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# **NUTRITION DURING THE BREASTFEEDING PERIOD IN THE FIRST SIX MONTHS**

ADDRESSING THE CHALLENGES IN VIETNAM WITH EXCLUSIVE BREAST-  
FEEDING

Thesis

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## Thesis abstract

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In Vietnam, during the period of 2015 – 2020, there were approximately 8.1 million babies being born. But in 2021, MICS reported only 45,4% of children under 6 months old got exclusive breastfeeding in Vietnam. This thesis was done as a collection of valuable information regarding the subject of exclusive breastfeeding in the crucial period of first six months after birth in Vietnam. At the same time, the thesis also touched on the challenges presented that hindered the achievability of the goal set by World Health Organization to ensure the overall development of babies. The goal of the thesis is to provide mothers, especially those in the rural areas, with substantial knowledge regarding proper diet and nutritional benefits during their breastfeeding period in order to improve both the mothers' breastfeeding quality and babies' overall health. The purpose of the thesis is to create a nutritional brochure offered as guidance for mothers and an aiding tool for healthcare workers in Vietnam to guarantee the transmitted information is suitable for people with little knowledge on medical subject. Research question: What nutrition will mothers need during the breastfeeding period to ensure an optimal development for infants in Vietnam? This thesis applied the method of literature review with eleven (n=11) research articles and informational articles being reviewed to produce the aforementioned brochure for mothers and mothers-to-be during the breastfeeding period in the first six months.

The data analysis process had taken an original approach and, in the end, offered a total of twenty-five nutrients being considered essential during the crucial breastfeeding period of the first six months. This finding leads to the result of a brochure with ingredients and food choices that are commonly found in different regions in Vietnam that contain the aforementioned nutrients that may serve as a checklist for mothers in planning the maternal diet. The brochure can be used as an aiding tool for the healthcare providers, specifically the nutritionists and OB/GYN nurses, in their process of providing educational knowledge to the mothers who need guidance. The brochure is presented to the authority with the hope to be published and put in healthcare centres in rural areas to be more accessible to the targeted group of the thesis.

<sup>1</sup> Keywords: nutrition, nutrients, breastfeeding, maternal diet.

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## Terms and Abbreviations

WHO	World Health Organization
SIDS	Sudden Infant Death Syndrome
CDC	Centers for Disease Control and Prevention
OB/GYN	Obstetrics and Gynecology

## 1 INTRODUCTION

In Vietnam, during the period of 2015 – 2020, there were approximately 8.1 million babies being born (statista, n.d.). According to the data collected throughout the year, birth rate in Vietnam has seen a drop steadily through the years. In 2022, the current birth rate for Vietnam is 15,502 births in 1000 persons, a 2,28% decline in comparison to 2021 (macrotrends, n.d.). Despite not being a topic under discussion or with statistics, it is widely known that in developing countries, the percentage of mothers breastfeeding is higher than that of the developed countries. Still, seeing how formula milk products are becoming more available and people have easy access to the products on the market, the percentage of breastfeeding is seeing a gradual decrease. In 2021, MICS reported only 45,4% of children under 6 months old got exclusive breastfeeding in Vietnam (MCIS, n.d.). It is a known fact that breast milk is the best source of nutrition for new-born babies. And to ensure the baby will receive enough milk during the breastfeeding period while not putting the mother's health in a predicament, an adequate nutrition supply is considered a priority.

In order to help mothers of new-born babies finding the correct way to supplement themselves with the needed nutrition during this significant period of the babies' development, research upon the topic "Nutrition during the breastfeeding period in the first six months" was proposed. It is considered important to collect the literature support to answer the need for a comprehensive checklist on nutrition supplements at this crucial point in time. And with the result gathered from that, a brochure will be consolidated with the useful and different sources in food with the necessary nutrition for women during the breastfeeding period to guarantee the optimal development for their babies through breast milk. The authors hope to make this brochure available to different health centers in Vietnam, especially in the rural areas, to elevate the burden in teaching new mothers the most approachable way of taking care of themselves through dietary route. This study might not be able to make major changes in Vietnam, but with the hope to have this reached as many mothers as it could and to relieve the burden and doubts from new mothers, the best effort will be put into completing the thesis with a well-developed brochure.

## 2 BREASTFEEDING CHALLENGES IN VIETNAM

### 2.1 The importance of breastfeeding

In 2001, the World Health Organization (WHO) recommended exclusive breastfeeding for the first 6 months of life. After that, complementary food should be introduced for a boost of nutrition, but breastfeeding should not be terminated before the 2 years period. The recommendation shows the importance of breastfeeding in helping infants achieve the optimal growth and development of physical as well as neurological health. Breast milk is considered the best source of nutrition for most infants, and it also provides a barrier between both the mother and the child and the risk of developing certain health conditions (CDC, n.d.). This benefit is further discussed in different studies carried out throughout the years.

Deeper research has shown a diversity in concrete evidence regarding the health benefits breastfeeding can provide for infants and their mothers. There are several health outcomes for infants from consuming breast milk exclusively in the first 6 months and further with the addition of complementary food, including the reduced risks of contracting infections and illnesses, Sudden Infant Death Syndrome (SIDS), and childhood obesity while boosting the neurological development. Furthermore, there are lower chances in developing asthma and atopic allergies, pediatric cancers, and cardiovascular and metabolic disease in infants who got exclusive breastfeeding (Dieterich et al, 2013, p. 31). Results have also shown exclusive breastfeeding also helps to prevent under-nutrition (Khan & Islam, 2017). On the other hand, Office on Women's Health (n.d.) commented on different benefits of breastfeeding on women's health including lower risks of developing Type 2 diabetes, certain types of breast cancer and ovarian cancer while also promotes weight loss after the delivery. An article in American Family Physician journal also stated that breastfeeding influences mothers' health in other aspects such as the risks of developing hypertension, hyperlipidemia, and myocardial infarction (Schwarz. & Nothnagle, 2015, p. 602)

Moreover, it is not just the benefits regarding the physical and mental aspects of exclusive breastfeeding that make it so significant for WHO to recommend and push for the implementation of it across the globe. One more aspect that receives much help from exclusive breastfeeding would be the connection between mothers and infants. Breastfeeding initiated within the first hour of the baby's life has a tremendous impact on both the baby and the mother.



Being called Golden Hour, the first one hour gives way to many elements that influence the physiologic stabilization of both mother and newborn right after birth, some of which include “delayed cord clamping, skin-to-skin contact for at least an hour, the performance of newborn assessments on the maternal abdomen, ... and the early initiation of breastfeeding” (Neczypor & Holley, 2017, p. 462). This initiation of breastfeeding will be the foundation to a successful breastfeeding experience, as skin-to-skin contact “creates ideal conditions for the baby to latch and feed in that very important first hour when they are wide awake and ready to bond” (Bateman, 2021). Furthermore, it is discussed that uninterrupted skin-to-skin contact also helps calm the baby down from the stress of the delivery, whether it was the traditional way or through C-section. Bateman gave more details on how being in the mother’s embrace offers the baby a resemblance of the environment inside mother’s body as the baby would be able to hear her heartbeat, feel the warmth and being enveloped in the same comforting scent. And according to BSA Health System (2021), skin-to-skin contact creates the safe environment which will help baby to attach itself to the nipple without prompting, makes it more likely to maintain exclusive breastfeeding for the recommended duration. On the other hand, early breastfeeding also allows a shorter time for the delivery of the placenta, decreasing the possibility of postpartum hemorrhage (BSA Health System, 2021). Hobden (2019), a birth center manager at the Prowers medical center, also noted how Golden Hour helps with the initiation of breastfeeding because “... babies have a time frame when they are more alert after birth and more likely to feed.”. There have been different protocols applied in hospitals to help mothers and newborns experience the Golden Hour uninterrupted, as the impact of this moment on the breastfeeding journey is undeniable. And if there is a way to ensure exclusive breastfeeding in the first 6 months of a baby’s life, healthcare providers should assist accordingly. But for breastfeeding to bring out the optimal results, many more aspects need to be taken into account, one of which is the mother’s diet during this period.

## **2.2 The challenges mothers are facing in Vietnam regarding breastfeeding**

Breastfeeding is known as the primary source of nutrients and antibodies for babies, which indicates the importance of breastfeeding. But despite the widespread knowledge of this certain topic, many mothers, including the soon-to-be, in Vietnam still have insufficient information regarding breastfeeding and the advantages that come with it. This relates to the fact that useful and reliable information is not within access to everyone in Vietnam, and people living in rural areas are not always guaranteed an access to Wi-Fi and the like. With how the living

standard in the countryside is still not up to par, the number of people in possession of a computer can be estimated to be below average (MICS, n.d.). Another point to be taken into account would be that women in the countryside, in general, are expected to stay at home and take care of the family, including the responsibility of giving birth to children and taking care of the household, thus reducing the possibility of receiving adequate education. This factor deepens the burden on new mothers when it comes to providing the bare necessity for newborn babies.

To add another point to the current situation which women are facing, the healthcare system in Vietnam cannot offer sufficient assistance to everyone because of the overloading issue in public and private health centers and the below-standard quality of care being provided in the health centers located in rural areas. Understaff is a dilemma that every hospital and public health centers in Vietnam are struggling to solve, even with the campaigns the government has pushed to promote the recruitment of more students graduated with a health degree (Vietnam Ministry of Health, 2020). This situation stems from the issue concerning the work environment and salary that healthcare providers have to tolerate. With a ratio of 1 doctor to over 1000 inhabitants and 11 nurses to 10000 inhabitants, the pressure put on each practitioner is going beyond what is indicated as safe (Ministry of Health, 2020). Looking at the state health budget in 2020, it can be seen only 0.37% is going into paying directly to the healthcare providers. With all that accounted for, it comes as no surprise why the healthcare industry in Vietnam is still struggling to keep up with the overwhelming demand, hence demanding suitable treatment, guidance and information seems to be a far-fetch request.

Moving on from the issue directly concerning the quality of care in Vietnam, women of reproductive age are facing other pressure coming from society that interferes with the prospect of a healthy childbirth and a smooth recovery after labor. Maternity leave has seen a gradual improvement with the most updated clause in Article 34 and 35 of the Law on Social Insurance stating female workers and sometimes their partner will be granted a total of 6 months paid-leave in normal circumstance regarding childbirth with additional days calculated based on different situations (The National Assembly, 2014). That being said, the period of maternity leave is calculated starting the day mothers take a leave before going into labor, of which the duration cannot exceed 2 months, stated in Article 34. This translates into the reality of female workers having to leave their newborn to the care of a relative or nursery home even before the baby reached 6-month-old, with the exemption of those who choose to go back to work

before the end of the period. Social insurance covers the allowance for childbirth and also requires a total of 6 months within 12 months before childbirth of paid social insurance premiums from either or both partners. However, as the allowance only amounted to double the basic salary, which, in 2022, is only approximately 63 euros, mothers cannot rely on the allowance to take care of every issue concerning the newborn. This pushes mothers to go back to work early on to earn more money, hence putting the quality of care for the child low on the priority list. And as mentioned above in section 2.1, the most important stage of development for a newborn baby is in the first 12 months, with the first 6-month period requiring exclusive breastfeeding to ensure optimal growth in both physical and mental aspects. For mothers to have to abandon the care of a child in favor of earning enough money to keep the life of the family intact is only one of the many problems that put a child's proper care in questionable stance. On the other hand, many would argue that the partner should be able to provide for both the mother and the baby during this period. But according to Numbeo, in 2022, the cost of living for a single person has already estimated to about 443 euros, without rent, and this amount only covers the basic needs of living in the more expensive cities like Ho Chi Minh City and other major metropolises. Only when the partner earns more than 1000 euros a month from their job could they provide for the family on their own, and it is a known fact that the cost of raising a child is a considerable amount. Comparing to Finland's social benefits which support families and children until the child is of legal age, Vietnam does not have the support system that allows parents to pay more attention to their child without risking their jobs or basic necessities. In situations such as this, there cannot be a chance for breastfeeding to become a priority that requires attention and care.

### **2.3 The role of healthcare providers in promoting the proper maternal diet during the breastfeeding period**

There has been much progress in the research upon the beneficial outcomes of certain food regarding to maternal diet and infants' nutrition. But to make sure that these new knowledges become accessible and understandable for the mothers with little to no knowledge on the medical subject, the healthcare providers, especially nutritionists and OB/GYN nurses, in Vietnam will become the leading row of providing education and guidance in this specific situation. A guideline for the task would be needed, granted that this is still an inadequate subject in the healthcare scene in Vietnam, which is the reason leading up to the making of this thesis. Seeing that healthcare workers in Vietnam could make use of a clear instruction on ways to supply

new mothers with the basic information needed for a smooth start to nursing and a most favorable process of breastfeeding, the necessity of a brochure on matters regarding nutrition should be of availability for health practitioners specialized in obstetrics. With personal understanding of the literacy rate in Vietnam, the participation of healthcare providers, those who work closely with mothers during and after pregnancy, would be of utmost importance to the plan of raising awareness for mothers in the necessity and benefits of exclusive breastfeeding.

Going into the making of this thesis, several current issues happening in Vietnam's healthcare scene are taken into consideration, as the need for the research of this specific subject is still up to debate. Understaff has been a problem in the healthcare system in Vietnam, and this problem has been presented since 2012. As this matter has been discussed in the previous section, it has been established that the number of healthcare professionals could not keep up with the demand, creating a situation where workers in the hospitals and local health centers overworked themselves and delivered below standard services. According to an interview with Doctor Vo Van Tien (Thanh Nien, 2021), the situation with Covid-19 pandemic had shown how glaring the shortage of staff problem was in Vietnam. With many of the healthcare practitioners being called to the frontline to take care of the infected, it left hospitals and local health centers vulnerable and without staff to keep the establishments in working conditions. Doctor Vo Van Tien also noted that even with all active healthcare providers being directed to locations that suffered the most from the pandemic, the government still requested the help of many retired workers and undergraduates to help combating the disease. Without a doubt, this situation has also put many pregnant women at risk, with doctors occupied by other pressing matters and nurses having to tend to patients in urgent need. The proposed brochure can be of help in this situation. Even if the information given cannot substitute the care provided by healthcare workers, it can function as a relief for specialists who are handling too many things at once.

However, with all the aspects mentioned above, the brochure is only a tool for healthcare providers to utilize in the process of caring for mothers and newborns. The brochure will not be able to function to its utmost possibility without doctors or nurses instructing mothers or caretakers on how to make use of the information contained in the brochure. The brochure was deemed necessary only after taking into account the role of healthcare providers in ensuring the content of the brochure is delivered as it is and without chances of misinterpretation. Communication is a key component of quality care, something only humans are capable of. Especially for nurses, those who stay by the patients' side constantly, communication is the only

path to achieve the best result for patients' rehabilitation. And for Vietnamese women in general, it is immensely significant that nurses deliver the importance of breastfeeding and maternal diet directly towards the mothers and mother-to-be. One last factor that highlights the vital role of healthcare providers, and nurses in particular, in this matter would be the fact that it would be easier to keep track of mothers' progress and certain problems concerning the nursing period. As the brochure only covers one aspect of the journey, it still provides a lead in correcting any mishaps or issues that might occur. Food affects the consumer directly and sometimes immediately, thus, being able to keep a record of what and how much mothers have consumed of said ingredient, follow-ups would be much easier for healthcare practitioners.

### **3 GOAL AND PURPOSE OF THE THESIS**

The goal of this thesis is to provide mothers, especially those in the rural areas, with substantial knowledge regarding proper diet and nutritional benefits during their breastfeeding period in order to improve both the mothers' breastfeeding quality and babies' overall health.

The purpose of the thesis is to create a nutritional brochure offered as guidance for mothers and an aiding tool for healthcare workers in Vietnam in order to guarantee the transmitted information is suitable for people with little knowledge on medical subject.

Research question: What nutrition will mothers need during the breastfeeding period to ensure an optimal development for infants in Vietnam?

## **4 METHODOLOGY**

### **4.1 Literature review**

The chosen methodology for this thesis is adapting methods of narrative literature review. This method focuses on gathering literature related to a specific topic and analysing and synthesizing its contents to provide a comprehensive report of current knowledge on that topic (Cronin et al., 2008, p. 38). Related information of nutrition important for the growth of the babies will be consolidated from the articles chosen to create a brochure filled with useful nutrition and their information as a guideline for mothers during the breastfeeding period. With this intention in mind, it was deemed narrative literature review the most befitting methodology. The key steps in the review process include selecting the topic; searching for literature; gathering, reading, and analyzing the literature; and writing the review (Cronin et al., 2008, p. 39-43).

### **4.2 Data collection**

The data collection process of the thesis consists of three stages: collecting, assessing, and analysing. The collected articles were carefully chosen and ensured that they are from reliable database such as PubMed, MedlinePlus, ScienceDirect, and official healthcare organizations' websites along with articles from different journals and health portals which have been medically reviewed by professionals and registered dietitians. Key words for the authors include breastfeeding, breastmilk, nursing, nutrition, nutrients, diet, maternal diet, macronutrients, micronutrients, energy, minerals, food, supplementary food, supplements, mothers, infants, exclusive breastfeeding, development, well-being. Boolean phrases are used in the research process. The searches were limited to only publications in English or Vietnamese from the past 10 years (2012-2022) and available in full text. The initial searches provided a combined total of 4625 results.

Following the first stage, the results were then assessed to eliminate duplications and narrow down the target information by reading through the abstracts and keywords. The data was selected based on the inclusion criteria in Table 1 below. The articles chosen needed to be up to date, available in English or Vietnamese, with qualified content that answered the research question. The final stage of the data collection process was the first step of the analysing process, as the data were read through thoroughly to determine whether the question of the thesis

was answered. The focus was put on the results or the highlight parts of the approved articles. In the end, there were a total of eleven (n=11) results which provided relevant information for our research question.

The data collection process was carried out between by both researchers between March and April 2022.

Table 1. Inclusion Criteria for Data Collection

<b>Inclusion criteria</b>
Available in English or Vietnamese languages
Published within the last 10 years (2012-2022)
Available in full text
Peer reviewed
Research/clinical report and practice guideline which presents research result and/or recommendations
Discuss nutrition and maternal diet during breastfeeding period
Answer the research question

### 4.3 Analysis

A total of twelve (n=12) inclusive articles were chosen for the literature review process as these articles answer the research question. After taking the nature of the thesis into consideration, instead of following the traditional path of inductive data analysis, a different approach to data analysis has been proposed which will suit the interest of the thesis best. The data analysis process has been carried out through grouping foods and ingredients together from which the necessary results can be drawn by studying the nutritional contents of said groups. Said nutrients benefits and components will also be provided in the result below as complement elements to validate the findings of the review.

Through the initial process of analysing the selected articles, twenty-five nutrients are determined as essential components to the mother's body during the breastfeeding period. The reasons behind this observation and the benefits of these nutrients will be presented in the following section. As this information is necessary but otherwise still deemed additional, the result of the analysis will be included in this section instead. With the table presenting the findings of the analysis is included in the appendix, the twenty-five nutrients put forth as important elements for mothers are Carbohydrates, Protein, Fat, Fibre, and a variety of micronutrients.



For the sake of a concise and succinct presentation, a selection of these nutrients is excluded from the explanation provided in the following section or are demonstrated as subsidiary elements as part of a larger group (Micronutrients). A table will be included providing the full list of twenty-five nutrients in the appendix section.

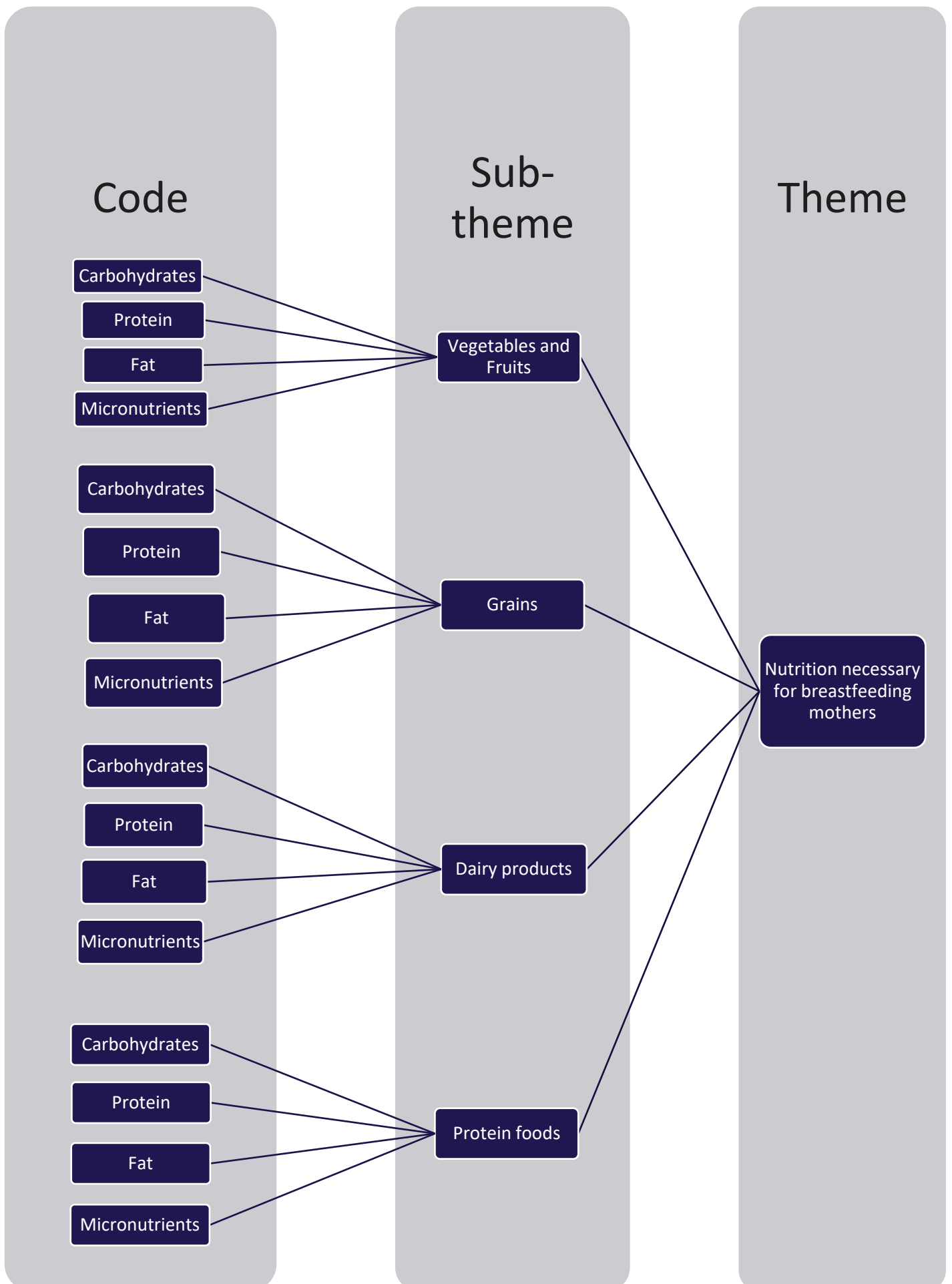


Figure 1. Data Analysis Process

Table 2. Articles details in alphabetical order

No.	Authors and the articles	Method of research	Sample of research	Related results
1	Bo Y Te (Ministry of Health) (2017). HƯỚNG DẪN QUỐC GIA DINH DƯỠNG CHO PHỤ NỮ CÓ THAI VÀ BÀ MẸ CHO CON BÚ (National Guidance about Nutrition for Pregnant Women and Breastfeeding Mothers)	Vietnamese government handbook		The handbook provided the list of necessary nutrition for mothers who give breastfeeding for babies in the first 6 month in details with recommended amount of each nutrient. The handbook is not reader-friendly for people with little knowledge of health-related science.
2	Burbidge, A. (2019). Breastfeeding and a Mother's Diet: Myths and Facts	Online article. Medically reviewed by registered dietician		The article discussed several nutrients that mothers should consume while breastfeeding such as Vitamin B12, calcium, iron, vitamin C, iodine, vitamin D, but it did not specify exact amount mothers should consume these nutrients. The article also suggested specific food for intaking during breastfeeding period.

3	<p>Bjarnadottir, A. &amp; Kubala, J. (2020) Breastfeeding Diet 101: What to Eat While Breastfeeding</p>	<p>Online article. Medically reviewed by registered dietician</p>		<p>The article discussed the benefit of breastfeeding then moving on to how maternal diet affects the composition and the quality of breast milk. It also included a list of foods and ingredients rich in nutrients and divided into different groups depending on what element was being mentioned. There was caution against specific foods to be avoided during breastfeeding period.</p>
4	<p>Bzikowska-Jura, A., Czerwogrodzka-Senczyna, A., Oleńska, G., Szostak-Wełgier, D., Weker, H. &amp; Wesółowska, A. (2018). Maternal Nutrition and Body Composition During Breastfeeding: Association with Human Milk Composition</p>	<p>Quantitative research. Statistical analyses were conducted</p>	<p>40 Polish mothers over 18 years old who were in their first month of breastfeeding. 24h milk sample was taken for the analysis and measurements</p>	<p>The research extracted information from the 24h milk sample, body composition analysis and a 3-day dietary record Polish mothers provided in the research at three time points: during the first, third, and sixth months of lactation. The research found out that mothers in the current research did not consume enough energy compared to the standard chart. However, they had enough protein, fat, minerals and vitamins, apart from vitamin D and calcium</p>

5	Di Maso et al (2021). Dietary Intake of Breastfeeding Mothers in Developed Countries: A Systematic Review and Results of the MEDIDIET Study	Systematic Review study	A comparison of a review of 28 articles and results from MEDIDIET (Italian mothers) study	Similar to Bzikowska-Jura et al. (2018), this article also classified a list of nutrients breastfeeding mothers had in their systematic review and MEDIDIET study. We only focused on the results of MEDIDIET study for our thesis because it answered our research question.
6	Ferreira, M. (2020) 6 Essential Nutrients and Why Your Body Needs Them	Online article. Medically reviewed by registered dietitian		The article discussed about nutrients and their benefits for the human body.
7	Gila-Díaz,A.; Díaz-Rullo Alcántara, N.;Herranz Carrillo, G.; Singh, P.; Arribas, S.M.; Ramiro-Cortijo, D. (2021). Multidimensional Approach to Assess Nutrition and Lifestyle in Breastfeeding Women during the First Month of Lactation	Multidimensional approach study	30 healthy breastfeeding women participated in a 72-hour dietary recall questionnaire and the Adherence to Healthy Food Pyramid questionnaire	The study provided the assessment of nutritional status of breastfeeding women during the first month of lactation as tool to detect deficiencies. The result was observed to extract necessary information regarding nutrients and food.

8	Kominiarek, M.A & Rajan, P. (2016). Nutrition Recommendations in Pregnancy and Lactation	A literature review study		The article stated that breastfeeding mother should consume more energy, protein and other micronutrients such as vitamins D and K, calcium, fluoride, magnesium, phosphorus, magnesium, vitamin B6, folate, calcium, and zinc. They also suggested that mothers should take Vitamins A, D, K, C, B1, B6, B12, and folate everyday but only specify the exact amount of nutrients such as energy, protein, Calcium and vitamin B12.
9	Marangoni, F et al. (2016) Maternal Diet and Nutrient Requirements in Pregnancy and Breastfeeding. An Italian Consensus Document	Consensus Document		The consensus document focused on assessing selected nutrients which required more attention during lactation period, supported by solid events.
10	Segura, S.A et al (2015) The importance of maternal nutrition during breastfeeding: Do breastfeeding mothers need nutritional supplements?	Special article. A literature review article.		The article provided a list of recommended nutrients required with specific amount for mothers during breastfeeding period of first 6 months. It is like a handbook of Bo Y te (2017)
11	Verduci, E. et al. (2020) The Triad Mother-Breast Milk-Infant as Predictor of Future Health: A Narrative Review	A literature narrative review		The review article provided an update on the available evidence regarding the association between maternal diet, lifestyle, and human milk composition.

12	Villines, Z. (2018) Foods to eat and avoid while breastfeeding	Online article. Medi- cally reviewed by registered dietician		The article suggested some nutrients essential for breast-feeding mothers such as energy (extra 500kcal per day), iron, calcium, potassium, vitamin A and D but they did not prescribe how much each nutrient should be. Instead, they had a list of certain food mothers should eat to obtain energy and nutrients mentioned above
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## **5 RESULTS**

We have selected a total of twelve (n=12) articles to provide information to answer the research question. The one requirement related to the research question are the essential foods and ingredients beneficial for breastfeeding mothers in the period of the first 6 months. Information regarding the nutrients contained within the foods and ingredients are also reviewed to ascertain the necessity of the element before being included in the results. Taken into account that the thesis' target group is mothers in Vietnam, all information has been assessed and tailored to answer the need of the target group with no indication on whether this could be applied to mothers of other countries.

### **5.1 Food and ingredients**

#### **5.1.1 Vegetables and fruits**

Fruits and vegetables should make up half of your plate in every meal, and for good reasons. These foods are your best source for dietary fiber and they are also rich in vitamins and minerals (Villines, 2018). They can even provide you with carbs if you choose the right source. Professionals recommend opting for fruits with bright colors and vegetables of many varieties (Bjarnadottir & Kubala, 2020). Legumes should also be considered an addition to your maternal diet to provide variety and a different source of nutritional elements such as protein and fat.

#### **5.1.2 Grains, nuts and seeds**

In many parts of the world, grains serve as the main source of carbs, specifically in Asia where rice is a staple in every household. Grains, especially whole grains, provide many essential nutrients such as protein, dietary fiber and carbohydrates (Villines, 2018). Brown rice can be found in many parts of Vietnam and it is easily accessible to the many households. On the other hand, nuts and seeds provide us with healthy fats and an assortment of minerals.

#### **5.1.3 Dairy products**

Your best source of calcium comes from dairy products, and they can even provide you with vitamin D among other necessary nutrients (Villines, 2018). Milk and other products made from

milk can be incorporated into your daily meal through different routes. Dairy products are also a great source of Potassium, which is one of the most important nutrients supporting the lactating process (Gila-Díaz et al., 2021, 1766).

#### **5.1.4 Protein foods**

As the name of the food group suggests, these are the food rich in protein but also supply your body with different nutrients depending on the food choices you make. Lean meat is the first option you can choose to enrich your meal, as you can avoid the extra fats and cholesterol coming with it, but professionals recommend going for seafoods or plant-based protein sources depending on your own dietary restrictions or preferences (Ministry of Health, 2017, 14). Eggs are one of the many choices you can have as your main protein supply while also gaining calcium and choline (Bjarnadottir & Kubala, 2020).

### **5.2 Nutrients**

As discussed previously, the information provided on nutrients are to be viewed as complementary knowledge to ascertain the necessity of consuming a good variety of food and ingredients. The combination of the nutrients listed below will provide mothers with the nutrition essential to the optimal growth of their infant.

#### **5.2.1 Carbohydrates**

Carbohydrates are known as the main source of energy for your body, as it will be broken down into glucose once absorbed into our body. As breastfeeding mothers are recommended to consume an additional of 500 kcal/day in comparison to non-breastfeeding women, the consumption of carbohydrates poses to play an important role in assuring the requirement is met (Kominiarek et al., 2016, 1253). Carbs act similarly to fuel for the body and protect it against disease (Ferreira, 2020). And as breastfeeding mothers need a decent amount of energy to produce milk while also maintaining daily activities, carbohydrates are vital to the diet of the mothers. The recommended amount of carbohydrates should be around 45 to 65 percent of the total daily calories (Ferreira, 2020).

### 5.2.2 Protein

Protein is essential for the body's growth, health, and maintenance, while acting as the secondary source of energy, only supplies energy for the body if the main intake is deprived (Ferreira, 2020). In relation to infant's growth as in their weight and length, protein plays an important role in influencing the optimal development, both in deficiency and excessive consumption through breastfeeding (Verduci et al., 2021, 486). Casein protein is considered to be even more important during the breastfeeding period because casein is "needed for the absorption of calcium and phosphate in the gut" of the infant while also providing all the required amino acids for the body, hence affecting the immunomodulatory functions (Segura et al., 2015, 347.e4). Segura et al. (2015) also suggested that the right type of protein also has beneficial effects on the regulation and sensitivity of insulin, which consequently requires the consumption of quality protein during the breastfeeding period to ensure the long-term result of such advantage.

### 5.2.3 Fat

Good fat helps your body in different ways, most notably providing you with fatty acids that the body cannot produce on its own (Ferreira, 2020). There are certain kinds of vitamins which are fat-soluble, hence they can only be absorbed in the presence of fats. As healthy fatty acids, such as DHA, also contribute to "infant's neurological and retinal development", it should play a fundamental role in the maternal diet (Verduci et al., 2021, 486). In research carried out by Bzikowska-Jura et al. (2018), it was stated that "specific fatty acids that form the total lipid fraction are sensitive to maternal nutrition", indicating a need to pay attention to the intake of fat during lactation period.

### 5.2.4 Vitamin

With the multitude of vitamins known to science, there are several benefits gained from consuming food rich in vitamins. Some of the most important vitamins to be included in maternal diet are vitamin A, C, D, E, B1, B2, B6, and B12. Vitamin A is involved in the development of normal vision, cell growth and enhanced immune system (Verduci et al., 2021, 486). An increase in consuming vitamin-A-rich food for the mothers shows result in the quality of breast milk, in turn answering the increased demand for vitamin A during this period (Gila-Díaz et al., 2021, 1766). Vitamin C also acts as a boost of your immune system which helps in wound

healing, and is a milk antioxidant (Verduci et al., 2021, 486). The group of vitamin Bs is known to help body with releasing and absorbing the energy taken from food, making them another good source of energy for the body during this breastfeeding period. The aforementioned group of vitamins are secreted into breast milk and shows a reduction in their content within breast milk if there is a deficiency in the maternal diet (Kominiarek et al., 2016, 1253).

### **5.2.5 Micronutrients**

A variety of micronutrients are recommended to be included in the maternal diet during the breastfeeding period. Some of the more prominent elements are Calcium, Zinc, Iodine, Magnesium and Phosphorus. These minerals are crucial for the body's functions, many of which would support the mothers in producing quality milk for their babies. Especially, Calcium is essential during lactation, during which it is subject to special regulatory mechanisms that lead to increased absorption, decreased renal excretion and greater mobilization of bone calcium" (Segura et al., 2015, 347.e5). It is also recommended that lactating women require double the amount of iodine intake comparing to normal adult women, as the infants should be able to receive the adequate iodine through breast milk to stimulate thyroid hormones (Segura et al., 2015.e5). Furthermore, iodine also plays a role in the metabolism of a variety of other nutrients in the body, and thermogenesis (Marangoni et al., 2016, 629).

### **5.3 Final assessments**

With the combination of the benefits of specific nutrients and the information of the food groups provided above, the thesis has come to acknowledge a certain variety of different ingredients which are essential to the maternal diet during the breastfeeding period. The thesis has arranged these ingredients as following:

In the category of food groups, the thesis breaks the ingredients down into four different groupings: (1) fruits and vegetables, (2) grains, nuts and seeds, (3) dairy products and (4) protein foods.

For fruits and vegetables: bananas, mangoes, oranges, tomatoes, bell peppers, cabbage, carrots, potatoes, sweet potatoes are among the recommendations that can be found from both articles written by Villines (2018) and Bjarnadottir and Kubala (2020). It is important to

note that this is the specific group of foods where the variety of ingredients you consume produces a better result than the quantity of a specific ingredient you choose as your main source of nutrition. Allergies should be taken into account while planning the maternal diet and alternatives can be proposed to supplement. For mothers in rural areas specifically, a few other options that can be available are pomelo, longan, dragon fruit, green papaya, a variety of gourds and melons, daikon and dark leafy greens (Ministry of Health, 2017, 60, 61). Legumes such as black beans and green peas are good sources for minerals also (Ministry of Health, 2017, 60).

With the main source of energy being grains, nuts, and seeds, Vietnam has long since been a country that takes pride in its culture revolving around rice. Mothers in rural areas will have no trouble accessing this type of ingredient, but there should be an effort put into consuming more brown rice (Villines, 2018). Any product made from rice can be a substitute to enrich the maternal diet, such as pho or rice noodles (Ministry of Health, 2017, 60). Almond, sesame seeds, sunflower seeds are among the recommended foods mothers can consider alternating in their diet (Bjarnadottir & Kubala, 2020).

Dairy products are one source that can be quite limited in Vietnam, especially in rural areas. Mothers in more secluded areas might need to stick with milk as this ingredient will be the easiest to acquire (Ministry of Health, 2017, 41). Butter or sour cream might be the better options for alternatives, but cheeses pose a hindrance to gain access to, hence not placed high in the priority list.

Moving on to the final groups of food, protein-dense food, specialists and nutritionists recommend sticking with white or lean meat, such as chicken or beef for the ultimate results, but alternatives are presented for people with different dietary restrictions which can provide even more nutritional benefits. Salmon, carp, herring and sardines all provide protein with omega-3 fat DHA, while tofu can be your source for minerals and vitamins such as calcium, iron and vitamin A (Villines, 2018). Eggs and poultry are also good sources for calcium while acting as the main provider of protein in a mother's diet (Ministry of Health, 2017, 49).

The ingredients provided above have also been taken into account when it comes to the issue of nutrient components. As no food groups only provide a specific nutrient, even protein-dense foods, these ingredients have thus been selected under the premise that each one can be a good source of different nutrient elements, including a plethora of micronutrients. To

make the argument clearer, there will be a table discussing the ingredients containing specific nutrients in the appendix.

In the end, we have a list of nutrients and foods suggested for mothers to take during their lactation period in the first 6 months after childbirth which will act as the central element of the proposed brochure. The information will be adapted into beginner-friendly language to accommodate the target group during the making process of the brochure.

## 6 CONCLUSION

With the research question being “What nutrition will mothers need during the breastfeeding period to ensure an optimal development for infants in Vietnam?”, this thesis has studied and produced a brochure of necessary nutrients that are recommended by qualified entities and authorities. As the thesis aims to tackle the challenges mothers are facing in Vietnam, the final result is tailored to the need of Vietnamese people, with an emphasis on ingredients that are common in different regions in the country. As the brochure prototype included in the result section has illustrated, the most important feature of the brochure is to present the latest updated list of necessary nutrients in a more comprehensive and straightforward way as to accommodate all readers from different educational backgrounds. There are bounds to be elements that cannot be explained explicitly through the brochure alone and other issues that cannot be covered entirely, but this is where the healthcare workers in Vietnam come in to give a hand in ensuring all matters related to maternal diet are explained and information provided. It is to be noted that the translation of the brochure into Vietnamese should be undertaken by a team of professionals in both areas of languages and nutrition to ensure no details are missing or mistranslated.

It should be taken into account that the brochure does not function as a compulsory direction to follow for mothers, but more of a guiding tool to keep track of the maternal diet and with adjustments made specifically for each individual. The nutrition list and additional information accompanied in the brochure has been reviewed and extracted from reliable sources and trustworthy specialists. However, such knowledge is updated continuously, hence the brochure being provided is not complete and should be updated accordingly when new information has been introduced.

Healthcare providers are responsible for the needed education on the matter of quality breastfeeding and appropriate maternal diet. New study would be encouraged to continue perfecting the information provided in the result section to ensure a better development for the next generation. It has been established previously the role of the government in aiding the healthcare workforce with proper equipment and adequate work environment to guarantee the quality of care provided for patients in general. The situation concerning childbirth and pregnancy in Vietnam could still see more improvement in the future, and the thesis aims to provide an initiation for the betterment of the healthcare field. The next step to achieve such goal would be to

updating the brochure with newfound information proven beneficial for mothers in Vietnam to aid healthcare workers in the process of improving the quality of care.



## 7 DISCUSSION

At the beginning of the process of planning the thesis, the idea of compiling the list for the possibility of a brochure was proposed. Considering the amount of work and time that might be needed to complete such an objective, the goal for the thesis has been temporarily directed towards compiling a list of nutrients and additional information instead. However, seeing that the potential coming with having a brochure is exponentially crucial for the outlook of Vietnam's healthcare system and the overall wellbeing of mothers and infants in the rural areas, the authors have picked up the work to lay down the foundation of the proposed brochure. As of now, the thesis has concluded with an up-to-date list of necessary nutrients for mothers in the first six-month-period of exclusive breastfeeding and additional information proven to be helpful for mothers, both of which are significant elements of the brochure. Other details that can help in elevating the value of this brochure can be discussed further if the subject matter is considered requisite and an authority or entity of equal standing in Vietnam decides to adopt the framework of the brochure into practice. In the hope that the brochure, once becoming available to the public, will be within access of the target group, namely mothers in the rural areas, the authors propose the option of having the brochure be distributed to different health centers throughout the country, especially targeting those which locate in medium to small towns. Seeing that health centers of even smaller subdivisions will not be able to provide adequate care to mothers during pregnancy and postpartum, the necessity of the brochure is deemed less significant as the guidance required to go with acquiring the brochure might not be supplied.

One thing to be taken into consideration would be the potential of extra training in the field of nutrition for nurses going into obstetrics to ensure transparency in providing information. As the healthcare system in Vietnam relies heavily on the work of doctors and specialists, nurses' responsibilities are limited, hence creating an imbalance in the work proportion and refraining nurses from overseeing more basic work that should fall under their management. Stereotypes and biases also play into creating a mindset where patients consider doctors as the more reliable source of information and would refuse the help of nurses in the matter of counselling, which creating a systematic problem that can only be resolved with the help of education and government's campaigns. Allowing nurses to receive better education and take over more responsibilities would lead to an increase in the quality of care for patients.

Going into the making of the thesis, different topics were presented as subject matter to discuss the breastfeeding procedure and the importance of breastfeeding. After much contemplation,

the authors have settled with the topic of nutrition as the main subject of discussion as it is a more universal concerns that have been discussed time and time again while still presenting spaces for improvement, especially considering the situation in Vietnam. Childbirth and breast-feeding have seen gradual changes in the current societal conditions, but traditions and prejudices pose a substantial challenge to overcome for the situation to further advance. One such problem being the old-fashioned customs of taking care of mothers and newborns in the first several months after birth. This is a problem that needs to be addressed in the healthcare context because it points to the lack of information provided for mothers and caretakers in light of maternal caring methods. Maternal diet is just one part of a bigger issue when discussed about the mishandling of maternal care outside of hospital's background. Mothers living in big city with an access to reliable sources could see a better outcome when it comes to managing their baby's and their own health; mothers in rural areas, on the other hand, oftentimes suffer from the lack of professional support and guidance which then affects the possibility of a smooth recovery from childbirth and risks hindering the child's development.

## 8 ETHICAL CONSIDERATIONS

The methodology employed in the writing of this thesis is governed by clear ethical principles and it is the responsibility of the reviewer(s) to uphold said rules. During the process of writing the thesis, careful attention was paid to the selection of studies for this review, ensuring the data collected was derived from reliable and verified sources from trustworthy databases. Chosen articles were handled in respectful manner while maintaining the credibility of the information gathered through reviewing and analyzing. Plagiarism was avoided by referencing all source materials. Such information not being listed in references were input made by authors while minimizing biases and prejudices. Personal views were not presented as databases and were not reflected in the results of the thesis.

The authors approached the subject matter with an open mind and without prejudice. Data collected from different sources were translated without partiality and upheld the intention of the original authors. Persons and associations involved and/or participants in the review process were made aware of the purpose of the thesis and consents were obtained before proceeding with the finalizing of the thesis.

The subject matter deals with information related to a marginally minor group, hence utmost attention and respect were paid to protect the rights and virtues of the target group without sacrificing the quality and credibility of the data collected. Differences in backgrounds, cultures, politics, and ethics were taken into consideration while presenting the results of the thesis and answering the research question. Materials collected from databases and verified sources were done without bias to ensure the result would be produced with only evidence-based information proven helpful and validated. The methods used to select said data were outlined in detail for the aforementioned purpose.

Every information and every use of such information abided by the standards and guidelines set by the official Seinäjoki University of Applied Sciences instructions for written work. The final edition of the thesis has been reviewed to ensure aforementioned guidelines are followed and adhered to. During the process of writing said thesis, authors participated in guidance workshops and personal meetings to receive feedbacks from the thesis supervisors to further guarantee the research and writing process were observed and provided with proper instructions.

To ensure the validity and credibility of the data used in this thesis, the two authors have consulted with supervising teachers and making their own research on the criteria for the trustworthiness of the content. The criteria are based on two separate measurements for reliability and validity, both of which have been mentioned in research by Mohajan (2017). In his paper, Mohajan (2017) has explained reliability and validity, given the different types of reliability and validity and the method to test each type for the ultimate result. Following the examples set in the research paper, the data used in this thesis has gone through the review process separately carried out by the two authors and another round together to finalize the decision.

In circumstances where the validity and credibility of the content could not be ascertained and confirmed, the authors had opted out of said content, choosing to preserve the quality of the thesis instead of putting to use dubious data.

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**APPENDIX**

Table 3. Nutrients necessary for breastfeeding mothers

No.	Nutrients
1	Carbohydrates
2	Protein
3	Fat
4	Dietary Fiber
5	Calcium
6	Iron
7	Zinc
8	Iodine
9	Potassium
10	Magnesium
11	Phosphorus
12	Vitamin A
13	Vitamin C

14	Vitamin D
15	Vitamin E
16	Vitamin K
17	Vitamin B1
18	Vitamin B2
19	Vitamin B3
20	Vitamin B5
21	Vitamin B6
22	Vitamin B9
23	Vitamin B12
24	Cholesterol
25	SFA

Table 4. Foods recommended for breastfeeding mothers

Food	Nutrient contained	Bur-bidge (2019)	Health-line (2020)	Medical News Times (2018)	Bo y te(2017)
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Meat, fish, liver, mussel and milk.	B12	Yes	-	-	-
Fish, pork, seeds, nuts, beans	B1 (Thiamin)	-	Yes	-	Yes
Cheese, almonds, nuts, red meat, oily fish, eggs	B2 (Riboflavin)	-	Yes	-	Yes
Chickpeas, nuts, fish, poultry, potatoes, bananas, dried fruit	B6	-	Yes	-	Yes
Shellfish, liver, yogurt, oily fish, nutritional yeast, eggs, crab, shrimp	B12	-	Yes	-	Yes
Eggs, beef liver, chicken liver, fish, peanuts	Choline		Yes	-	-
Sweet potatoes, carrots, dark leafy greens, organ meats, eggs	Vitamin A	-	Yes	-	-
Cod liver oil, oily fish, some mushrooms, fortified foods,	Vitamin D	-	Yes	-	-
Salmon, sardines, and trout	Vitamin D	-	-	Yes	Yes
Vegetable oil, sun flowerseeds, spinach, peanut	Vitamin E	-	-	-	Yes
Vegetable oil	Vitamin K	-	-	-	Yes
Brazilian nuts, seafood, turkey, whole wheat, seeds	Selenium	-	Yes	-	-
Dried seaweed, cod, milk, iodized salt	Iodine	-	Yes	-	-
Beans, lentils, leafy greens, asparagus, avocados	Folate B9	-	Yes	-	-
Dairy products, leafy greens, legumes	Calcium	-	Yes	-	-
Red meat, poultry, seafood, beans, green vegetables, dried fruit	Iron	-	Yes	-	-

Shellfish, whole grains, nuts, beans, organic meats, potatoes	Copper	-	Yes	-	-
Oysters, red meat, poultry, beans, nuts, dairy	Zinc	-	Yes	-	-
Cantaloupe and honeydew melon, banana, mango, apricot, prunes, oranges, red or pink grapefruit,	-	-	-	Yes	-
Spinach, cooked greens (such as kale and collards), carrots, sweet potatoes, pumpkin, tomatoes, red bell peppers	-	-	-	Yes	-
Brown rice and whole-wheat bread (8 ounces per day) and quinoa	-	-	-	Yes	-
Nuts and seeds, lean beef, pork, and lamb, oysters, crab, and mussels, salmon, herring, pollock, sardines, and trout	Protein	-	-	Yes	-
Salmon, sardines, and trout	Omega-3	-	-	Yes	-

## Plate model



**Recommended proportion**

- 1/2 vegetables and fruits
- 1/4 protein
- 1/4 whole grain

# Nutrition

## Breastfeeding period oriented

- Protein: Can be found in white meat, poultry, eggs, milk,...
- Carbohydrates: can be found mostly in starchy food like potato, bread, beans,...
- Fiber: can be found in vegetables and fruits or whole grains

Nutrients list

Giving more thoughts to your maternal diet is the first step to a well-developed future for your baby and yourself.



## About Us

Thesis on the benefits of nutrition during the exclusive breastfeeding period on the development of babies. Information has undergone rounds of assessment to ensure the most valuable data are provided in the brochure. For more information, please contact us at: name.surname@gmail.com

## Info

### MANAGEMENT

It is the responsibility of mothers and the caretakers to observe the information provided in the brochure and make meal plans catering to the need of mother. As guidance is only exemplary, family should adjust your personal diet within the means of the family.

### MEASUREMENT

As the information about nutrients and food provided in the brochure is for the general public, the amount and value of intake should be consulted with the professionals to determine the correct need of the individual.

### MODIFICATION

No set meal plan is proposed to avoid exclusion of any individual. Nutrients and food ingredients combined with basic information are given as the foundation of your personal diet. Diet restrictions related to health or religions are not taken into account while constructing the brochure, please contact your dietitian for more instructions.



Figure 2. Brochure prototype