lao PDR, 2018). The Lao government is combating diseases such as diarrhea, pneumonia, and malaria that are the leading killers of children aged under five years. in approximately 11,720 children aged under five it was found that 6.5 percent had experienced a diarrhea episode. In turn, mothers or caregivers feeding practices while children suffered diarrhea, showed that the children were given much less to drink 4.1%, somewhat less 26.7%, about the same 40.7%, more 19.9% and nothing 8.4%. Children who were given to eat much less 3.8%, about the same 45.8% and more 14.1% (Lao Statistics Bureau, 2018). In addition, in order to reduce and prevent children's chronic malnutrition, the government of the Lao PDR set aims in the National Nutrition Strategy to 2025 and the Plan of Action 2016-2020 to reduce the prevalence of diseases caused by contaminated foods and indirectly transmitted infectious diseases which damage the body's ability to absorb food consumed. These policies require improvements to the safety and diversity of food consumed so that people may have access to food at all times and locations, and furthermore, concentrate on improving maternal and child health (MCH) practices and access to health services (GoL, 2015).

The Lao PDR set a goal for the under five mortality rate targeted at 40/1000 live births by 2020, according to Health Sector Reform Strategy by 2020 (MOH, 2016); The Lao social indicator survey showed that children under five had a mortality rate of about 46 deaths per 1,000 live births (Lao Statistics Bureau, 2018). It was appraised that 11% of the under five deaths were due to diarrhea (WHO, 2015). Based on the Lao PDR Center for Disease Control and Prevention it reported 17 leading nationally notifiable diseases and syndromes, of which diarrhea is one. It has been entered and stored as a notifiable disease under national surveillance in Laos.

The Lao Social Indicator Survey (LSIS II) in 2017 presented differentials in children's mortality levels which were somewhat larger in certain provinces. In Xayabury, Vientiane Capital and Sekong the lowest under five mortality rates 11, 35 and 35 deaths per 1,000 live births, were recorded respectively. Meanwhile in Khammuane, Phongsaly and Oudomxay the highest rates, at 63, 68 and 71 deaths per 1,000 live births, were found respectively (Lao Statistics Bureau, 2018). Children under five mortality rates were expressed as 63 deaths per 1,000 live births and 4.2% of children had an episode of diarrhea during a two week period in Khammuane province (Lao Statistics Bureau, 2018). Based on the LSIS children under five had diarrheal disease at the rate nearly 65 patients per 1000 (MOH & Lao Statistics Bureau, 2012).

1.6. Factors associated with FCP of children with diarrhea

The following section examines the research into nutrition status worldwide. Various studies discussed FCPs according to the variables in this present study.

❖ **General characteristics of children**

Sex: Rakotonirainy's team. studied the dietary diversity of 6- to 59-month-old children in rural areas of Moramanga and Morondava districts, Madagascar. The sample had 1824 children and the data were analyzed by using the chi-square test. The study found that there was no significant association between the sex of the child and the FCPs of children (p-value >0.05) (Rakotonirainy et al., 2018). In another study by Bi and colleagues. Which dealt with dietary diversity among preschoolers in Central South China it showed that was no significant association between sex and the FCPs (p-value>0.05)(Bi et al., 2019).

Age: Senbanjo, Olayiwola, and Afolabi studied dietary practices and the nutritional status of under five children in rural and urban communities of Lagos State, Nigeria A total of 300 mother–child pairs were studied. The study found that there was a significant association between a child's aged and diet by p-value< 0.05 (Senbanjo, Olayiwola, & Afolabi, 2016).

Birth weight: Rahman and colleagues did a study on the association of low-birth - weights with malnutrition in children under five years in Bangladesh. This team considered the mother's education, socio-economic status, and birth interval matter. It was found that there was a significant association between low birth weights and the FCPs of children (Rahman, Howlader, Masud, & Rahman, 2016).

Vaccine status: A study on vaccinations and the nutritional status of children in Karawari, East Sepik Province, Papua New Guinea found that there was a significant association between children who had an incomplete series of vaccinations and their FCP (p-value<0.05)(Samiak & Emeto, 2017).

❖ **General characteristics of caregivers**

Age: Thonethong studied the factors relating to stunting among children under five years in Viengthong and Bolikhan districts, Bolikhamxay province. This was a cross-sectional analytical study. The sample had 308 children under five. The analysis was done by using logistic regression. They found the age of caregiver was not significantly associated with FCP of children (Thonethong, 2016).

In a study by Bounkham on the factors affecting the malnutrition of children under five years in the area of the Theun-Hinboun power company/Theun-Hinboun Expansion Project, it found that there was also no significant association between the age of caregivers and the FCP of children (p-value >0.05) (Bounkham, 2012).

Relationship of the child: Souksavath studied the nutrition of children 6-59 months among the Taoy, Katang, and Pako ethnic group in Taoy district, Salavane province. It was found that there was no significant association between the relationship of child and the FCP of children by p-value>0.05 (Souksavath, 2012).

Education: Rakotonirain's team did a study in Madagascar which found that there was a significant association between the caregivers' education and family income and the children's FCP by (p-value> 0.05)(Rakotonirainy et al., 2018).

Ethnicity: Annim and Imai studied the nutritional status of children, food consumption diversity and ethnicity in the Lao PDR. Their finding showed that was a

significant association between ethnicity and the FCP of children (Annim & Imai, 2014).

Dalaphon studied the perception of mothers about child feeding and the prevention of malnutrition among children aged of 6-59 months in Sepon district, Savannakhet province, Laos. The study found that there was no significant association between the caregivers' ethnicity and the children's FCP p-value> 0.05 (Dalaphone, 2012).

Family income: Rakotonirainy's team studied the dietary diversity of 6 to 59 month old children in rural areas of Moramanga and Morondava districts, Madagascar. The study found that there was no significant association between income and the children's FCP by p-value> 0.05 (Rakotonirainy et al., 2018).

Another study by Annim and Imai was done on the nutritional status of children, food consumption diversity and ethnicity in the Lao PDR with at sample size over 1000 children under five. It found that family income had a significant association with the FCP of children by p-value < 0.05 (Annim & Imai, 2014).

Caregivers' knowledge: Bi's team did a cross-sectional study on dietary diversity among preschoolers in poor, rural, and ethnic minority areas of Central South China. The sample size was 1328 children. The study found that there was a significant association between the caregivers' knowledge and the children's FCP (Bi et al., 2019).

In addition, Odur and colleagues did a study on caregivers' nutritional knowledge and attitudes with respect to how they mediate with seasonal shifts in children's diets. It found that there was a significant association between the caregivers' nutritional knowledge and the children's FCP (p-value < 0.00), reaching a 0.05 level of significance (Oduor, Boedecker, Kennedy, Mituki-Mungiria, & Termote, 2018).

Caregivers' perceptions: Heitzinger and colleagues studied caregivers' perceptions of children's nutritional status in Magallanes, Chile. There were 795 children included in the study. It found that there was a significant association between the caregivers' perceptions and the children's FCP (p-value<0.05) (Heitzinger, Velez, Parra, Barbosa, & Fitzpatrick, 2014).

Daniel, Amosu, Ayeni, and Olagbegi studied about child feeding practices and perceptions for mothers/caregivers linked to a nutrition therapy program in three counties of Lakes state South Sudan. It found that the caregivers' perceptions had a significant association with the children's FCP p-value<0.05 (Daniel, Amosu, Ayeni, & Olagbegi, 2017).

Caregiver's practices: Inayati's team did a study on improved nutrition knowledge and practices through intensive nutrition education. It was a study among caregivers of mildly wasted children on Nias Island, Indonesia. It showed that there was no significant association between the practices of caregivers and the FCP of children at p-value> 0.05 (Inayati et al., 2012).

- **Environmental supports:**

The study by Bounkham on factors affecting malnutrition in children under five years in the area of the Theun-Hinboun Power Company/Theun-Hinboun Expansion Project showed that there was no significant association between environmental supports and children's FCP p-value>0.05 (Bounkham, 2012).

In another study, Nepper looked at the association of the home food environment with eating behaviors and the weight status among children and adolescents. It found that the availability and/or accessibility of healthy or unhealthy home foods was associated with the children's FCP (Nepper & Chai, 2015).

- **Healthcare providers:**

The research of Saluvan and Ozonoff studied about the functionality of hospital information systems. The results from a survey of quality directors at Turkish hospitals; found that there was high value related to hospital information systems functions surveyed because they equate to quality service and patient safety (Saluvan & Ozonoff, 2018).

Another study by Harris looked at hospital-based patient education programs and the role of the hospital librarian. It found that hospital librarians should contribute

their expertise to patient education programs because they are uniquely trained with skills in providing information on other health education topics (Harris, 1978).

UNICEF and WHO recommend that the proper feeding of infants and young children can increase the chances of survival. Also, it can promote appropriate growth and development, especially during the high risk period from birth to two years of age. Breastfeeding during the first few years of life protects children from infection because it is a source of excellent food as well as being economical and safe (Bhutta et al., 2013; WHO et al., 2010). Measuring food consumption patterns involved, three dimensions of child feeding which were combined into the assessment of the children who received appropriate feeding, using the indicator of "minimum acceptable diet". To have a minimum acceptable diet in the previous day, a child must have received (i) the appropriate number of meals/snacks/milk feeds; (ii) food items from at least four food groups; and (iii) breast milk or at least 2 milk feeds (for non-breastfed children) (WHO, 2008; WHO et al., 2010).

1.7. Situation of the target population

The provincial hospital, and Mahaxay, and Gnommalath district hospitals are located in Khammuane province. These three hospitals are accessible to patients from all over Khammuane province. The provincial hospital is located in Thakhek municipality. It was established in 1924 (with 8 buildings and 50 beds), and in 1956, the Filipino health project Operation Brotherhod provided technical assistance. In 1965, the United Kingdom built one building, and then in 1975 and through to recent times the hospital complex has been developed more and more (nowadays there are 150 beds and 25 sectors). According to the organizational structure, there 252 medical officers, including 201 women; 26 contract staff/ of whom 15 were women and 104 volunteer staff including 78 women. The Khammuane Provincial Hospital is the under of the Provincial Department of Public Health and the hospital has a wide range of services for the public both local and foreign. The provincial hospital provides comprehensive health care services such as physical, emotional and social treatments.

It covers four areas: health promotion, disease prevention, curative treatment and rehabilitation (Provincial Hospital Khammuane, 2017).

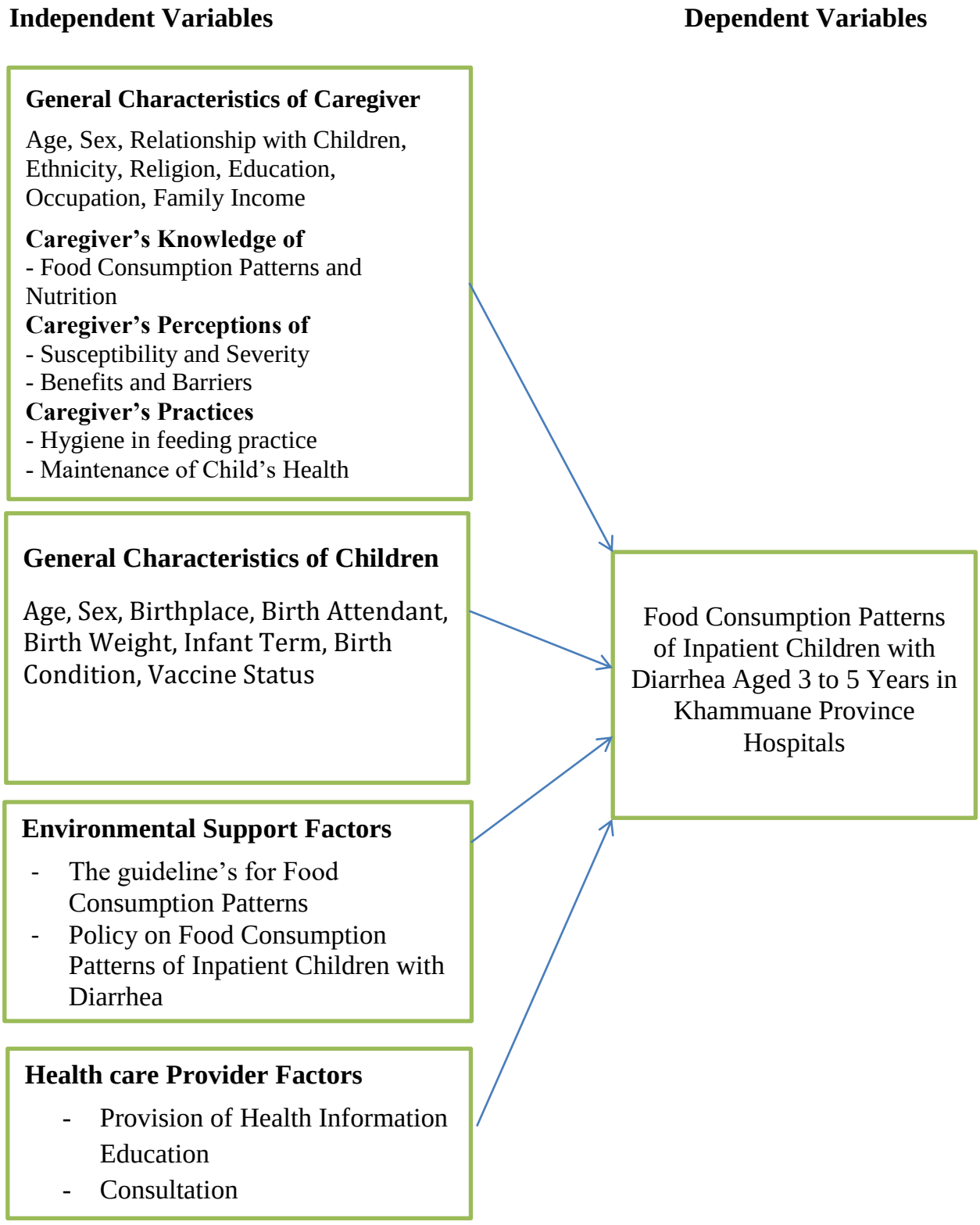
Most diarrhea related deaths in children are due to dehydration from the loss of large quantities of water and electrolytes from the body in liquid stools. However, managing diarrhea either through oral rehydration salt solutions (ORS) or recommended fluids can prevent many of these deaths. Furthermore, the provision of zinc supplements has been shown to reduce the duration and severity of the illness as well as the risk of future episodes within the next two to three months. Whereas the provision of safe water and sanitation facilities is an important strategy for the prevention of diarrhea, preventing dehydration and malnutrition by increasing fluid intake and continuing to feed the child are also important strategies for managing diarrhea. The LSIS II in Khammuane province made the following findings about feeding practices during diarrheal episodes: children were given 7.8 percent less to drink, 31.8 percent of the children drank the same quantity, 40.5 percent drank more and 12.6 percent did not drink anything. A second part looked at eating practices while suffering diarrhea; the child was given to eat much less, somewhat less, about the same, and more were measured at 3.3%, 14.7%, 48.2% and 33.9% respectively and only 23.5 % of children with diarrhea were given a zinc supplement. In different vein, according to by maternal education, mothers with higher education support their children to drink and eat more about 36.3% and 29.1% respectively. Meanwhile mothers with limited education supplement their children's drinking and eating by 14.2% and 10.7% respectively.

Ethnicity can also be a key factor. According to ethnicity of mother/caretaker, it was noted that Lao-Tai specking groups contributed more to their children's drinking intake than mothers/caretakers who were Mon-Khmer, Hmong-Mien, and Sino-Tibetan speaking groups. It was significant to note that people who were Hmong-Mien speakers supported their children to eat more than other ethnic minorities. The people

who were wealthy engaged their children in more drinking and eating during diarrhea than people who were poor (Lao Statistics Bureau, 2018).

Dietary diversity has been correlated with an improved nutritional status of children (Nti, 2011), Food intakes that does not provide enough calories, protein for growth and maintenance, and essential nutrients will result in undernourished individuals. The ability of children to fully process food consumed is also a component of undernourishment as individuals with a reoccurring infectious diseases may be unable to absorb and use nutrients from consumed food (Bedeke, 2012). This becomes a worsening factor for severe conditions and malnutrition because children are at their critical point of growth where they require adequate nutrients to get healthy and meet the growing demands. Therefore, this study seek to describe the FCP of the inpatient children aged 3 to 5 years with diarrheal disease in three hospitals.

CONCEPTUAL FRAMEWORK



Chapter 2

SUBJECTS AND METHODOLOGY

2.1 Subjects

2.1.1 Quantitative research

The subjects included all caregivers' children aged 3 to 5 years who admitted in one of three hospitals (Provincial Hospital, Gnommalath District Hospital, and Mahaxay District Hospital) with diarrheal diseases during the study period from 17/01/2019 to 17/03/2019.

- **Inclusion Criteria**
  - Children aged 3 to 5 years who admitted in the three hospitals with all types of diarrhea such as acute watery diarrhea, acute bloody diarrhea, and persistent diarrhea during the study period.
  - Their caregivers willingly agreed to participate in this study.
- **Exclusion Criteria**
  - Inpatient children aged 3 to 5 years with diarrhea living in the intensive care unit (ICU) because those children could not eat anything and needed special treatment.
  - Or the children's caregivers did not agree or could not participate in this survey.

2.1.2 Qualitative research

The subjects of qualitative research were physicians who work in three hospitals (Provincial Hospital, Gnommalath District Hospital, and Mahaxay District Hospital). This was to assess the consultation process and health information education. In addition, some of the medical officials were selected for representation by all physicians.

2.2 Design

This study was designed as a cross-sectional study using mixed methods: quantitative and qualitative research.

2.3 Sample size

2.3.1 Quantitative research

According to the Provincial Hospital's report on children's diarrhea, the number of children admitted with diarrhea was approximately 18 patients each month in 2017, and approximately 30 patients in the first six months of 2018. So, this study chose the whole sample of children aged 3 to 5 years old who were admitted with the diarrheal diseases during the study period from 17/01/2019 to 17/03/2019.

2.3.2 Qualitative research

In order to make this research achieve clear finding, qualitative data were collected by in-depth interviews with key informants including physicians and nurses who were responsible for closely managing and treating the children. In total 15 medical staff were interviewed in three hospitals. In each hospital, a manager from the hospital in charge of the children's department, 2 doctors and 2 nurses were interviewed.

2.4 Sampling method

In order to avoid bias the random selection method (lottery pick up) was used to select target areas; there are eleven hospitals in Khammuane province.

- First, the name of each hospital was written on a small paper, then rolled and placed in a box
- Second, three hospitals were picked randomly to be representative of all hospitals in Khammuane province.
- The Khammuane Provincial Hospital, the Mahaxay District Hospital and the Gnommalath District Hospital were dawn to be the areas to conduct this study.

2.4.1 Quantitative method

All children aged 3 to 5 years old admitted in the Provincial Hospital, Gnommalath District Hospital and Mahaxay District Hospital who were diagnosed with diarrheal episodes, and recorded as inpatients for at least one day (24 hours) during the study period met the criteria for selection in the study sample.

2.4.2 Qualitative method

This research collected data from the pediatrics departments in the Provincial Hospital, Gnommalath District Hospital and Mahaxay District Hospital. The key informants of each hospital were interviewed.

2.4.3 Quantitative data collection

This study used household and IYCF questionnaires. The questionnaires were translated into the Lao language in order to be more convenient with the target group and assistants. The questionnaires were piloted in a small sample with 10 mothers or caregivers and then they were revised. Furthermore, training was provided to the interviewers. Before conducting an interview, informed consent was taken from each mother or caregiver. Those fulfilling inclusion criteria were enrolled in the study. All the study-related information was collected on a pre-designed preformat. Baseline information about the child and the mother was asked and noted. Information questionnaires were collected from respondents regarding WHO IYCF practices. The questionnaires asked about the mother's knowledge, healthcare workers, and dietary practices in a 24 hours period and other information.

2.4.4 Questionnaires

The questionnaire consisted of seven parts detailed as follows:

- **Part I: General characteristics of caregiver**

The general characteristics of caregiver part consisted of eight items with the caregiver's general information through to their child's FCPs. For instance, the caregiver was asked to describe his/her relationship with the child, age, sex, ethnicity, religion, education, occupation, and family income.

- **Part II: General characteristics of children**

These part consisted of seven items regarding the child's general information which related to their FCPs. It included specific details such as age, sex, birthplace, birth attendant, birth weight, infant term, birth condition and immunization status.

- **Part III: Caregivers' knowledge of the FCPs and the nutrition of children with diarrhea**

Questionnaires were used to find the knowledge of caregivers on food consumption patterns and the nutrition of children aged 3 to 5 years with diarrhea. The questionnaire consisted of 12 items in total with two choices for each answer which was scored by using "True" = 1 Point, and "False" = 0 Points for positive questions were in items 1, 2, 3, 4, 5, 6, 7, 8 and 9. For negative questions points were in items 10, 11, and 12 with an answer and scored as: "True" = 0 point, "False" = 1 point.

The positive questions were related to the food groups that the children should eat and were recommended to consume in a balanced diet, while the negative questions were related to food groups that the children should not eat and were not recommended to consume. (The range of scores was 0-12 points).

The criterion for the knowledge level was made, depending on the percentage gained from the knowledge score. The knowledge level was divided into three categories as follows:

Good knowledge: ≥ 80 % or ≥ 10 of the total score

Fair knowledge: 60-79 % or 7-9 of the total score

Poor knowledge: < 60% or < 7 of the total score

The scale reliability coefficient for the knowledge of caregivers on the FCPs was Kr20 equal to 0.68.

In the assessment of the relationship for the FCPs of inpatient children with diarrhea the knowledge level of caregivers was a combination of low and fair knowledge due to the values being small and it was difficult to assess the relationship by statistics association. Thus there were two levels when determining the caregiver's knowledge: low and good.

- **Part IV: Caregivers' perceptions of the FCPs and the nutrition of children with diarrhea.**

The analysis of perception in this part had four sections: perceived susceptibility, perceived severity, perceived benefit, and perceived barrier. Each section was divided into five items, thus there was a total of four sections with 20 items. The positive questions which constituted ten items, were in items 1, 2, 5, 6, 7, 10, 11, 15, 16 and 19. They were answered and scored as follows: "Agree" = 2 points, "Uncertain" = 1 point, and "Disagree" = 0 points. For negative questions there were ten items, namely items 3, 4, 8, 9, 12, 13, 14, 17, 18 and 20. They were answered and scores as follows: "Agree" = 0 points, "Uncertain" = 1 point and "Disagree" = 2 points. (The range for each section of scores was 0-10 points).

The criterion for the perception levels was made, depending on the percentages of the perception scores. The perception levels were divided into three categories as follows:

Good perception: ≥ 80 % or ≥ 8 of the total score

Moderate perception: 60-79 % or 6-7 of the total score

Low perception: < 60% or < 6 of the total score

The scale reliability coefficient for the caregiver's perception on FCPs was 0.75.

In the examination of the relationship between the caregiver's perception and the FCPs of a inpatient child with diarrhea, the perception of caregivers' levels was combined for low and moderate readings because the values were small and could effectively determine the relationship by statistics association. Thus there were two levels for the caregiver's perception: low and good.

- **Part VI: Caregivers' practices for children suffering diarrhea**

In the caregiver's practices for children suffering diarrhea part of the questionnaire there were two sections to seek information regarding hygiene and the maintenance of child's health.

Section 1: The questionnaires were used to explore an awareness of hygiene for feeding practices by caregivers and its impact on the food consumption patterns of inpatient children with diarrhea. The questionnaire for this section had seven items. The question answers had three choices namely: “Yes, every time” = 2 points, “Yes, sometimes” = 1 point, “No, never” = 0 points. (The range of scores was 0-14 points).

The criterion for hygiene and feeding practices levels was made according to the percentages gained from practice scores. The practice levels were divided into three categories as follows:

Good practice: ≥ 80 % or ≥ 11 of the total score

Moderate practice: 60-79 % or 8-10 of the total score

Low practice: < 60% or < 8 of the total score

Section 2: The questionnaires investigated the practice of caregivers towards maintain their children’s health and ways they look after those unable to care for themselves. In particular, it focused on feeding and taking care of children while they experienced diarrhea. The questionnaire for this section had six items with only positive questions. The questions were answered with three choices namely: “Yes, every time” = 2 points, “Yes, sometimes” = 1 point, “No, never” = 0 points. (The range of scores was 0-12 points).

The criterion of practice for maintaining a child’s health level was made based on the percentages attained from the practice score. The practice levels were divided into three categories as follows:

High practice: ≥ 80 % or ≥ 10 of the total score

Moderate practice: 60-79 % or 7-9 of the total score

Low practice: < 60% or < 7 of the total score

The scale reliability coefficient for the caregiver’s practice with respect hygiene and the maintenance of a child’s health during dirrhea episodes was 0.75.

- **Part IV: Environmental support characteristics**

Section 1: The questions were designed to know if there were any guidelines about caregiver's feeding practices and other received health information. The question account for one item.

Section 2: The questions were designed to know if there were any policies about the FCPs of inpatient children with diarrhea. The question accounted for one item.

2.4.5 Qualitative data collection

Guidelines for in-depth interviews was translated in the Lao language to more convenient for the target group. The medical officer selected was interviewed by the researcher and asked questions following the guidelines for in-depth interviews. In-depth interviews were conducted during the period of study. Their objective was to assess the medical officers' attitudes, beliefs, and perceived acceptability of health information when providing education sessions and consultations. The interviews lasted between 15 and 25 minutes.

All interviews were conducted in a private location, chosen by the participating physician, to ensuring their participation was not known to other members of their unit. The interviews were audio-recorded and transcribed verbatim. Handwritten notes were taken as well.

2.5 Variables

According to the goals of this study which is to explore the FCPs of inpatient children in hospitals, there were multiple variants that influenced the research subjects. These included children's factors, caregiver's characteristics, caregiver's knowledge of children's dietary needs, caregiver's perception of children's dietary requirements, environmental supports and healthcare providers (see details in Annex 1).

Dependent variables:

In this part, the questionnaires asked about the food groups that inpatient children ate in the last 24 hours/yesterday. There were 13 questions in this section asking about foods that came under the seven food groups to assess whether the

inpatient children got appropriate food consumption or not. Question number 1, 2 and 3 asked about foods under the group of grains, roots, and tubers; Question number four asked about foods under the group of legumes and nuts; Question number five was about dairy products; Questions number 6, 7 and 8 asked about meats; Questions number nine was about eggs; Questions number 10, 11 and 12 asked about vitamin-A rich fruits and vegetables; and Questions number 13 asked about other fruits and vegetables. The questions were answered using three choices namely: "Yes = ate, "No" = did not ate, DK= don't know= not sure. (The range of was based on minimum diet diversity) (Lao Statistics Bureau, 2018; UNICEF, FANTA, USAID, & WHO, 2017).

- **Measurements in the FCPs**

Children's feeding was combined into the assessment of the children who received appropriate feeding, using the "minimum acceptable diet" indicators. To have a minimum acceptable diet during the previous day, a child must have received:

- An appropriate frequency of meals (feeding frequency)
- Appropriate nutrient content in the food consumed (dietary diversity)

Feeding frequency was used as a proxy for calculating energy intakes, requiring children to receive a minimum number of meals/snacks (and milk feeds for non-breastfed children) for their age. Dietary diversity is used to ascertain the adequacy of the nutrient content of the food (not including iron) consumed. For dietary diversity, eight food groups were created in which a child consuming at least five of these is considered to have a better quality diet.

Minimum Diet Diversity (MDD) is a proxy indicator of the mean micronutrient density adequacy of the diet and is measured by counting the number of food groups a child received in the last day or night. Validation studies show that infants and young children who consumed at least four of the seven groups were more likely to have diets that were higher in micronutrient density

However, for this study the criteria the subjects were children aged 3-5 years. From the eight standard food groups this study utilized seven. The breastfeeding group

was excluded. This meant those children who during the last day or night or 24 hours period received foods from five or more of the following seven food groups:

1) Grains, roots and tubers
2) Legumes and nuts
3) Dairy products (milk, yogurt, cheese, infant formula)
4) Meats (beef, fish, pork, poultry and offal)
5) Eggs
6) Vitamin-A rich fruits and vegetables
7) Other fruits and vegetables

Table 1: Measurements for the FCPs

Guiding Principles	Indicators /Proximate Measures
Appropriate frequency and energy density of meals	**Minimum Meal Frequency** Four meals/snacks and/or milk feeds provided in the last 24 hours
Appropriate nutrient content of food	**Minimum Diet Diversity** Five food groups ate in the last 24 hours

(Lao Statistics Bureau, 2018; UNICEF, FANTA, USAID, & WHO, 2017).

Qualitative topics

Qualitative research was used to support the second objective of this research which was to explain why caregivers of inpatient children with diarrhea, chose the kinds of foods or limited their use of foods, and to know what information caregivers got from the healthcare workers.

Main topics for qualitative research were:

- Barriers to providing health information education
- Availability of guidelines or handouts for physicians on providing health information education to the caregivers of children with diarrhea
- Nurture of consultations to patients or caregivers about health education.

2.6 Data analysis

2.6.1 Quantitative analysis

This took place after collecting data and gathering information for analysis.

2.6.2 Data Entry

Data were coded, and entered into the Epidata 3.1 software. Before transferring the data for further analysis it was rechecked. This involved scanning for errors and missing values. Then coding, scoring and recoding was carried out. The next step involved analyzing it using the Stata/MP application version 14.2 for Windows 10.

2.6.3 Statistical techniques

When data collection was completed and data entries clearly recorded, data analysis took place in the following manner:

- Descriptive statistics: These were used to describe the demographic characteristics of the study participants. Categorical variable was presented as frequencies and percentages, while continuous variables were presented as means and standard deviations (SD).
- Simple binary logistic regression analysis was used to describe the association between independent variables (for example: characteristics of caregiver, characteristics of children, knowledge of food consumption and nutrition of children with diarrhea, perception of food consumption and nutrition of children with diarrhea, practices of caregivers, healthcare providers and environmental support) and dependent variables for the food consumption patterns of inpatient children with diarrhea. Binary logistic regression was performed to calculate the crude odds ratio (OR) with a corresponding 95% confidence interval
- Multivariate logistic regression analysis means variables had a p-value < 0.05 in the multivariate analysis which was taken of significant predictors. Crude and adjusted odds ratios with their 95% confidence intervals were calculated and presented in texts and tables.

2.6.4 Qualitative analysis

Information recordings, along with notes taken, was used to generate the transcripts that were the translated into Lao. These were then analyzed based on the thematic analysis in the transcripts. Data analysis was done manually. Researchers read the transcripts several times to get a clear view of the material and other authors added their perspectives. These were then coded and shared to develop at consensus. Extracts which gave meaningful explanations about practices were identified and then abbreviated to produce concise summaries explaining motivations and attitudes for FCPs. The summarized were labeled with codes, and different sub-categories were tabulated to find contrasting and similar sub-themes.

2.7 Ethical issues

This study was conducted after ethical approval was given by the Ethical Committee for Health Research of the UHS (Reference Number 106/19 dated 07/02/2019) and the Hanoi University of Public Health (Reference Number 472/2018/YTCC-HD3). The written consent of the children's mothers/caregivers was obtained after explaining the design, objectives and benefits of the study. The participants responded clearly that their involvement in the study was well informed and voluntary. According to guidelines for the protection of the confidentiality of participants, the names of respondents were not included in the answers, and all information collected from the respondents was kept strictly confidential. They were assured anonymity and privacy, and the participants had the right to end their involvement in the research at any time if they felt uncomfortable.

Chapter 3

RESULTS

3.1 Basic information about study subjects

3.1.1 Socio-demographic characteristics of caregivers

Table 2: Socio-demographic characteristic of caregivers (n=130)

Characteristics of caregivers	Number	Percentage (%)
Relationship with child		
Father	36	27.7
Mother	72	55.4
Other	22	16.9
Age		
17-28 years	76	58.4
29-62 years	54	41.5
Mean=29, Median=28, SD=9.3, Min=17, Max=62		
Sex		
Female	91	70.0
Male	39	30.0
Ethnicity		
Lao	108	83.0
Hmong or Yao	22	16.9
Religion		
Buddhist	93	71.5
Christian	19	14.6
Animist	18	13.8
Education		
No schooling	21	16.1
Primary - High School	40	30.8

Vocational Certificate- Bachelor Degree	69	53.1
Occupation		
Government official	43	33.0
Housewife or farmer	56	43.0
Self-Employed and Private Sector	31	23.8
Family Income (kip/month)		
≤ 1,550,000	65	50.0
≥ 1,551,000	65	50.0
Mean=1,757,308, Median=1,550,000, SD=1,221,578, Min=300,000, Max=10,000,000		

The samples of the study were caregivers who had inpatient children aged 3 to 5 years with diarrhea admitted in the Provincial Hospital, Mahaxay District Hospital and Gnommalath District Hospital with 130 subjects in total. The general characteristics of the caregivers shown in Table 2, showed that the majority of relationships with children were mothers (55.3%). However, just under 20% of carers were not the biological parents. The median age of caregivers was 28 years. the majority of caregivers were aged under 30. There was more double the amount of females when compared with males. Another point is that the vast majority of caregivers were from Lao-Tai speaking ethnic groups. In addition, there was an overwhelming majority of caregivers who were Buddhist. There was a diverse proportion of education levels among caregivers with a sizeable group remaining illiterate. The breakdown of occupations among caregivers was relatively even between government clerks, primary producers and those engaged in commerce. Traditional occupations, namely farming and housekeeping, were the mean. There was an even distribution for family income, as half of the respondents less than or equal to 1,550,000 kip/month and vice versa.

3.1.2 Socio-demographic characteristics of children

Table 3: Number and percentage for general characteristics of children (n=130)

Characteristics of children	Number	Percentage (%)
Age		
3 years	78	60
4 years	34	26.1
5 years	18	13.9
Sex		
Female	80	61.5
Male	50	38.4
Birthplace		
Health facility	116	89.2
Other places	14	10.7
Birth Weight		
≤ 2490 g	25	19.2
≥ 2500 g	105	82.8
Mean=2731, Median=2725, SD=344, Min=2000, Max=3800		
Birth Attendant		
Doctor	73	56.1
Midwife	34	26.1
Nurse	11	8.4
Specify other	12	9.2
Infant Term		
Full term	99	76.1
Pre-term	31	23.8
Birth Condition		
Natural birth	109	83.8

Caesarean	21	16.1
Immunization Status		
Complete	103	79.2
Some	27	20.7

A total of 130 inpatients children participated in the study. The results for the general characteristics are shown in Table 3. More than half of the children were aged 3 years. In the sample there were one and a half times more females than males. For the birthplace, the vast majority of these children were born at hospital or health center. At the same time, most children were delivered by medical professional. Less than 10% were born at home without qualifies medical assistance. Of these children a large majority achieved a healthy birth weight of more than 2.5 kilograms. Under a quarter of the children surveyed were born prematurely. A clear majority of mothers had natural birthings. Finally, the study noted that most carers insured that their children received a full series of vaccinations.

3.1.3 Caregivers' knowledge of the FCPs of children with diarrhea.

Table 4: The level of knowledge for caregivers' knowledge of the FCPs of children with diarrhea (n=130)

Caregivers' knowledge level	Number	Percentage (%)
Poor knowledge	9	6.9
Fair knowledge	1	0.7
Good knowledge	120	92.3
Mean ± SD=10.7± 1.7, Median=11, Min=4, Max=12		

Based on 12 items, the knowledge of caregivers' knowledge of the FCPs of children with diarrhea was calculate by way of detailing 130 caregivers shown in Table 4. The mean of food consumption knowledge score was 10.7± 1.7 and the knowledge level was categorized into three groups. Nearly all of caregivers had a good level of knowledge about the FCPs of children with diarrhea (Table 4).

The knowledge of the FCPs for children with diarrhea drawn from the responses of 130 caregivers is shown in Annex 2. The frequency distribution of knowledge according to the question items showed that the vast majority of respondents (92.3%) knew that feeding un-cooked animal meats can effect a child's health when suffering diarrhea and they should not give spicy or fatty foods to children. Most carers (90.7%) were aware that having adequate nutrition is an important step towards healthy growth for children, as it supports proper organ formation, and function, a strong immune system, and neurological and cognitive development. The same percentage of carers knew children with diarrhea, should be given more fluid. In addition, an equal percentage of respondents knew they could provide ORS for children with diarrhea to prevent dehydration, and that while recovering from diarrhea, children should eat bland, simple foods that are easy to digest. There were though some topics that carers understood poorly. For example, few carers (13.8%) had a knowledge of feeding children with food diversification, which is helpful for maintaining, recovering and preventing children from under-nutrition. Only one in ten carers knew that withholding any food from children during diarrheal episodes is incorrect (see details in Annex 2).

3.1.4 Caregivers' perception of FCPs of children with diarrhea.

Table 5: The perception levels of caregivers (n=130)

Caregiver's perception		Number	Percentage (%)
Perceived susceptibility			
	Low perception	35	26.9
	Moderate perception	20	15.3
	Good perception	75	57.6
Median=8, Mean=7.6, SD=1.9, Min=3, Max=10			
Perceived Severity			
	Low perception	34	26.1
	Moderate perception	19	14.6

	Good perception	77	59.2
Median=8, Mean=7.7, SD=1.9, Min=3, Max=10			
Perceived Benefits			
	Low perception	54	41.5
	Moderate perception	12	9.2
	Good perception	64	49.2
Median=7, Mean=7.2, SD=2.4, Min=1, Max=10			
Perceived Barriers			
	Low perception	37	28.4
	Moderate perception	44	33.8
	Good perception	49	37.6
Median=7, Mean=6.5, SD=1.8, Min=2, Max=10			

The caregivers' perception part was classified into four sections namely, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. The scores for each section were ranked from 0 to 10 using five questions and then classified into three levels, namely, less than 60% of the total score was a low perception level, 60% to 79% was a moderate perception level and 80% or more was a high perception level. The results presented in Table 5 showed a common pattern for carers' responses regarding perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. For each category the carers scored highest for their perception level, 57.6%, 59.2% and 49.2% respectively. In addition, the second ranking scores for a poor perception level had a parallel distribution, 26.9%, 26.1% and 41.5% respectively. The same was true for the third ranking scores which had a moderate perception level, 15.3%, 14.6% and 9.2% respectively. In contrast to these trends, the caregivers' score distribution for perception barriers to FCPs and the nutrition of children with diarrhea had middle levels of perception ranked ahead of low

levels, yet both of these remained below high levels which continued to receive the top score.

For the responses in the perception questions in Annex 3 the caregivers perceived susceptibility for food consumption patterns and the nutrition of children with diarrhea. More than four fifths of them agreed that “children who are not adequately nourished while suffering diarrhea will experience an effect on their nutritional status”. Three quarters of the respondents sais that “drinking plenty of water helps to prevent dehydration and flush any toxins out of the body”. And approximately two thirds of them disagreed with “withholding food from children with diarrhea because the children would recover better when provided with more suitable food”. Then, the caregivers perceived severity in FCPs with four fifths of them agreeing that the “dietary intake is very important for the recovery of children with diarrhea”. More than half of the respondents felt that “eating foods rich in nutrients could not prevent children from developing malnutrition”. For the next stage, caregivers perceived benefits in FCPs. Almost three quarters of them agreed with “the importance of optimal IYCF practices during and after common childhood illnesses such as diarrhea and emphasized the need to increase fluid intakes during illness while feeding was maintained and food intakes were increased during convalescence”. In contrast, nearly two thirds of caregivers felt that “withholding feeding practices from children with diarrhea did not help children recover as quickly”. The final section dealt with caregivers perceived barriers on FCPs and the nutrition of children with diarrhea. More than four fifths of them agreed with “following the advice of a health worker for a child’s dietary intake, as it can prevent children with diarrhea developing at more severe condition and malnutrition”. A clear majority of caregivers disagreed that “it was a loss of time on encouraging children to drink more fluids to prevent dehydration”. (see in details Annex 3)

3.1.5 Caregivers’ practices of the FCPs of children with diarrhea.

Table 6 : The number and percentage of practice levels for caregivers (n=130)

Practice level		Number	Percentage (%)
Hygiene in feeding practices			
	Poor practice	10	7.7
	Moderate practice	28	21.5
	Good practice	92	70.7
Median=12, Mean=11.5, SD=2.3, Min=4, Max=14			
Maintenance of child's health			
	Poor practice	26	20.0
	Moderate practice	59	45.4
	Good practice	45	34.6
Median=8.5, Mean=8.4, SD=2.3, Min=2, Max=12			

The caregivers' practices had two sections: hygiene in feeding practices and the maintenance of children's health when suffering from diarrhea. The results from Table 6 show that almost three quarters of caregivers' practices of hygiene was at a good level, while less than a quarter had a moderate level and under ten eight had poor practices. Just under half of the caregivers' practices moderate levels of health maintenance for children with diarrhea. While a third had a good levels and one fifth had poor levels.

For questions measuring caregivers' practice of hygiene in feeding and maintenance of their children's health while suffering diarrhea in Annex 4, it was found more than four-fifths of caregivers washed their hands before feeding a child and they washed fruits, vegetables and meats before cooking and serving every time. That enabled to provide their children with better hygiene. More than half of them fed their child with old/leftover food. A large majority of study subjects never gave under cooked foods to children, but a small percentage of caregivers never washed fruits,

vegetables, and meats before cooking and feeding. For the caregivers' practices when maintaining the health of children with diarrhea it was particularly noteworthy to see that almost three quarters of caregivers continued to feed their children as normal while also giving oral rehydration therapy (ORT). It was disappointing to note that less than half of caregivers occasionally fed their children with a good diversification of foods. Even more alarming was that less than five percent of caregivers prepared carbohydrates, fruits, vegetables and products for their children every day (See details in Annex 4).

3.1.6 Environmental support characteristics

Table 7 : Types of environmental support characteristics

Environmental Supports	Number	Percentage(%)
Have you ever received children's health guidelines for FCPs		
No, never	73	56.1
Yes	57	43.8
► If yes where did you get the information (n=57)		
Newspapers, posters, magazines	20	35.1
Healthcare worker	12	21.0
Mass media	25	43.9
Specify others	0	0
Policy for FCPs of inpatient children with diarrhea in hospital		
No	107	82.3
Yes	23	17.7
► If yes, what did the policy detail (n=23)		
Provision of free food and fluids	0	0
Advice on FCPs	23	100
Specify others	0	0

The results in Table 7 revealed that more than half (56.1%) of caregivers were never getting child's guidelines on FCPs. then, there was less than half (43.8%) of them ever had to get children's health guidelines, of these figures, nearly half (43.9%) of caregiver got the food guidelines from the internet like mass media, and there was only (21%) got from a healthcare worker. Nevertheless, most of the caregivers (82.3%) said no policy for FCPs of inpatient children with diarrhea in hospital, although nearly One-fifths (17.7%) of the subjects told that had policy by advice FCPs.

3.1.7 FCPs of inpatient children aged 3 – 5 years with diarrhea.

Table 8: Number and percentage of FCPs for inpatient children with diarrhea

Food consumption patterns	Female (n=80)		Male (n=50)		Total (n=130)	
	Number	Percentage (%)	Number	Percentage (%)	Number	Percentage (%)
Appropriate food consumption						
< 5 group food	18	22.5	20	40.0	38	29.2
≥ 5 group food	62	77.5	30	60.0	92	70.7
Median=5, Mean=5.09, SD=1.05, Min=2, Max=7						

Based on the questions measuring inpatient children's FCPs while suffering diarrhea in Table 8, it showed that the mean distribution for the use of food groups was 5.09 ± 1.05 groups. A poor level of FCPs was recorded for nearly one third of inpatient children, while most of the others had a good level for FCPs. An important finding was that more than three quarters of female inpatient children had appropriate FCPs levels, while barely two thirds of males had the suitable level.

The results reported in Annex 5 indicate that more than half of inpatient children consumed rice soup/rice porridge two-three time per day and a vast majority of them never ate legumes (beans, peas, peanuts, soybeans). Just over a third of inpatient children never consumed dairy products (Fresh milk, yogurt, butter, cream). However, with respect to meats and protein foods (meat, fish, poultry, offal), more than two

thirds of the children ate poultry (chicken, turkey, duck) at least once a day, followed a clear majority who ate one egg per day. Nearly half of the children had green leafy vegetables with high vitamin A concentration (spinach, basil, Chilnes cabbage). However, more than two thirds of them never ate red or orange vegetables with high vitamin A content (pumpkin, carrots, sweet potatoes). Another disturbing finding was that a quarter of the children surveyed did not consume fruits and vegetables (bananas, pineapples, tomatoes, eggplant) to supplement their dietary intake (see details in Annex 5).

3.2 The relationship factors associated with the FCPs of inpatient children aged 3 to 5 years with diarrhea in Khammuane province hospitals in 2019

It was necessary to analyse the factors related to appropriate food consumption, including variables such as caregivers' characteristics (relationship with child, age, sex, ethnicity, religion, education, occupation and family income per month), caregivers' knowledge, perceptions and practices, children's characteristics (age, sex, birthplace, birth weight, birth attendant, birth term, birth condition and immunization status) and environmental supports which were used for frequency analysis. The relationship between appropriate nutrients and these factors was determined through logistic regression tests with a statistical significance p-value <0.05.

3.2.1 The relationship between general characteristics of caregivers and the FCPs of inpatient children with diarrhea

Table 9: Bivariate analysis of caregivers' demographic factors associated with the FCPs of inpatient children aged 3 to 5 years with diarrhea in Khammuane province hospitals in 2019.

Factors	Appropriate food consumption				Crude OR	
	No (n=38)		Yes (n=92)		(95% CI)	P-value
Caregivers demographic	N	%	N	%		
Relationship with children						

	Father	11	28.9	25	27.1	1	
	Mother	18	47.3	54	58.7	1.3 (0.5-3.2)	0.5
	Other	9	23.6	13	14.1	0.6 (0.2-1.9)	0.4
Aged							
	17-28	17	44.7	59	64.1	1	
	29-62	21	55.2	33	35.8	0.4 (0.1-1.0)	0.04*
Sex							
	Female	25	65.7	66	71.7	1	
	Male	13	34.2	26	28.2	0.7 (0.3-1.8)	0.5
Ethnicity							
	Lao	36	94.7	72	78.2	1	
	Hmong or Yao	2	5.2	20	21.7	5 (1.1-46.0)	0.06
Religion							
	Buddhist	29	76.3	64	69.5	1	
	Christian	3	7.8	16	17.3	2.4 (0.6-8.9)	0.1
	Animist	6	15.7	12	13.0	0.9(0.3-2.6)	0.8
Education							
	No schooling	4	10.5	17	18.4	1	
	secondary	12	31.5	28	30.4	0.5 (0.1-1.9)	0.3
	Tertiary	22	57.8	47	51.0	0.5 (0.1-1.6)	0.2
Occupation							
	Government officer	14	36.8	29	31.5	1	
	Housewife or farmer	15	39.4	41	44.5	1.3 (0.5-3.1)	0.5
Self-employed and private sector		9	23.6	22	23.5	1.1 (0.4-3.2)	0.7
Family income							
	≤ 1,550,000 kip/month	16	42.1	49	53.2	1	

> 1,550,000 kip/month	22	57.8	43	46.7	0.6 (0.2-1.4)	0.2

Table 9 shows the relationship between the FCPs of inpatient children and the characteristics of caregivers. The caregivers' age was associated significantly with the children's appropriate food consumption (p-value=0.04). A child whose caregiver's age was between 29 and 62 years was 0.4 times more likely to get appropriate food consumption than whose caregiver's age was between 17 to 28 years (OR=0.4, 95% CI=0.1-1.0).

3.2.2 The relationship between general characteristics of children and the FCPs of inpatient children with diarrhea

Table 10: Bivariate analysis of children's demographic factors associated with the FCPs of inpatient children aged 3 to 5 years with diarrhea in Khammuane province hospitals in 2019.

Factors	Appropriate food consumption				Crude OR (95% CI)	P-value
	No (n=38)		Yes (n=92)			
Children's demographics	N	%	N	%		
Aged						
3 years	23	60.5	55	59.7	1	
4 years	11	28.9	23	25.0	0.8 (0.3-2.0)	0.7
5 years	4	10.5	14	15.2	1.4 (0.4-4.9)	0.5
Sex						
Female	18	47.3	62	67.3	1	
Male	20	52.6	30	32.6	0.4 (0.1-1.0)	0.03*
Birthplace						
Health facility	33	86.8	83	90.2	1	
Other places	5	13.1	9	9.7	0.7 (0.1-2.9)	0.5
Birth weight						
< 2500 g	7	18.4	18	19.5	1	

≥ 2500 g	31	81.5	74	80.4	0.9 (0.2-2.6)	0.8
Birth attendant						
Doctor	22	57.8	51	55.4	1	
Midwife	8	21.0	26	28.2	1.4 (0.5-3.5)	0.4
Nurse	3	7.8	8	8.7	1.1 (0.2-4.7)	0.8
Other	5	13.1	7	7.6	0.6 (0.1-2.1)	0.4
Infant term						
Full-term	27	71.0	72	78.2	1	
Pre-term	11	28.9	20	21.7	0.6 (0.2-1.7)	0.3
Birth condition						
Natural birth	31	81.5	78	84.7	1	
Caesarean	7	18.4	14	15.2	0.7 (0.2-2.5)	0.6
Immunization status						
Complete	29	76.3	74	80.4	1	
Some	9	23.6	18	19.5	0.7 (0.2-2.2)	0.5

The results in Table 10 show the relationship between the FCPs of inpatient children and the characteristics of these children. The child's sex was associated significantly with children's appropriate food consumption (p-value=0.03). A child whose sex was male was 0.4 times more likely to get appropriate food consumption than one whose sex was female (OR=0.4, 95% CI=0.1-1.0).

3.2.3 The relationship between caregivers' knowledge and the FCPs of inpatient children with diarrhea

Table 11: Bivariate analysis of caregivers' knowledge of factors associated with the FCPs of inpatient children aged 3 to 5 years with diarrhea in Khammuane province hospitals in 2019

Factors	Appropriate food consumption		Crude OR	
	No (n=38)	Yes (n=92)	(95% CI)	P-

Caregivers' knowledge	N	%	N	%		value
Low & moderate	6	15.7	4	4.3	1	
Good	32	84.2	88	95.6	4.1(0.8-20.9)	0.02*

Table 11 revealed that there was a significant association between caregivers' knowledge and children's appropriate food consumption (p-value=0.02). The caregivers who had a good knowledge level were 4.1 times more likely to manage children's food consumption appropriately than those caregivers who had a low or moderate knowledge level (OR= 4.1, 95% CI=0.8-20.9).

3.2.4 The relationship between caregivers' perception and the FCPs of inpatient children with diarrhea

Table 12: Bivariate analysis of caregivers' perception of factors associated with the FCPs of inpatient children aged 3 to 5 years with diarrhea in Khammuane province hospitals in 2019.

Factors	Appropriate food consumption				Crude OR (95% CI)	P-value
	No (n=38)		Yes (n=92)			
Caregivers' perception	N	%	N	%		
Perceived susceptibility						
Low & moderate	11	28.9	24	26.0	1	
Good	27	71.0	68	7309	1.1 (0.4-2.8)	0.7
Perceived severity						
Low & moderate	16	42.1	37	40.2	1	
Good	22	57.8	55	59.7	1.0 (0.4-2.4)	0.8
Perceived benefits						
Low & moderate	20	52.6	46	50.0	1	
Good	18	47.3	46	50.0	1.1 (0.4-2.5)	0.7
Perceived barriers						
Low & moderate	17	44.7	64	69.5	1	

Good	21	55.2	28	30.4	0.3 (0.1-0.8)	0.007*

Table 12 shows that in perception factors significant relationship was found between the caregivers' perceived barriers and the children's FCPs (p-value=0.007). The caregivers who received barriers at a good level were 0.3 times more likely to give children appropriate FCPs than those caregivers who had a low or moderate perception level (OR= 0.3, 95% CI=0.1-0.8).

Apart from this, there was no significantly association between the caregivers' perceptions, and the children's FCPs (p-value>0.05). However, the caregivers who perceived benefits at a good level were 1.1 times more likely to provide better FCPs for children than those caregivers who received low or moderate levels (OR= 1.1, 95% CI=0.4-2.5).

3.2.5 The relationship between the caregivers' practice and the FCPs of inpatient children with diarrhea

Table 13: Bivariate analysis of caregivers' practical factors associated with the FCPs of inpatient children aged 3 to 5 years with diarrhea in Khammuane province hospitals in 2019.

Factors	Food consumption patterns				Crude OR (95% CI)	P-value
	No (n=38)		Yes (n=92)			
Caregivers' practices	N	%	N	%		
Hygiene						
Low	2	5.2	8	8.7	1	
Moderate	8	21.0	20	21.7	0.6 (0.1-3.6)	0.5
Good	28	73.6	64	69.5	0.5 (0.1-2.8)	0.4
Maintenance of child's health						
Low	7	18.4	19	20.6	1	
Moderate	21	55.2	38	41.3	0.6 (0.2-1.8)	0.4

Good	10	26.3	35	38.0	1.2 (0.4-3.9)	0.6

Table 13 shows no statistically significant relationship between the caregivers' practices and the children's FCPs factors (p-value>0.05). It still may be of interest to note that caregivers who had good practices in hygiene were 0.5 times more likely to provide appropriate children's FCPs than those who had low or moderate (OR= 0.5, 95% CI=0.1-2.8). In addition, caregivers who had good practices in maintaining a children's health during diarrheal episodes were 1.2 times more likely to give children appropriate FCPs than those who had low or moderate practices (OR= 1.2, 95% CI=0.4-3.9).

3.2.6 The relationship between environmental supports and the FCPs of inpatient children with diarrhea

Table 14: Bivariate analysis of environmental supports for characteristics factors associated with the FCPs of inpatient children aged 3 to 5 years with diarrhea in Khammuane province hospitals in 2019.

Factors	Appropriate Food Consumption				Crude OR (95% CI)	P-value
	No (n=38)		Yes (n=92)			
Environmental supports	N	%	N	%		
Availability of children's health guidelines						
No	21	55.2	52	56.5	1	
Yes	17	44.7	40	43.8	0.9 (0.4-2.1)	0.8
Policy for FCPs						
No	33	86.8	74	80.4	1	
Yes	5	13.1	18	19.5	1.6 (0.5-5.9)	0.3

With regard Table 14 there was no significant association between environmental supports and appropriate FCPs for children (p-value>0.05). However, the caregivers who received the children's guidelines on FCPs were 0.9 times more

likely to provide children with the appropriate food consumption rates than those who did not receive the guidelines (OR= 0.9, 95% CI=0.4-2.1). Moreover the caregivers who obtained the policy on FCPs were 1.6 times more likely to administer appropriate FCPs for the children in their care than those who did not (OR= 1.6, 95% CI=0.5-5.9).

3.2.7 Factors affecting the FCPs of inpatient children with diarrhea

Table 15: A multivariate logistic regression analysis of the factors associated with the FCPs of inpatient children aged 3 to 5 years with diarrhea in Khammuane province in 2019.

Variables	Appropriate Food Consumption		P-value
	COR (95% CI)	AOR (95% CI)	
Caregiver's age			
≤ 28 years	1	1	
≥ 29 years	0.4(0.1-1.0)	0.4 (0.1-0.9)	0.03**
Sex of children			
Female	1	1	
Male	0.4(0.1-1.0)	0.8 (0.3-2.1)	0.7*
Caregiver's knowledge			
Low	1	1	
Good	4.1(0.8-20.9)	6.2 (1.4-26.8)	0.01**
Perceived barriers			
Low	1	1	
Good	0.3(0.1-0.8)	0.3 (0.1-0.7)	0.01**

An effort to identify the best model for children's appropriate FCPs was presented in Table 15. This involved the selection of independent variables from the literature review to be included in the multiple logistic regression models, or the results of the bivariate analysis. The independent variables had to be correlated significantly with the dependent variables, with p-value<0.05. A backward stepwise was performed

to determine the association between factors and children's appropriate food consumption. Some independent variables which the made models unreliable were excluded and the results were presented by adjusting odds ratio (AOR) with corresponding confidence level of 95% (Table 15).

After adjusting for the independent variables, the multivariate logistic regression model showed that the caregiver's age, knowledge, and perceived barriers had a statistically significant association with the children's appropriate food consumption.

3.3 Results of qualitative research

3.3.1 Provision of health information education

Interviews were held with 15 key healthcare informants drawn from the three hospitals. Each hospital provided five healthcare providers to interview. These constituted a head of the section, two doctors and two nurses from the pediatrics department of each hospital. The interview focused on provision of health information education and consultations given by healthcare providers to patients and caregivers.

The key informants explained the importance of providing health information education to patients and caregivers allowing them to understand more clearly about diseases. The knowledge shared clearly benefits them. They were able to cooperate and demonstrate the advantages of other people of these practices.

"The concept for providing health education to the patient is very important for patients to understand the need to be pro-active in caring for their own health, i.e. knowing how to protect themselves, cooperate with physicians in treatment, and more". (Head of Department, aged 30)

A key informant noted that the health information provided influenced the knowledge gained by the caregivers of children with diarrhea. Most physicians in these hospitals advised caregivers about hygiene and sanitation first, then they recommended that sick children drink more fluids mixed with ORS. In addition, they suggested likely causes and explained the symptom of diarrheal diseases. A nurse noted that when

"providing health education to parents of children suffering diarrhea they consider healthy hygiene principle as key to a healthy diet, as well as a guide to understanding the causes of disease, treatment, and prevention". (Nurse, aged 22)

"Parents of sick children should be advised to clean their children's hand before and after using the toilet, to prevent epidemics and prevent the disease from developing in an infected and to give the children plenty of ORS liquids to prevent them from dehydration". (Doctor, aged 34)

The guidelines or handouts for physicians on providing health information education to caregivers of children with diarrhea were based on standard guidelines, and information taken from the Internet websites endorse by the MOH that related to diarrhea treatment. A doctor said that: *"Medical staff provided health information to parents with children suffering diarrhea according to the child treatment manual, which includes a variety of childhood illnesses and details about treatment, prevention and other care". (Doctor,aged 38)*

The barriers to health workers in the provision of health information education in these hospitals were generally was language, time, and intention. There were a lot of doctors and nurses who said that the psychology of language was very important when communicating with the patients and caregivers because in some cases the caregivers ignores the suggestions of doctors or nurses. However, the most important thing is time to process and understand health education instructions.

"For me the barrier to provide health education to caregivers of patients was language. There were not only ethnic Lao people who came for treatment in the hospital, but there were also people from other ethnic group and foreigners. Thus when talking in the Lao language they may not really understand everything. So, it becomes harder to treat them effectively". (Nurse, aged 24)

"In my nine years of experience, the barrier to providing of health information education to the caregivers or patients was time management. This is because there are a lot of patients, but the time for health education to patients is limited. So, medical

officers must run from client and client all the time. If all the details are explained in their entirely too much time is lost and also many other people will miss out on basic advice". (Nurse, aged 29)

3.3.2 Consultations

Healthcare providers giving consultations to patients or caregivers usually made them aware of and understand the disease so as to change their behavior, and reduce their fear. When the patients or caregivers understand the disease, they will know how to prevent illness for themselves and others. Thus consultations encourage people to changing their behavior a positive way and helps caregivers and patients to relax and not panic about the disease.

"Continuous counseling with caregivers/patients is very important for them to assist their treatment by knowing how to prevent, knowing the steps that to lead to a lasting cure and knowing to give knowledge and guidance to patients and parents which gives them reassurance. In addition, it allows patients or caregivers to understand and recognize the side effects of the disease, to understand the prevention and treatment procedures, and gives them a chance to cooperate with their doctors. All of these factors help them to get better as soon as possible". (Head of Department, aged 31)

The consultation process for the healthcare workers with caregivers of children with diarrhea, mostly involved them assessing the patient's hygiene status, and encouraging them to drink more water with ORS and to eat bland, simple foods. According to the dynamics of diarrheal diseases, the practice of good hygiene is the best way to prevent epidemics and severe infections. In addition, it helps to moderate the condition of affected patients through the intake of more fluids and suitable foods. A doctor said, *"after checking stools containing mucus or blood. It is advisable to eat bland foods, simple, not too spicy or in excessive amounts to be easy to digest. This will help absorb some water from the stool, in combination with drinking more fluids (ORS, coconut). Moreover they are advised about hygienic practices such as eating well-*

cooked foods. Carers need to keep track of children's fluids continuously because the child with diarrhea is likely to worsen in their condition quickly if not drinking" (Doctor, aged 27)

Depending on the physician's experience, counseling with patients or caregivers is generally done directly with them to get the message through clearly and immediately, then the patients or caregivers can directly ask the physicians for suffestions in case they have a problem.

"My experience is that two-way communication is a better form of counseling. It is providing direct counseling to the patients/caregivers and they can ask in case they are unclear of information or have other concerns. Sometimes in the case of multiple patients, they are grouped in the patients' ward. The medical officers talk to the patients directly to let them know how to recover, how to cooperate with the doctors, and what treatment they will received. The benefit of this types of discussion with the patients is to get them to understand quickly and not to have any misunderstanding circulating around the ward" (Nurse, aged 24)

The availability of educational and counseling manuals was essential. Through discussion and observation in these hospitals it was noted there were several manuals such as booklets on the treatment of children in hospitals, a 2015 WHO guide for nursing practices, a 2008 national treatment book developed by the Luxembourg project, the proceeding from a 2017 workshop on the Integrated Management of Childhood Illness, the guidelines on treating children from a 2018 MOH-KOICA workshop, and the 2012 national standard treatment guidelines. Physicians provided health education and advice to patients and caregivers routinely through bedside consultation each morning round. These lasted for about 10-15 minutes per patient. However, there was no guideline on how to feed sick infants and children found in these hospitals.

Chapter 4

DISCUSSION

The study of FCPs of inpatient children aged 3 to 5 years with diarrhea in hospitals in Khammuane province. Covered the general characteristics of children, general characteristics of caregivers, caregivers' knowledge, caregivers' perceptions, caregivers' practices, environmental supports and children's appropriate food consumption.

FCPs of inpatient children

To get a healthy diet we need to eat many different types of food each day, including fruit, vegetables, grains, roots, beans, nut, animal products and others. It is not healthy to eat the same food with the same components every day. Consuming a wide variety of foods is likely to increase the adequate of nutrients. Good nutrition is the key to good mental and physical health. The inpatient children at the target hospitals come from different regions, so those who originate from urban areas and higher levels of modernization often experience different feeding practices compared to their rural counterparts.

The prevalence of inpatient children with diarrhea who had more than satisfactory FCPs in hospitals in Khammuane province was 70.7%. This finding was different, to that in the study by Islam in 2008, about dietary intake and the clinical response of hospitalized patients with acute diarrhea in Bangladesh, which found that inpatients children had low dietary diversity of 65.2% (Islam et al., 2008). Three other studies of dietary and nutritional adequacy showed there was no large difference in the proportion of inpatient children with appropriate and sub-standard (Bandoh & Kenu, 2017; Pantenburg, Ochoa, Ecker, & Ruiz, 2014; Ronoh, Were, Wakhu-Wamunga, & Wamunga, 2017). It was important to note that the results gained in this provincial study contrasted with nationwide results measuring at 60.6%. Thus FCPs in

Khammuane had a higher standard than originally thought (Lao Statistics Bureau, 2018).

Based on the findings we can see that inpatient children require close attention with respect to their FCPs while suffering diarrhea. This is despite a rising prevalence of inpatient children with a good dietary diversity. This could be due to the fact that the three target hospitals' inpatient children come from different regions and different ethnic groups that can be affected by the urban environment around the hospitals where feeding practices and caregivers' knowledge its exposed to new perceptions about children's health.

The relationship between the general characteristics of children and the FCPs of children with diarrhea

There was no significant association between the general characteristics of children such as age, sex, birthplace, birth attendant, birth weight, birth term, birth condition and immunization status in Pearson's chi-square test (p-value>0.05). However, the results showed that more than two third of females were more likely to have appropriate FCPs compared to only one third of males. This is different to the study by Rakotonirainy's team on dietary diversity for 6 to 59 month old children in Madagascar which found a closer margin of difference between female and male FCPs, 52.7% and 47.3% respectively (Rakotonirainy et al., 2018). In contrast, a study in China by Bi on dietary diversity among preschoolers showed that males eclipsed females with regard to appropriate FCPs (Bi et al., 2019).

In this study, children who had a low birth weight were not badly impacted with respect to FCPs despite suffering diarrhea. However, these findings differ from a previous study by Rahman in 2016 who studied children in Bangladesh. It showed that children with a low birth weight significantly increased their risk of becoming malnourished (Rahman et al., 2016). This is because parents of children in Khammuane with a low birth weight are especially concerned about their children's frailty, so they provide food with rich nutrients. Bangladesh is the most densely

populated country in the world, so children suffer from high rates of micronutrient deficiency. The loss of arable land, frequent flooding and extreme weather patterns compound the threat to food security, thus undernutrition is exacerbated by poor dietary diversity.

The relationship between the general characteristics of caregivers and the children's FCPs

The caregivers' age was significantly associated with children's appropriate FCPs in Pearson's chi-square test (p-value<0.05). A child whose caregiver's was aged between 29 and 62 years was more likely to give appropriate FCPs for children with diarrhea than younger caregivers. In contrast, there was a previous study in Khammuane province which revealed there was no significant association between the age of caregivers and children's FCPs (Bounkham, 2012). In a previous study by Thonethong in 2016, who did research in Bolikhamxay province, it showed that there was no significant association because it produced a p-value > 0.05 (Thonethong, 2016). In addition, Souksavath did research on children's nutritional status in Saravan province in 2012 and found there was no significant association either (Souksavath, 2012).

According to the situation in the three hospitals, caregivers aged 17-28 years made up more than half of the sample group compared to caregivers aged 29 to 62 years. Nearly three quarters of caregivers were women. A child whose caregiver's age was 17-28 years was moderately concerned because this group was less mature and occupied with fewer obligations. Hence they frequently paid less attention to their children and their responsibility for their children's health. Another impeding factor for caregivers was geography since location restricted their choices for healthcare practices.

After adjusting the odds ratio for children's appropriate food consumption, there was a statistically significant relationship between the caregivers' age and the inpatient children's appropriate FCPs. A child whose caregiver's age was 29 to 62 years was

only marginally able to provide more appropriate FCPs than children whose caregivers were aged younger.

The relationship between the caregivers' knowledge and the children's FCPs

The caregivers' knowledge of nutrition is very important when developing their children to have good health, strong growth rates, good cognitive skills and a high level of natural immunity. In this study it was found that there was a significantly strong association between the caregivers' knowledge and the children's FCPs with a p-value= 0.02. The proportion of caregivers who had a good knowledge on nutrition was more than 9:1 when compared to those with a poor knowledge. The caregivers who had a good knowledge knew how to feed their children food with appropriate nutrient contents and they were able to select suitable foods for their children. This results of this study were similar to the research of Oduor and colleagues who focused on caregivers' nutritional knowledge and found that there was a significant association between caregivers' nutritional knowledge and children's FCPs (Oduor et al., 2018). Zeng's team which researched the relationship between caregivers' nutritional knowledge and children's FCPs in China found that the caregivers' knowledge was strongly associated with children's FCPs (Zeng et al., 2012). Another study in Ghana found that caregivers' nutritional knowledge was significantly associated with the dietary diversity of a child's intake (Christian et al., 2016).

In addition, a recent study by Peter Chege in Kenya, showed that the nutritional knowledge level of caregivers was low, whereby they did not know the correct foods, right amounts, suitable food preparation methods and appropriate frequency of feeding for children. The nutritional knowledge level among caregivers was significantly associated with the dietary practices by a p=value < 0.05. Hence cultural norms for a regular diet in this context had a detrimental impact (Chege & Kuria, 2017). A study by Bi found there was a significantly strong association between caregivers' knowledge and children's FCPs with a p-value <0.001 (Bi et al., 2019). A study by Dalaphone in Sepon district, Savannakhet province found that the caregivers who had a

good knowledge of nutrition and children's nutrition were significantly associated with a p-value=0.001(Dalaphone, 2012). There were a lot of studies showed that the knowledge of caregivers was a major factor affecting children's FCPs, whether they be in remote areas or urban centres.

After adjusting the odds ratio for children with appropriate FCPs, a significant relationship was found between the caregivers' knowledge and the inpatient children's FCPs. The caregivers who had a good knowledge were more than five times more likely to give children appropriate FCPs than those caregivers who had a low knowledge.

The relationship between the caregivers' perception and children's FCPs

A child's dietary diversity depends on the caregiver's ability to make healthy food and beverage choices on their behalf. The caregiver's perception may help to develop behaviors to improve the child's diet and nutrition. The present study found that there was a significantly strongly association between the caregivers' perceived barriers and the children's appropriate FCPs (p-value=0.007). The caregivers who perceived barriers at a good level were more likely to give children appropriate FCPs compared to those who perceived poor levels. A low perception level increased the risk to children's appropriate FCPs because they would suffer malnutrition which in turn heightened the child death rate. This study results were in agreement with Heitzinger and colleagues, who studied caregivers' perceptions of children's nutritional status in Magallanes, Chile. Their study showed that there were a significant associated between the caregivers' perception and the children's FCPs (p-value<0.05) (Heitzinger et al., 2014). Another study by Briefel and Reidy found that the proportion of children with a very healthy diet was significantly associated with caregivers' perception (Briefel, Deming, & Reidy, 2015). Furthermore the study by Suzana Almoosawi and colleagues showed there was a significant association between caregivers' perception and children's FCPs (Almoosawi et al., 2016). In addition, Daniel's team in South Sudan revealed that there was a significant association with caregivers' perceptions and the

FCPs of children (Daniel et al., 2017). Therefore, it can be note the way and amount caregivers perceive barriers is important to their decision making about what is suitable for children's health, even though there are many healthy suggestions given by nutritionists and other medical professionals.

After adjusting the odds ratio for children's appropriate FCPs, there was a strong relationship between the caregivers' perceived barriers and the children's appropriate FCPs. The caregivers who perceived barriers at a good level were only slightly more likely to give children appropriate FCPs than those caregivers who perceived poor levels.

The relationship between the caregivers' practices and the children's FCPs

Appropriate feeding practices during children's illnesses are important to achieve optimal health outcomes, and to prevent children from getting undernutrition. This research studied the caregivers' practices through two stages. Firstly, the practice of hygiene, and the maintenance of children's health was scrutinized using the Pearson Chi-square test. The univariate logistic regression showed that all of the caregivers' practices were not significantly associated with children's FCPs with a p-value>0.05. It may be of interest to note that caregivers who had good practices for hygiene and the maintenance of children's health were more likely to give children appropriate FCPs than those with poor practices. The majority of respondents had poor practices, thus they increased the risk of children not getting enough nutrients. These result were on par with those reported by Inayati and colleagues who investigated improved nutrition knowledge and practices through intensive education in Indonesia. Their study revealed that children's FCPs were not significantly associated with caregivers' practices (Inayati et al., 2012). Another study in Brazel revealed that children's nutrition was not associated with caregivers' feeding practices (Maranhao, Aguiar, Lira, Sales, & Nobrega, 2018). Conversely, the findings of a previous study in South Africa by Chelule and Chihope showed that was a significant association between caregivers' practices and the FCPs of children aged under five at Nyangabgwe

Hospital, Botswana (Chelule & Chihope, 2015). The reasons why the Khammuane study differed were the majority of caregivers were younger aged, and paid less attention to strict hygiene practices which effect children's FCPs.

The relationship between environmental supports and children's FCPs

The results of the present study showed there were not significant association between environmental supports and children's appropriate FCPs (p-value>0.05). However, the caregivers who received children's health guidelines and policies for FCPs were more likely to give children appropriate FCPs than those who did not. Similarly, a prior study in Khammuane by Bounkham revealed that there was no significant association between environmental supports and children's FCPs (p-value>0.05) (Bounkham, 2012). In contrast, there were two different studies in the USA which showed that were significant association between environmental supports and children's FCPs (Florez et al., 2017; Nepper & Chai, 2015). As Laos is a developing country it has limited environmental supports when compared to develop countries.

Healthcare Providers

The provision of health information education and the consultation of healthcare providers nearly always emphasizes treatment, prevention, sanitation and hygiene. There are usually few suggestions that focus on food consumption patterns for children. The hospitals in this study still have no principal guidelines or handouts for healthcare workers to act as a standard for the food consumption patterns of children. Healthcare workers need to be informed in advance about comprehensive approaches when providing health information education and consulting with caregivers or patients.

When looking at the obstacles for physicians who provide and medical advice and consult caregivers of children with diarrhea, the main hurdle identified was language. There were not only ethnic Lao people who came for treatment at the hospital, but there were also people from other ethnic groups and foreigners. Thus

when medical officers talked in the Lao language the patients could not always really understand everything. So, it became hard to treat them effectively as patients struggled to describe their symptoms and the doctors could not fully explain their diagnosis and treatment plans. Apart from verbal communication problem there were still a few barriers related to times as patients felt obstructed when seeking the provision of help and desired more time for discussion during consultations. Consequently, caregivers/patients lacked adequate information about inpatient children's FCPs because good models for FCPs were lacking in the hospitals. The results were consistent with those of a previous study conducted in Turkish hospitals (Saluvan & Ozonoff, 2018). Another study of hospital Iibrarians revealed that they should contribute their expertise to patient education programs. This is because they are uniquely trained with skills in providing information on health education (Harris, 1978). This was no, in line with a separate study on disseminating health information by healthcare providers so as to improve practice and patient care. Its research findings showed that overall there was insufficient evidence to justify healthcare information by supplementary healthcare providers because they were not perceived as the most reliable informants for improved practices and patient care (McGowan et al., 2009).

Limitation of study

Our results should be considered with the following limitations in mind. Firstly, a drawback of this study was that a cross-sectional analysis could not be used to determine the causality between inpatient children and food consumption patterns. Hence dietary diversity scores and frequency could not be equated to the quality of diet. Secondly, this study was conducted over a very short time, so it was difficult to identify the main factors influencing the inpatient children with diarrhea. Thus it was only possible to evaluate the association between independent and dependent variables. Thirdly, this research focused on children aged in a specific group namely only children aged 3 to 5 years old, and was conducted in only three hospitals. Therefore, it might insufficiently represent the children in province. The target group was not

enough and it is well known that most children experience diarrhea sometime during the rainy season so the frequencies may be exaggerated. Future studies should concentrate on children aged under five years and be conducted in five hospitals, thus covering half of the provincial treatment centres.

CONCLUSIONS

The results of this study showed that nearly one-third of children with diarrhea were poorly nourished while suffering diarrhea in the hospital. Some affecting factors were the age of caregivers, and the caregivers' knowledge and perceptions in connection with FCPs of inpatient children with diarrhea in hospitals in Khammuane province. In addition, healthcare providers were a factor that affected the FCPs of inpatient children with diarrhea in Khammuane province hospitals. This was because the provision and consultation of healthcare providers focused mainly on treatment and sanitation, rather than giving direct advice feeding practices. Another major concern is that there is still not standard set of guidelines for the FCPs of children suffering gastro-intestinal illnesses.

RECOMMENDATIONS

This study has identified three key issues which demand immediate action and are detailed as follows:

1. Actively provide detailed information on the FCPs of inpatient children with diarrhea, noting to give extra attention to caregivers who demonstrate a low level knowledge due to a lack of formal schooling.
2. Promote the provision of factual information/guidelines regarding the FCPs of children with diarrhea through announcements in factsheet, newspapers, posters, radio broadcasts, mass media campaigns and other sources so that everyone can access the relevant information easily and affordably.
3. Initiate the development of guidelines for children's FCPs and then distribute the completed guidelines to hospitals to serve as manuals for healthcare workers. By producing a quality reference tool of this type healthcare professionals will be ideally placed to have free, open and respectful conversations with parents about child nutrition, and they should always be encouraged to do so.

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ANNEXES

Annex 1: Variables

Since the goals of this study are to explore the FCPs of inpatient children with diarrhea in hospitals, there are multiple variables with influence.

No	Variable	Definition	Type of Category and Measure	Data Collection Method
Independent Variables				
Part 1: General characteristics of children				
1	Age	Refers to the length of time for a child since birth to the day of the interview. This study defined age groups between 3 – 5 years which were classified 2-3 years (24 months to 36 months), 3-4 years (37 months to 48 months), and 4-5 years (49 months to 60 months).	Continuous Variable …….. years old	Caregiver-Administered Questionnaires
2	Sex	Gender refers to the socially constructed roles, behaviors, activities, and attributes that a given society considers appropriate for men and women	Bivariate 1= Male 2= Female	Caregiver-Administered Questionnaires

3	Birthplace	Refers to the place where the mother delivered this child such as a hospital, home, and other places.	Categorical Variable 1= Hospital 2= Home 3= Other places	Caregiver-Administered Questionnaires
4	Birth Weight	Refers to the weight of the child at birth which is classified into four categories as a very low birth weight at 600g – 1500g, a low birth weight at 1500g - 2500g at birth, a normal birth weight at 2500g – 4200g at birth, and an oversized birth weight more than 4200g at birth.	Categorical Variable 1= a very low birth weight at 600g – 1500g 2= a low birth weight at 1500g - 2500g at birth 3= a normal birth weight at 2500g – 4200g at birth 4= oversized birth weight at more than 4200g at birth.	Caregiver-Administered Questionnaires
5	Birth Attendant	This refers to the person who attended the birth of this child and assisted with the delivery such as doctors, nurses, family members, and other people.	Categorical Variable 1= Doctor 2= Midwife 3= Nurse 4= Other person	Caregiver-Administered Questionnaires

6	Infant Term	Refers to the range of months into the gestation period that the infant was at childbirth. These are divided into pre-term and full-term periods	1 = Full-term 2 = Pre-term 3= Don't know/Not sure	Caregiver-Administered Questionnaires
7	Birth Condition	Refers to the birthing method at the time the mother give birth. The options were natural or caesarean	1 = Natural birth 2 = Caesarean 3 = Don't know/Not sure	Caregiver-Administered Questionnaires
8	Immunization Status	Immunization status (complete) refers to the children whose vaccines before the age of 1 year included BCG, HepB0, DPT (diphtheria, pertussis, and tetanus), OPV (oral polio vaccine) and MR (Measles-Rubella) and that these had been recorded in their health book.	Categorical Variable 1= Complete 2= Partial 3= Not vaccinated	Caregiver-Administered Questionnaires
Part 2: General characteristics of the caregivers				
Caregivers: refers to the people who are taking care of the children				
1	Age	Caregiver's age: refers to the length of time in years until his/her last birthday, classified into two groups	Continuous Variable …….. years old	Self-Administered Questionnaires
2	Relationship	Relationship with child: refers to the	Categorical Variable	Self-Administered

	with children	relationship of the respondent and child such as father, mother, brother, sister, grandmother, grandfather and others.	1= Father 2= Mother 3= Brother 4= Sister 5= Grandmother 6= Other	Questionnaires
3	Ethnicity	This refers to the ethnicity of the caregivers. Ethnic groups in Khammuane province include the Lao Khmu, Akha	Categorical Variable 1= Lao 2= Khmu 3= Hmong and IuMien 4= Akha	Self-Administered Questionnaires
4	Religion	The refers to the religion of the caregiver. Religions in Khammuane province include Buddhism, animism, and Christianity.	Categorical Variable 1= Buddhist 2= Animist 3= Christian	Self-Administered Questionnaires
5	Education	This refers to the highest level of education that the caregiver has attained. This study classified education into 7 groups as follows: never studied, primary school, secondary school, high school, and	Categorical Variable 1= No schooling 2= Primary School Certificate 3= Lower Secondary	Self-Administered Questionnaires

		other levels.	School Certificate 4= High school 5= Vocational Certificate 6= Bachelor Degree 7=Masters Degree	
6	Occupation	Refers to the caregiver's career at the time of this research defined by the following categories: government official, housewife, farmer, and self-employed business person and other.	Categorical Variable 1= Government official 2= Housewife 3= Farmer 4=Self-employed business person 5= Other	Self-Administered Questionnaires
7	Family Income	Refers to the average total family income per month in Lao kip.	Continuous Variable …….. kip	Self-Administered Questionnaires
❖ Caregivers' knowledge of FCPs and the nutritional status of the child with diarrhea				
8	Caregivers' knowledge of food consumptio	Knowledge of FCPs and the nutritional status: refers to the understanding of the caregiver about healthy foods, proper foods for children while suffering from	Categorical Variable 1= Yes 2=No 3= Don't Know/Unsure	Self-Administered Questionnaires

	n and the nutritional status	diarrhea, and malnutrition prevention (stunted, wasted, and underweight), sanitation and monitoring the nutritional status of children.		
9	Caregivers' perceptions of FCPs of children with diarrhea	Perception refers to the feeling of the caregiver concerning perceived susceptibility, perceived severity, perceived benefit, perceived barrier, and sources of health information about FCPs for children with diarrhea. Therefore, their perceptions of FCPs for children with diarrhea consisted of three levels as follows: low, moderate, and high.	Categorical Variable 1= Yes 2=No 3= Don't Know/Unsure	Self-Administered Questionnaires
10	Perceived susceptibility	Perceived susceptibility refers to the beliefs and feelings of the caregiver about their child's FCPs	Categorical Variable 1= Yes 2=No 3= Don't Know/Unsure	Self-Administered Questionnaires
11	Perceived severity	Perceived severity refers to the caregiver's beliefs and feelings about the seriousness of their child's FCPs	Categorical Variable 1= Yes 2=No	Self-Administered Questionnaires

			3= Don't Know/Unsure	
12	Perceived benefits	Perceived benefits refers to the caregiver's beliefs and feelings about the benefits of their child's FCPs	Categorical Variable 1= Yes 2=No 3= Don't Know/Unsure	Self-Administered Questionnaires
13	Perceived barriers	Perceived barriers refers to the caregiver's beliefs and feelings about obstacles facing the FCPs	Categorical Variable 1= Yes 2=No 3= Don't Know/Unsure	Self-Administered Questionnaires
❖ Caregiver's practices for FCPs of children with diarrhea				
14	Hygeine in Feeding Practices	Hygeine refers to the feeding practices of the caregivers such as how to cook meals and feed children.	Categorical Variable 1= Yes (every time) 2= Yes (sometimes) 3= No (Never)	Self-Administered Questionnaires
15	Maintenance of Child's Health	Maintenance: refers to the practice and concern of a caregiver towards their child such as looking after those unable to care for themselves, especially feeding, taking care when they get sick, etc.	Categorical Variable 1= Yes (every time) 2= Yes (sometimes) 3= No (Never)	Self-Administered Questionnaires
Part 3: Environmental support characteristics				

❖ Guidelines for FCPs				
1	Guidelines for FCPs	Refers to the way to support mothers or caregivers with how to act, how to respond to FCPs, the treatment and prevention of malnutrition for children with diarrhea.	Categorical Variable 1= Yes 2=No 3= Don't Know/Unsure	Self-Administered Questionnaires
❖ Policy for FCPs of inpatient children with diarrhea				
1	Policy for FCPs of inpatient children with diarrhea	This refers to policies which can help mothers' or caregivers' behavior when being responsible for children with diarrhea.	Categorical Variable 1= Yes 2=No 3= Don't Know/Unsure	Self-Administered Questionnaires

Annex 2

The frequency distribution of knowledge about questionable items.

	Female (n=91)		Male (n=39)		Total (n=130)	
Caregivers' knowledge of FCPs	Number	Percentage (%)	Number	Percentage (%)	Number	Percentage (%)
Adequate nutrition						
False	9	9.8	3	7.6	12	9.2
True	82	90.1	36	92.3	118	90.7
Diarrhea is diagnozed						
False	15	16.4	1	2.5	16	12.3
True	76	83.5	38	97.4	114	87.6
Received five food groups						
False	16	17.5	5	12.8	21	16.1
True	75	82.4	34	87.1	109	83.8
Should be given more food						
False	7	7.6	8	20.5	15	11.5
True	84	92.3	31	79.5	115	88.4
Should be given more fluid						
False	9	9.8	3	7.6	12	9.2
True	82	90.1	36	92.3	118	90.7
ORS to prevent dehydration						
False	9	9.8	3	7.6	12	9.2
True	82	90.1	36	92.3	118	90.7

Food diversification						
False	15	16.4	3	7.6	18	13.8
True	76	83.5	36	92.3	112	86.1
Feeding un-cooked items						
False	6	6.5	4	10.2	10	7.6
True	85	93.4	35	89.7	120	92.3
Eat bland, simple foods						
False	10	10.9	2	5.1	12	9.2
True	81	89.0	37	94.8	118	90.7
Withholding some foods						
False	81	89.0	36	92.3	117	90.0
True	10	10.9	3	7.6	13	10.0
Diarrhea cannot affect						
False	79	86.8	34	87.1	113	86.9
True	12	13.1	5	12.8	17	13.0
Give spicy or fatty foods						
False	81	89.0	39	100	120	92.3
True	10	10.9	0	0	10	7.6

Annex 3

The frequency and proportion of caregivers' perception of each item measuring perception (n=130)

Caregivers' perception	Agree		Uncertain		Disagree	
	Number	Percentage (%)	Number	Percentage (%)	Number	Percentage (%)
Perceived Susceptibility						
• Children who are not adequately nourished	105	80.7	17	13.0	8	6.1
• Fiber helps keep the digestive system active.	60	46.1	50	38.4	20	15.3
• Do not provide any food	18	13.8	28	21.5	84	64.6
• Less feeding practice	21	16.1	39	30.0	70	53.8
• Drink plenty of water	98	75.3	24	18.4	8	6.1
Perceived Severity						
• A malnourished child is more vulnerable to illness	98	75.3	21	16.1	11	8.4
• Children with diarrhea become malnourished	93	71.5	33	25.3	4	3.0

more easily						
• Eat foods with rich nutrients	23	17.7	34	26.1	73	56.1
• Consume various foods	33	25.3	33	25.3	64	49.2
• Balanced dietary intake	108	83.0	19	14.6	3	2.3
Perceived Benefits						
• The importance of optimal IYCF	95	73.0	28	21.5	7	5.3
• Withholding food practice	18	13.8	29	22.3	83	63.8
• Dietary intake should be less than usual	26	20.0	33	25.3	71	54.6
• No fluids apart from ORS	30	23.0	38	29.2	62	47.7
• Give your child frequent small meals	76	58.4	37	28.4	17	13.0
Perceived Barriers						
• It is too expensive	49	37.6	36	27.7	45	34.6
• Consult with health providers costs more money	15	11.5	42	32.3	73	56.1
• It is a loss of time	18	13.8	36	27.6	76	58.4
• Family member’s	49	37.7	42	32.3	39	30.0

suggestion						
• Following the advice of health workers	108	83.0	13	10.0	9	7.0

Annex 4

All items measuring the caregivers' practices for feeding children with diarrhea from 130 caregivers classified by correct answers (n=130)

Caregiver's Practices	Yes Every time		Yes Sometimes		No Never	
	Number	Percentage (%)	Number	Percentage (%)	Number	Percentage (%)
Hygiene in feeding practices						
• Washing hands	108	83.0	20	15.4	2	1.5
• Washing the child's hands	90	69.2	31	23.8	9	6.7
• Washing fruits, vegetables, and meats	112	86.1	13	10.0	5	3.8
• Not well cooked food	8	6.1	16	12.3	106	81.5
• Feed a child with old/ leftover food	6	4.6	69	53.0	55	42.3
• Given spicy food	8	6.1	37	28.4	85	65.4
• Store fresh food what a suitable temperature	78	60.0	46	35.4	6	4.6
Maintenance of child's health						
• Preparing carbohydrate, fruits, and other foods	76	58.4	49	37.7	5	3.9
• Some foods	55	42.3	58	44.6	17	13.0

aggrevate children's diarrhea						
• Feeding meals to the child more than usual	51	39.2	51	39.2	28	21.5
• Feeding continues at the same time as ORT	97	74.6	21	16.1	12	9.2
• Feeding child with more food diversification	44	33.8	61	46.9	25	19.2
• Withholding some food	15	11.5	18	13.8	97	74.6

Annex 5

The frequency of eating particular food items among 130 inpatient children

Food Items	No Number (%)	1 time/ day Number (%)	2-3 times/ day Number (%)	4-5 times/ day Number (%)	6-7 times/ day Number (%)	Don't know Number (%)
Rice, sticky rice, etc.	15 (11.5)	29 (22.3)	72 (55.3)	14 (10.7)	0 (0)	0 (0)
Rice soup/rice porridge	4 (3.0)	23 (17.7)	79 (60.7)	22 (17.0)	0 (0)	2 (1.5)
Tubers (Potatoes)	80 (61.5)	28 (21.5)	5 (3.8)	4 (3.0)	1 (0.7)	12 (9.2)
Legumes (beans)	93 (71.5)	15 (11.5)	4 (3.0)	5 (3.8)	0 (0)	13 (10.0)
Milk products	48 (36.9)	27 (20.7)	41 (31.5)	12 (9.2)	0 (0)	2 (1.5)
Poultry (Chicken, ducks)	21 (16.1)	88 (67.6)	14 (10.7)	4 (3.0)	0 (0)	3 (2.3)
Meat (Beef, pork)	28 (21.5)	78 (60.0)	13 (10.0)	3 (2.3)	1 (0.7)	7 (5.3)
Liver, kidney, heart, or the other organs	49 (37.6)	63 (48.4)	8 (6.1)	4 (3.0)	0 (0)	6 (4.6)
Egg of any type	31 (23.8)	75 (57.6)	22 (16.9)	0 (0)	0 (0)	2 (1.5)
Green leafy vegetables high in vitamin A	37 (28.4)	63 (48.6)	19 (14.6)	8 (6.1)	0 (0)	3 (2.3)

Red/orange/red vegetables high in vitamin A	80 (67.5)	29 (22.3)	8 (6.1)	5 (3.8)	4 (3.0)	4 (3.0)
Vitamin A-rich fruits	30 (23.0)	49 (37.6)	48 (34.6)	4 (3.0)	0 (0)	2 (1.5)
Other fruits and vegetables	33 (25.3)	71 (54.6)	21 (16.1)	4 (3.0)	1 (0.7)	0 (0)

Annex 6: Questionnaires

Questionnaires

(English Version)

Food Consumption Patterns of Inpatient Children Aged 3 to 5 Years with Diarrhea in Hospitals In Khammuane Province Lao P.D.R. in 2019

Quantitative questionnaire:

ID: ……..……..

Date of interview...../...../.....

Part I: General Characteristics of Caregiver

1. Relationship with child (code: g1)

   □[1] Father □[2] Mother □[3] Brother

   □[4] Sister □[5] Grandmother □[6] Other……

2. Age ……..……old (code: g2)
3. Sex (code: g3): □[1] Male □[2] Female
4. Ethnicity (code: g4)

   □[1] Lao □[2] Khamu □[3] Akha □[4] Other

5. Religion (code: g5)

   □[1] Buddhist □[2] Christian □[3] Animist

6. Education (code: g6)

   □[1] No schooling □[2] Primary School Certificate

   □[3] Lower secondary School Certificate

   □[4] Upper Secondary School Certificate

   □[5] Vocational Certificate □[6] Bachelor Degree □[7] MasterS Degree

7. Occupation (code: g7)

   □[1] Government officer □[2] Housewife □[3] Farmer

   □[4] Self-employed business person □[5] Other specify…….

8. Family Income (code: g8) ……..…..……kip.

Part II: General Characteristics of Child

1. Age (code: c1): ……years old.
2. Sex (code: c2): □[1] Male □[2] Female
3. Birthplace (code: c3):
   □[1] Health facility □[2] Home □[3] Other place
4. Birth weight (code: c4): ……g/kg
5. Birth attendant (code: c5):
   □[1] Doctor □[2] Midwife
   □[3] Nurse □[4] Other specify ……
6. Infant term
   □[1] Full-term □[2] Pre-term □[3] Don't know/Unsure
7. Birth condition
   □[1] Natural birth □[2] Caesarean □[3] Don't know/Unsure
8. Immunization status(code: c6)
   □[1] Complete □[2] Partial □[3] Not vaccinated

Part III: Caregivers' knowledge of food consumption patterns and the nutritional status of children with diarrhea

No.	**Knowledge of food consumption patterns and the nutritional status of children with diarrhea**	**True[1]**	**False[2]**	**code**
1	Children having adequate nutrition is an important step towards healthy growth, proper organ formation, and functioning, a strong immune system, and neurological and cognitive development	□[1]	□[2]	K1
2	Diarrhea is defined as the passage of three or more loose or liquid stools per day (or more frequent passage than is normal for the individual)	□[1]	□[2]	K2
3	Children receiving 5 food groups every day can boost	□[1]	□[2]	K3

	their cognitive and physical development			
4	During the time of diarrhea, caregivers should give more food to children as much as they can eat.	☐[1]	☐[2]	K4
5	During the time of diarrhea, caregivers should give more fluids to children as much as they can drink.	☐[1]	☐[2]	K5
6	Provide ORS for children with diarrhea to prevent dehydration.	☐[1]	☐[2]	K6
7	Feeding children with food diversification is helpful for maintaining good nutrition, recovering nutritients and preventing children from undernutrition.	☐[1]	☐[2]	K7
8	Feeding un-cooked animal meats can affect a child's health during diarrhea.	☐[1]	☐[2]	K8
9	While recovering from diarrhea, children should eat bland, simple foods that are easy to digest and will help absorb some water from the stool.	☐[1]	☐[2]	K9
10	Withholding some foods during diarrhea	☐[1]	☐[2]	K10
11	Children's diarrhea cannot affect child's nutritional status or develop into malnutrition	☐[1]	☐[2]	K11
12	Should give spicy or fatty foods to your children	☐[1]	☐[2]	K12

Part IV: Caregivers' perceptions of food consumption patterns of children with diarrhea.

This part consisted of four sections: Perceived susceptibility, perceived severity, perceived benefits and perceived barriers:

"Agree" refers to the statement of the respondent that he/she believes to be most correct.

"Uncertain" refers to the statement of the respondent who not quite sure.

"Disagree" refers to the statement of the respondent who does not believes or a agree.

I	**Perceived Susceptibility**	**Agree**	**Uncertain**	**Disagree**	**Code**
1	Children who are not adequately nourished during diarrhea episodes will have their nutritional status effected	☐[1]	☐[2]	☐[3]	P11
2	Fiber helps keep the digestive system active. Usually this is a good thing, but when the body is trying to recover from diarrhea fiber may make symptoms worse.	☐[1]	☐[2]	☐[3]	P12
3	Don't provide any food while child suffers diarrhea; child will recover better than when provided with more food.	☐[1]	☐[2]	☐[3]	P13
4	Less feeding during child's diarrheal episode is not a cause of under-nutrition.	☐[1]	☐[2]	☐[3]	P14
5	Drinking plenty of water helps to prevent dehydration and flush any toxins out of the body.	☐[1]	☐[2]	☐[3]	P15
II	**Perceived Severity**	**Agree**	**Uncertain**	**Disagree**	**Code**
6	A malnourished child becomes ill with diarrhea more easily than a healthy one?	☐[1]	☐[2]	☐[3]	P21
7	A child with diarrhea becomes malnourished more easily than a healthy child?	☐[1]	☐[2]	☐[3]	P22
8	Eating foods rich in nutrients cannot prevent children from developing malnutrition.	☐[1]	☐[2]	☐[3]	P23

9	Consuming various food is not suitable for children with diarrhea	☐[1]	☐[2]	☐[3]	P24
10	Dietary intake is very important for children recovering from diarrhea	☐[1]	☐[2]	☐[3]	P25
III	**Perceived Benefits**	**Agree**	**Uncertain**	**Disagree**	**Code**
11	The importance of optimal IYCF practices during and after common childhood illnesses such as diarrhea emphasize the need to increase fluid intakes during illness while feeding is maintained and increased food intake should occur during convalescence	☐[1]	☐[2]	☐[3]	P31
12	During diarrhea the withholding food practice is helpful for children's fast recovery	☐[1]	☐[2]	☐[3]	P32
13	During children's diarrhea, dietary diversity should less than usual	☐[1]	☐[2]	☐[3]	P33
14	Apart from ORS, there are not any other fluids that can be used instead for treating childhood diarrhea.	☐[1]	☐[2]	☐[3]	P34
15	Giving your child frequent small meals to ensure he/she stays strong during the diarrheal episode	☐[1]	☐[2]	☐[3]	P35
IV	**Perceived Barriers**	**Agree**	**Uncertain**	**Disagree**	**Code**
16	It is too expensive to buy enough fruits, meats, vegetables, and dairy products for my children.	☐[1]	☐[2]	☐[3]	P41
17	Consultation with healthcare workers about the	☐[1]	☐[2]	☐[3]	P42

	food consumption patterns of children with diarrhea costs too much money				
18	It is a waste of time to encourage children to drink more fluids to prevent dehydration	☐[1]	☐[2]	☐[3]	P43
19	Family members, friends and others are the main sources of suggestions for food consumption patterns of children with diarrhea	☐[1]	☐[2]	☐[3]	P44
20	Following the advice of a health worker for a child's dietary intake can prevent a child with diarrhea developing a more severe condition and malnutrition	☐[1]	☐[2]	☐[3]	P45

Part V: Caregivers' practices: feeding practices for children with diarrhea

This part consists of hygiene for nutrition and the care of the child's health

"Yes, every time" refers to the caregiver's action at all times.

"Yes, sometimes" refers to the caregiver's action with periodic variation.

"No never" refers to the caregiver not ever practicing a particular activity.

I	**Hygiene in feeding practices of caregivers affecting the food consumption patterns of inpatient children with diarrhea**	**Yes Every time**	**Yes Some times**	**No Never**	**Code**
1	Did you wash your hands before child feeding?	☐[1]	☐[2]	☐[3]	H11
2	Did you wash the child's hands before eating?	☐[1]	☐[2]	☐[3]	H12
3	Did you wash fruits, vegetables, and meats before cooking and feeding?	☐[1]	☐[2]	☐[3]	H13
4	Did you under-cook food for the child?	☐[1]	☐[2]	☐[3]	H14

5	Did you feed your child with old/leftover food?	☐[1]	☐[2]	☐[3]	H15
6	Have you ever given spicy food to the child?	☐[1]	☐[2]	☐[3]	H16
7	Did you store fresh food in a place with a suitable temperature all the time?	☐[1]	☐[2]	☐[3]	H17
II	**Maintenance of child's health**	**Yes Every time**	**Yes Some times**	**No Never**	
1	Do you prepare carbohydrates, fruits, vegetables and milk for your child every day?	☐[1]	☐[2]	☐[3]	H21
2	Do you think that only feeding your child with one type of food whil they suffer diarrhea is harmful and can make the situation worse?	☐[1]	☐[2]	☐[3]	H22
3	Do you give meals to your child more than usual?	☐[1]	☐[2]	☐[3]	H23
4	Should your feeding continue at the same time as ORT?	☐[1]	☐[2]	☐[3]	H24
5	Do you have good food diversification when you feed your child?	☐[1]	☐[2]	☐[3]	H25
6	Do you withhold any foods from your child?	☐[1]	☐[2]	☐[3]	H26

Part VI: Environmental support characteristics

I. Have you ever reveived children's health guidelines for food consumption patterns? (Code: e1)

□[1] No □[2] Yes >> If "Yes" Where did you get the information?

□ [1] Newspaper, poster, magazines □ [2] Health worker

□[3] Mass media □[4] Other specify……

II. Is there a policy for food consumption patterns of inpatient children with diarrhea in the hospital? (Code: e2)

□[1] No □[2] Yes >> If "Yes" What does the policy say?

□ [1] Provide free food and fluids □ [2] Advice on food consumption pattern

□[3] Other specify……

Questionnaire for food consumption patterns of inpatient children aged 3 – 5 years with diarrhea

For each food group not mentioned after completing the above, a set of question was asked to make sure the caregivers could name the specific food eaten yesterday, during the day or at night according to the seven food groups

Yes: refers to esting

No: refers not eating

Don't know (DK): refers to he/she knowing or being unsure

No.	Item	Food group	Yes	No	DK	code
1	Bread, rice, noodles, porridge, or other foods made from cereals?	FOODS MADE FROM GRAINS	□[1]	□[2]	□[3]	A1
2	Pumpkins, carrots, squashes, or sweet potatoes that are yellow or orange inside?	FRUITS and VEGETABLES	□[1]	□[2]	□[3]	A2
3	White potatoes, white yams, cassava, or any other foods made from tubers?	FOODS MADE FROM ROOTS	□[1]	□[2]	□[3]	A3
4	Dark green, leafy vegetables, such as spinach, morning glory, and green lettuce?	VEGETABLES	□[1]	□[2]	□[3]	A4
5	Ripe mangoes or papayas, carrots or sweet potatoes (locally available vitamin –A rich fruits)?	VITAMIN-A rich fruits and vegetables	□[1]	□[2]	□[3]	A5
6	Other fruits or vegetables such as watermelons,	OTHER FRUITS OR	□[1]	□[2]	□[3]	A6

	bananas, (which are most commonly eaten)?	VEGETABLES				
7	Liver, kidney, heart or other internal organ?	OFFAL	□[1]	□[2]	□[3]	A7
8	Meats, such as beef, pork, lamb, goat, chicken, duck or sausages made from these meats?	MEATS	□[1]	□[2]	□[3]	A8
9	Eggs?	EGGS	□[1]	□[2]	□[3]	A9
10	Fish or shellfish, either fresh or dried?	FRESH OR DRIED FISH	□[1]	□[2]	□[3]	A10
11	Beans, peas, lentils or nuts, including any foods made from these?	FOODS MADE FROM NUTS AND LEGUMES	□[1]	□[2]	□[3]	A11
12	Cheese, yogurt or other foods made from animal milk?	PROCESSED DAIRY FOODS	□[1]	□[2]	□[3]	A12
13	Milk and cream	NATURAL DAIRY PRODUCT	□[1]	□[2]	□[3]	A13

Qualitative Questions

Guideline for in-depth interviews

- **Providing health information education**
  1. What do you think about the provision of health information education?
  2. What are the barriers related to providing health information education on a day-to-day basis from your experience?
  3. In this hospital, is it compulsory or does it depend on the physician for providing health information education to the caregiver of a child with diarrhea?
  4. How do you provide health information education to the caregiver of a child with diarrhea?
  5. Are there any guidelines or handouts for physicians to provide health information education to the caregiver of a child with diarrhea?
- **Consultations**
  1. What do you think about the health education given in consultations with patients or caregivers?
  2. Based on your experience did you ever consult patients or caregivers about health education? How?
  3. Are there any guidelines or handouts for physicians about consultation methods in the hospital?
  4. Please describe a consultation with a caregiver of a child with diarrhea?
  5. In this hospital, is it compulsory or does it depend on the physician for a consultation to be given to a caregiver of a child with diarrhea?

APPENDIX: A

Patient/ Participant Information Sheet From

(English Version)

Title of research: Food consumption patterns of inpatient children aged 3 to 5 years with diarrhea in Khammuane province Lao PDR 2019.

Principal researcher's name: Mr. Sengouthai PHOUTTHAVONG.

Office address: Bualapha District Health Office**,** Khammuane province

Home address: Khamhoung Village, Xaythany District, Vientiane Capital.

Mobile phone number: +85620 59-452-888.

E-mail address: spmethanolic@gmail.com

1. Invitation for Research

You are being invited to take part in a research project because you are a caregiver of inpatient children aged 3 to 5 years with diarrhea in a hospital in Khammuane province. Before you decide to participate, it is important for you to understand why the research is being done and what it will contain. Please take the time to read the following information carefully and do not hesitate to ask if anything is unclear or if you would like more information.

2. Background and rationale

Food consumption pattern diversity has been associated with an improved nutritional status for children. Nutrition impacts the mental and physical development of children. An appropriate dietary intake benefits the national economy directly by reducing public health expenses in health care and indirectly through the improvement of the community's health. Healthy foods help to prevent malnutrition in all forms.

Acute diarrhea is the most common childhood illness and cause of hospitalization in low and middle-income countries. Diarrhea as a disease continues to be a major cause of avoidable deaths and accounts for about 8% of all child deaths worldwide. Meanwhile, it accounts for approximately 11% of all children's deaths in the Lao PDR.

During the period of suffering diarrhea, children suffer from a reduced food intake, decreased nutrient absorption, and increased nutrient requirements that cause weight loss and a failure to grow normally. The child's nutritional status declines and any pre-existing malnutrition is made worse. In turn, to prevent and treat children with acute water diarrhea the WHO and UNICEF have issued guidelines on the management and treatment of children's diarrhea that strongly recommend preventing dehydration through the early administration of increased amounts of appropriate fluids, and continued feeding alongside the administration of oral rehydration solutions.

- **Objectives.**
  - To describe the food consumption patterns of inpatient children aged 3 to 5 years with diarrhea in Khammuane province in 2019.
  - To determine factors affecting the food consumption patterns of inpatient children aged 3 to 5 years with diarrhea in Khammuane province in 2019.

3. Setting the criteria of the participant.

The subjects included all children aged 3 to 5 years who admitted in one of three hospitals in Khammuane province, namely the Provincial Hospital, Gnommalath District Hospital and Mahaxay District Hospital with diarrheal diseases in the company of their caregivers during the study period.

- **Inclusion Criteria**
  - Children aged 3 to 5 years who admitted in the three hospitals with all types of diarrheal episodes such as acute watery diarrhea, acute bloody diarrhea, and persistent diarrhea.
  - Their caregivers who willingly agreed to participate in this study.
- **Exclusion Criteria**
  - Inpatient children aged 3 to 5 years with diarrhea living in the intensive care unit (ICU) because those children could not eat anything and needed special treatment

– Caregivers who did not agree or could not participate in this survey.

4. Procedure for participants

The participants will have to answer all forms including caregiver's and child's general information, caregiver's understanding and parental practices regarding diarrhea and environmental factors.

5. Hazards or risks that may arise for research volunteers

You will not have any risk to your body, mind, social relations economic condition or religious beliefs because this process mostly consist of a carefully administered interview. However, it may take up about 30 minutes to complete the accompanying questionnaire.

6. The benefits of the project

The results of this study will be used as a foundation to develop and change caregivers' or people's behavior in Khammuane province and elsewhere in Laos regarding children's nutrition. More specifically it seeks to generate a better understanding of the importance of feeding practices and caring behaviors for children with diarrhea. In turn this will be a beneficil component in the process of reducing the mortality rate of children under 5 years from diarrhea and malnutrition. The result of this study will be useful information for actions taken under the national nutritional program to improve the status of child nutrition and to deal with associated factors.

7. Keeping information related directly to the participant

The researcher will use a code as a reference number for your name to retain this information. The researcher will not put your name on the questionnaire. Access to your information for translation and recording data will only be permitted to researchers and experts while maintaining your secrecy. After that, the researcher will analyze the data and explain the results for education purposes. All collected data will be destroyed after the report has been completed.

8. Process of providing information to participant volunteers.

Research activities involving you, the volunteer, to participate in this project will be as follows:

- You will be told about the risks and inconvenience that may occur during the study.
- You will be provided with a description of the research methodology and data collection.
- You will have the opportunity to ask questions about the research or related procedures.
- You can withdraw from the research at any time without any impact.
- You will receive a copy of the descriptive document for the participant, and a signed and dated consent form.
- You have the right to decide whether or not to participate in the research.
- You will not suffer intimidation or deception during and after the study.

Finally, should the researcher not perform his/her tasks as indicated in the information, the participants can report to the Ethics Commission at the Institute of Science and Education, the University of Health Sciences (Faculty of Postgraduate studies) Office address: Samsenthai Road, Ban Kaognot, Sisattanak District, Vientiane Capital, Lao PDR. Tel: +856 21245820; Fax: +856 021 214055; Email contact@uhs.edu.la

APPENDIX: B

INFORMED CONSENT FORM

I and the person under my care have been informed about the rationale and objectives of the project "Food consumption patterns of inpatient children aged 3 to 5 years with diarrhea in hospitals in Khammuane province in 2019", and what will be done in details for the person under my care, should there be any risks or dangers and benefits resulting from this project. The researcher has explained to me and I clearly understand with satisfaction.

I willingly agree to let the person under my care participate in this project and consent the researcher to interview me using all of the questionnaires until the interview is finished. Upon completion of the research, the information related to the research informants will be destroyed within one year. Both the person under my care or I have the right to withdraw from this research project at any time we wish, with no need to give any reason. This withdrawal will not have any negative impact on the person under my care or mysrlf.

The researcher has guaranteed that the process acted upon me and the person under my care will be the same as indicated in the information. Any personal information which could be used to identify the person under my care and myself will not appear in the report.

If I and the person under my care have not been treated in compliance with the information for research participants, I can report to the Ethics Commission at the Institute of Science and Education, University of Health Sciences (Postgraduate Faculty), Office Address: Samsenthai Road, Ban Kaognot, Sisattanak District, Vientiane Capital, Lao P.D.R; Tel: +856 21245820, Fax: +856 21 214055; Email : contact@uhs.edu.la

I also have received a copy of the information sheet and informed consent form

Researcher's Name: _____ *Researcher's Signature:* _____

*Date:*_____

Caregiver's Signature: _____ *Date:* _____

APPENDIX: C

BIOGRAPHY

Personal Details:

Family Name: PHOUTTHAVONG First Name: SENGOUTHAI

Date of birth: 17 August, 1988

Address: Ban Nabong, Thakhek District, Khammuane Province

Country: Lao PDR

Nationality: Lao

Telephone: +8562059452888

E-mail: spmethanolic@gmail.com

Professional Experience:

- I was a volunteer in the Food and Drug Section, Department of Health Khammuane Province from 2012 to 2013.
- Then I was a technical staff member of the Boualapha District Health Office
- Now, I am the deputy chief of the Food and Drug Unit at the Boualapha District Health Office

Education and Training

- Bachelor of Sciences in Pharmacy in 2010-2011
- Bachelor of Education Majoring in English in 2010-2012

Computer and software skills

- Basic skill for PC computers and Microsoft Word, Excel and PowerPoint software

APPENDIX: D

CERTIFICATE OF APPROVAL

MINISTRY OF HEALTH
HANOI UNIVERSITY OF PUBLIC HEALTH

No.:472/2018/YTCC-HD3
Subject: Ethical Approval

SOCIALIST REPUBLIC OF VIETNAM
Independence – Freedom - Happiness

Hanoi, December 21st , 2018

DECISION

On Ethical approval for research involving human subject participation

THE CHAIR OF THE ETHICAL REVIEW BOARD FOR BIOMEDICAL RESEARCH
HANOI UNIVERSITY OF PUBLIC HEALTH

- Based on decision No. 651/QĐ-ĐHYTCC by the Dean of Hanoi School of Public Health on the Issuing Regulation of the Institutional Ethical Review Board of Hanoi School of Public Health; 26 June 2015;
- Based on Decision No. 560/QĐ-ĐHYTCC by the Dean of Hanoi School of Public Health on Establishment of The Institutional Ethical Review Board of Hanoi School of Public Health; 16 May 2016;
- Based on Decision No. 58/QĐ-ĐHYTCC by the Dean of Hanoi University of Public Health about the member replacement of The Institutional Ethical Review Board of Hanoi University of Public Health; 15 January 2018;
- Based on the minutes of meeting to review ethics application No. **018-472/DD-YTCC** dated December 21st, 2018,

DECIDED:

Article 1. Grant ethical approval for ethnographic study project:
- Project Title: **Food consumption patterns of the inpatient children aged 3 to 5 years with diarrhea in Khammouane province Lao PRD in 2019**
- Principal Investigator: **Sengouthai PHOUTTHAVONG,** Hanoi University of Public Health
- Supervisors: Dr. Nguyen Ngoc Bich – Hanoi University of Public Health
  Dr. Chandavone Phoxay
- Research site: Khammouane provincial Hospital, Gnommalath district hospital and Mahaxay district hospital, Khammouane province, Lao PRD
- Project time: from 01/09/2018 to 30/05/2019
- Data collection time: from 30/12/2018 to 30/01/2019
- Review type: Expedited review

Article 2. This decision is effective from **21/12/2018** to **30/05/2019**

Article 3. Principal Investigator has to send progress report once each year and a final report upon the study completion to the Institutional Ethical Review Board of Hanoi University of Public Health (IRB of HUPH).

Article 4. Principle Investigator should notify (IRB of HUPH) immediately of any adverse effects arising from this study (e.g. unexpected adverse outcomes, unexpected community/subject risk factors or complaints, etc.). Active research projects are subject to random audit by the IRB of HUPH.

CHAIR OF HUPH IRB
(Signature and full name)

Ha Van Nhu

SECRETARY
(Signature and full name)

Nguyen Thi Minh Thanh

Lao's People Democratic Republic
Peace Independence Democracy Unity Prosperity
****

Ministry of Health
University of Health Sciences
Ethic Committee

No: 106 /19

Tel: 021 245820

Vientiane, Date 07/02/19

Ethical Clearance

- According to the Ethic Committee's declaration of the University of Health Sciences Number: 3809/UHS.15, dated 1 Sep, 2015.
- According to the letter of request for Ethical Clearance of Mr Sengouthai PHOUTTHAVONG, Master of Public Health, Faculty of Public Health, University of Health Sciences. for research entitled: **« Food consumption patterns of the inpatient children aged 3 to 5 years with diarrhea in Khammuane Province, Lao PDR in 2019 »**

The Ethic Committee of the University of Health Sciences approved the research proposal of this study before it is initiated. This study is committed in compliance with local requirements, to confirm that it is without the physical and psychological harm of the participants as well as the ethical issues for health research. However, we believed that this study/project will contribute to a great importance of health promotion; it will also be a direct and indirect participants' beneficial and to be a crucial database in the further research of the University of Health Sciences and Health sectors in the country.

Hence, the Ethic Committee of the University of Health Sciences sincerely agreed to approve in term of ethical clearance for this study/project.

√.President of the
University of Health Sciences

Assoc. Prof. Dr. Mayfong Mayxay

for President of the
Ethical research committee

Dr. Bansa OUPATHANA

APPENDIX: E

Thesis Comment

MINISTRY OF HEALTH
HANOI UNIVERSITY OF PUBLIC HEALTH

FORM

MINUTES OF EXPLANATION
AFTER THESIS/PROPOSAL DEFENCE

Full name: ……Mr. Sengouthai PHOUTTHAVONG……...

Thesis title: Food consumption patterns of inpatient children aged 3 to 5 years with diarrhea in khammuane province hospital Lao PDR, 2019

TT	**Comments** *(List all comments followed by outline/dissertation/thesis/thematic structure)*	**Student's explanations detail** *(Clearly state how, which part, page that student edits. if students disagree, reasons should be indicated)*
1	Orientation and specialized codes	
	……	
2	Thesis topic	
	- There are many "in"(preposition) in the last sentences and no need to put the year 2019	- Student already revised the thesis title as suggested by the panel - Drop out "in" and "2019"
3	Abstract	
	- In summery part need to change to text paragraph not bullet symbol	- Revised all abstract, page x - Added the qualitative result Page x
4	Introduction	
	- The problem of "food consumption pattern" among diarrhea children in Lao PDR is not clear. Food consumption does not limit to "more to drink (40%)" and "more to eat (34%)", but food consumption includes more (appropriate food, types of food, quantity and quality of foods…)	- Added some information Page 2

	- In the last paragraph if introduction part should be clearing stated in order to show the evidence of diarrhea problem in Khammuane province	
5	Objectives	
	…	
6	Review of Literature/Theoretical framework	
	- Structure should be revised, for examples: - "1. Review of literature" should be deleted, starting with: Basic or key concepts and definitions. All concepts/definition should be based on references. - Terminology: "Food consumption pattern" is not being interchangeable with "Situation of nutrition pattern…" (1.6, page 19) and "Factor associated with nutrition pattern…" (1.7, page 22). - Measurement of food consumption pattern by using IYCF questionnaire should be introduced and explain reasons why IYCF questionnaire is relevant for this research. Based on references (The questionnaire have been used in various researches and it have been proved its relevance) - Section 1.7 "Factor associated with …" should be improved. More references should be used to clarify the four groups of factors associated with Food consumption pattern (not nutrition pattern written in section 1.7, p. 22) and presented in Conceptual Framework. For example: how can you explain General characteristics of children are factors related to Food consumption pattern of children with diarrhea? - Some information in the literature review is not relevant to the topic as a	- Revised structure - Change the terminology - Added information on measurement of food consumption patterns - Checked information that is not relevant - Literature review part, page 4-22

	key word of food consumption pattern and diarrhea - Some article are too old for example since 1984	
7	Objects and research methods	
	- Should be caregivers of diarrhea children… But not children. Definition of caregiver and IYC (see comment in the literature review) should be given - The sentence in the Methodology part should change to the past tense not future tense - Study design: explain clearly about the combination of quantitative and qualitative: purposes, sequence… - IYCF questionnaire: it is for infant feeding in general? Why this is applied for diarrhea children? - Measurement of food consumption pattern should be explaining the basic of this measurement (as WWHO/UNICEF or author(s)). Give references! - Anthropometry measurement: this is to meet what study objective? - Data analysis: Quantitative data: see comments in the Section 1.7 and decide if it is appropriate to identify the association of General characteristics of children with food consumption. Qualitative results analysis should be presented clearly and how the results will be presented in the result chapter	- Change the sentence into past tense - Revised the subject - Remove Anthropometry measurement due to this is not relevant to objective - Page 23-34
8	Study results	
	- Structure revision is needed. Results should be divided in two main sections, following the tow study objectives. It would be better if Qualitative result is not presented as a separate section. Numbering sections should be revised, for example:	- Revised result part - Revised add more detailed about quantitative - Page 34-55

	number 3. Results; 3.1 Qualitative data should be deleted and presented as follows: - 3.1. Basic information of study subject - 3.1.1….. - 3.1.2….. - … - 3.2. Food consumption patterns (or KP on feeding,… if the author want to revise – see following comments - 3.2.1…. - … - 3.3. Factors…… - 3.3.1…. - You should write more some paragraph to state how your quantitative and qualitative result support is each other - Once again, terminology "food consumption pattern"; "food consumption pattern and nutrition status…" (Section 3.1.4, p.46)); "feeding practice" (section 3.1.6, p.52) were used in the results chapter. This makes reader confuse. Reading the result chapter, the reader understand that this study is about KAP on feeding for diarrhea children	
9	Discuss	
	- Discussions should follow the two objectives. Section 4.6: "care giver's practice" IS DIFFERENT FROM "children food consumption"? Can you explain? - Some of reference citations are not the same reference citation with the HUPH	- Revised discussion part follow the two objective - Fix some reference which not the same - Page 56-64

	guideline	
10	Conclusions	
	- Conclusion should follow the two study objectives but not be divided in quantitative and qualitative results.	- Revised conclusion part follow the two objective - Page 79
11	Recommendations	
	- Required “children have to accept food and fluid” and “get appropriate treatment”??? YOU BELIEVE children can follow you recommendations?Your recommendation is not relevant to the research result -	- Revised the recommendation, - page 66
12	References	
	…	
13	Questionnaire	
	…	
14	Other comments	
	- No need to put budget and research plan in side - List abbreviation from A-Z	- Deleted budget and research plan - List abbreviation from A-Z, page vi

Notes:

- Use lines to separate each comments and explanations. Comments and equivalent explanations stay at the same row.
- Explanations should be written by following thesis structure (if any). Students do not mention the examiners’ name

Day month year 2019
Student
(Sign and full name)

1st supervisor	**2nd supervisor**	**Supporting lecture (if any)**
(Sign and full name)	*(Sign and full name)*	*(Sign and full name`)*
		
Dr. Chandavone PHOXAY	Dr. NGUYEN NGOC BICH	Dr. Visanou Hansana

Examiners' comments *(if any)*:

……..……

……..……

Day month year 2019
On behalf of the committee
(Sign and full name)

Assoc. Prof. Nguyen Thanh Huong

HANOI UNIVERSITY OF PUBLIC HEALTH

THESIS COMMENT FORM OF MASTER PROGRAM
(For reviewer of thesis defence committee – Master Program)

FOOD CONSUMPTION PATTERN OF INPATIENT CHILDREN AGED 3 TO 5 YEARS WITH DIARRHEA IN HOSPITAL IN KHAMMUANE PROVINCE LAO PDR IN 2019

June 17th, 2019

General comments:

- ***R****esponses/ explanations to reviewers' comments are very short and not in details.*
- *Table of contents should be revised to be more appropriate and good looking: numbering (in all chapters); incomplete result chapter, title of section (chapter 4), etc.*
- *English should be edited*

1. Thesis topic has correct orientation and specialized codes (Master of public health applied science orientation/ Master of public health applied research orientation): **Yes.**

2. **Thesis topic:**

3. **Research summary:**

The summary should be revised. Summary is not just represented results as "bullets" but in sentences. Summary should be divided in paragraphs:

- short introduction, objectives, study subject, place and time, methodology,
- results: key results, following objectives (not clear associate factors)
- conclusion and recommendations (not presented)

4. **Introduction:**

The problem of "food consumption pattern" among diarrhea children in Lao PDR is not clear. Food consumption does not limited to "more to drink (40%)" and "more to

eat (34%)", but food consumption include more (appropriate food, types of food, quantity and quality of foods,…)

5. Research Objectives:

Objectives are clear and appropriate (in terms of writing, however they may be revised after the following sections have been revised) (Food consumption or KP on feeding practice – see comments in the next sections)

6. Literature review:

- **Structure should be revised**, for examples:

  All concepts/definition should be based on references. It is very important that "Food consumption pattern" definition, "Infant Young Child (IYC)" MUST be clear, based on reference, BECAUSE This definition will be used in this research. Then Food consumption pattern for children in general and particularly diarrhea children in the world and in Lao PDR (Objective 1); following by factors associated to Food consumption pattern for diarrhea children (Objective 2)

- **Measurement of food consumption pattern by using IYCF questionnaire** should be introduced and explain reasons why IYCF questionnaire is relevant for this research. Based on references (The questionnaire has been used in various researches and it have been proved its relevance)!

- **Section 1.7 "Factor associated with …"** should be improved. More references should be used to clarify the four groups of factors associated with Food consumption pattern (not nutrition pattern written in section 1.7, p. 15) and **presented in Conceptual Framework**. For example: how can you explain General characteristics of children are factors related to Food consumption pattern of children with diarrhea?

7. Subjects and research methods:

Study design: explain clearly about the combination of quantitative and qualitative: purposes, sequence of conducting quantity and quality method.

Sample size and sampling method: should be short but clear, e.g: based on what criteria to select 15 medical staff? it is not clear reasons to randomly select 3 out of 11 hospitals. Please explain why only 3/11 hos. selected (not for avoiding bias but may increase the bias because hospitals are difference). Why 15 med. Staff selected but only 8 interviewed??? (p.29)

It is not appropriate to do randomly select study subject for qualitative research. Qualitative study subject should be key informants.

IYCF questionnaire: it is for infant feeding in general? Why this is applied for diarrhea children?

Measurement of food consumption pattern should be explained the basic of this measurement (as WWHO/UNICEF or author(s)). Give references! **It must be clear what is appropriate/not appriate food com. patt.**

Anthropometry measurement: this is to meet what study objective?

Data analysis: Quantitative data: see comments in the Section 1.7 and decide **if it is appropriate to identify the association of General characteristics of children with food consumption**. Qualitative results analysis should be presented clearly and how the results will be presented in the result chapter.

8. Research results:

Structure revision is needed. Results should be divided in two main sections, following the tow study objectives. Numbering sections should be revised, for example: number 3. Results

3.1. Basic information of study subject

3.1.1. Care givers

3.1.2. Children.

…

3.2. Food consumption patterns (or KP on feeding,… if the author want to revise – see following comments

3.2.1….

…

3.3. Factors……

3.3.1….

…..

What is appropriate food consumption?

Qualitative results must be presented relevant to purpose of the qualitative research. For example, (table 19, p61) association between care giver knowledge and FCP but quali. Results are all about health education for parents)

9. **Discussion:**

   Discussions should follow the two objectives.

   No need discussion on research design, sample and research instruments. In fact, these are not discussions but are summary of these sections. This may be in limitation of these areas.

10. **Conclusion:**

Conclusion should follow the two study objectives with key results.

11. **Recommendations: should be based on results.**
12. **FINAL CONCLUSION:**

Approval with conditions: completed revisions, explainations/response to the reviewer's recommendations/questions.

Reviewer

Ha Van Nhu

HANOI UNIVERSITY OF PUBLIC HEALTH

THESIS COMMENT FORM OF MASTER PROGRAM
(For reviewer of thesis defence committee – Master Program)

Thesis topic: Food consumption Patterns of inpatient children aged 3 to 5 years with Diarrhea in Khammouane provincial hospital, Lao PDR

Thesis code: *(Written on the right corner of thesis cover page)*

....., *Date.....Month.....year 2019*

1. **Thesis topic has correct orientation and specialized codes (Master of public health applied science orientation/ Master of public health applied research orientation)**

.....

.....

.....

2. **Thesis topic:**

1. Comments ..... There are many "in" (preposition) in the last sentence and we need to put the years 2016.

.....

2. Which part need to be edited, (if any): .....

Food consumption patterns ..... in Khammouane provincial hospital, Lao PDR

.....

3. **Research summary:**

1. Comments: ..... According to the design of this study is a mix method as quantitative and qualitative study but in the result part he didn't mention about the qualitative result.

2. Which part need to be edited, (if any): ..... In the result paragraph should be brief described about the qualitative result

.....

.....

4. Introduction:

1. Comments: In the last paragraph of introduction part should be clearly stated in order to show the evidence of Diarrhea problem in Khammuane province where you conducted this study

2. Which part need to be edited, (if any): ....

5. Research Objectives:

1. Comments: As mentioned previous comment, this study is applied mix method as quantitative and qualitative design but in the objective, you there is no qualitative objective

2. Which part need to be edited, (if any): Should be added more about qualitative objective in order to link with the study design

6. Literature review:

1. Comments: (structure and content of literature review are coherent with objectives and research topic, use updated reference and citation correctly, and other comments (if any): Some information in the literature review is not relevant to the topic as a key word of food consumption pattern and diarrheal. Some articles are too old. for example: since 1984 ..

2. Which part need to be edited, (if any): Need to review more especially Factors associated with the nutrition of Diarrhea

7. Subjects and research methods:

1. Comments: (i) Subjects are suitable to objectives; (ii) Sample size and sample selection are appropriate and feasible; (iii) Variables/contents are suitable to objectives, orientation and specialized codes; (iv) Data collection is clear, feasible and appropriate with research content; (v) Data analysis and research ethic are written clearly and appropriately; (vi) Other comments (if any): The sentence in the Methodology part should change to the past tense and future tense

2. Which part need to be edited, (if any): .....
- Sentense change to past tense. in all methodology part

8. Research results:

1. Comments: (i) Research results are suitable with objectives, orientation and specialized codes; (ii) Research result is presented clearly and followed by objectives; (iii) Using data analysis appropriately and ensuring confidence of these methods; and other comments (if any): .....
According to your design is mix method [quanti and qualitative, in the summary result you should elaborate more

2. Which part need to be edited, (if any): How is link your result between quantitative result and qualitative result

- So you should write more some paragraph to state how is your quanti and qualitative result support each other.

9. Discussion:

1. Comments: (i) Structure/Content of this part are suitable to objective and research results; (ii) Reference citation is correct: .....
- Some of Reference citation are not the same.
Reference citation style should be checked in order to match with the UHPH guideline.

2. Which part need to be edited, (if any): .....

10. Conclusion:

1. Comments: (The main research result are given in this part and suitable to objectives)

2. Which part need to be edited, (if any): .....

.....

.....

.....

11. Recommendations

1. Comments: The recommendation is given appropriately and based on research results:

..... Your recommendation is not relevant to the research result.

2. Which part need to be edited, (if any): .....

.....

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.....

12. FINAL CONCLUSION: (NEED TO BE CLEARLY STATE):

[ ] Approval **[✓] Approval with some conditions** **[ ] Reject**

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Reviewer

Dr. Visanou Hansana