TRENDS AND FACTORS ASSOCIATED WITH BREASTFEEDING IN THAILAND: A SECONDARY ANALYSIS OF THE MULTIPLE INDICATOR CLUSTER SURVEY 2005-2016

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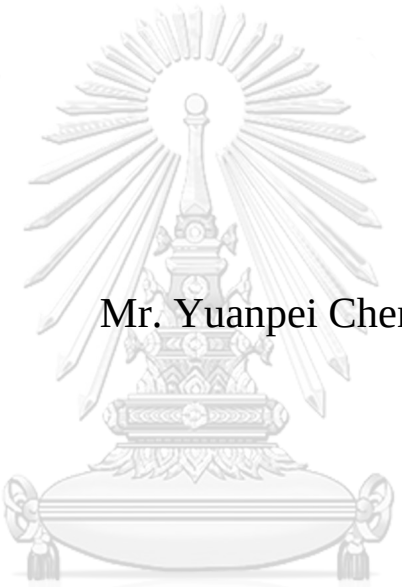

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แนวโน้มและปัจจัยที่เกี่ยวข้องกับการเลี้ยงลูกด้วยนมแม่ในประเทศไทย การวิเคราะห์ทุติยภูมิของการสำรวจพหุดัชนีแบบจัดกลุ่มปี 2548 - 2559

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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรมหาบัณฑิต
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Thesis Title	TRENDS AND FACTORS ASSOCIATED WITH BREASTFEEDING IN THAILAND: A SECONDARY ANALYSIS OF THE MULTIPLE INDICATOR CLUSTER SURVEY 2005-2016
By	Mr. Yuanpei Chen
Field of Study	Public Health
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Accepted by the College of Public Health Sciences, Chulalongkorn University in Partial Fulfillment of the Requirement for the Master of Public Health

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หยุนเผ่ย เชน : แนวโน้มและปัจจัยที่เกี่ยวข้องกับการเลี้ยงลูกด้วยนมแม่ในประเทศไทย การวิเคราะห์ทุติยภูมิของการสำรวจพหุดัชนีแบบจัดกลุ่มปี 2548 - 2559. (TRENDS AND FACTORS ASSOCIATED WITH BREASTFEEDING IN THAILAND: A SECONDARY ANALYSIS OF THE MULTIPLE INDICATOR CLUSTER SURVEY 2005-2016) อ.ที่ปรึกษาวิทยานิพนธ์หลัก : ปีเตอร์ ซีนอส

การศึกษาแบบภาพตัดขวางนี้ใช้ข้อมูลทุติยภูมิจากการสำรวจกลุ่มผู้คัดกรองหลายกลุ่ม (MICS รอบ 3, 4 และ 5) ระหว่างปี พ. ศ. 2548 ถึงปี พ.ศ. 2560 เพื่อระบุแนวโน้มและปัจจัยที่เกี่ยวข้องกับการเลี้ยงลูกด้วยนมแม่ในประเทศไทย กลุ่มตัวอย่างมาจากการสำรวจ MICS 3 ครั้งและรวมกัน จนกระทั่งได้กลุ่มตัวอย่างแบบถ่วงน้ำหนักเป็นกลุ่มเด็กอายุต่ำกว่า 2 ปี จำนวน 9,757 รายสำหรับศึกษาการเลี้ยงลูกด้วยนมในระยะแรก และเด็กที่ได้รับนมแม่อย่างเดียวจำนวน 2,568 ราย ใช้การวิเคราะห์ความถดถอยโลจิสติกแบบเชิงเส้นและเชิงพหุเพื่อหาแนวโน้มและปัจจัยที่เกี่ยวข้อง ผลการศึกษาพบว่าอัตราการให้นมบุตรโดยรวมลดลง แม้ว่าอัตราการเริ่มเลี้ยงลูกด้วยนมแม่ในระยะแรกเพิ่มขึ้นเล็กน้อยจาก 27.4% ในปี พ.ศ. 2548-2549 เป็น 36.7% ในปี พ.ศ. 2558-2559 และอัตราการเลี้ยงลูกด้วยนมแม่เพิ่มขึ้นอย่างมีนัยสำคัญทางสถิติจาก 6.3% เป็น 27.1% ในช่วงทศวรรษที่ผ่านมา ปัจจัยที่มีความสัมพันธ์เชิงบวกกับการให้นมแม่ในระยะแรก (p <0.05) คือ ภาคเหนือ (adjusted OR 1.530) และภาคใต้ (adjusted OR 1.857) อายุของเด็ก (adjusted OR = 1.008) การเคยมีลูกก่อนหน้านี้ (adjusted OR = 1.175) ขนาดของเด็กเมื่อแรกคลอด (adjusted OR = 1,180) และน้ำหนักของเด็กแรกเกิด(adjusted OR = 1.217) ในขณะที่ปัจจัยที่เกี่ยวข้องเชิงลบกับการให้นมแม่ในระยะแรก ได้แก่ อายุของมารดา (adjusted OR = 0.973) ดัชนีความมั่งคั่งควอไทล์ที่สี่ (adjusted OR 0.555) มารดามีการศึกษาระดับประถมศึกษา (adjusted OR = 0.568) มารดามีการศึกษาระดับมัธยมศึกษา (adjusted OR = 0.706) และมารดามีการศึกษาระดับสูงกว่ามัธยมศึกษา (adjust OR = 0.504) การคลอดในสถานพยาบาลที่ไม่ใช่ของรัฐ (adjusted OR = 0.550) จำนวนครั้งที่รับบริการการฝากครรภ์ (ปรับ OR = 0.984) และ การผ่าคลอด (adjusted OR = 0.448) ในทางตรงกันข้าม ปัจจัยที่มีความสัมพันธ์เชิงบวกกับการเลี้ยงลูกด้วยนมแม่อย่างเดียว (p <0.05) ได้แก่ พื้นที่ชนบท (adjusted OR = 1.417) ภาคเหนือ (adjusted ค่า OR = 2.948) และภาคตะวันออกเฉียงเหนือ (adjusted OR = 1.551) อายุแม่ (adjusted OR = 1.023) และเด็กเพศหญิง (adjusted OR = 1.527) ดัชนีความมั่งคั่งควอไทล์ที่ห้า (adjusted OR = 1.675) มารดามีการศึกษาระดับมัธยมศึกษา (adjusted OR = 3.867) และการเคยมีลูกก่อนหน้านี้ (adjusted OR = 1.171) ในขณะที่ปัจจัยที่มีความสัมพันธ์เชิงลบกับการเลี้ยงลูกด้วยนมแม่อย่างเดียว ได้แก่ อายุของเด็ก (adjusted OR = 0.637) การคลอดในสถานพยาบาลที่ไม่ใช่ของรัฐ (adjusted OR = 0.621), น้ำหนักของเด็กแรกคลอด (adjusted OR = 0.518) จำนวนครั้งที่รับบริการการฝากครรภ์ (adjusted OR = 0.924) และ การผ่าคลอด (adjusted OR = 0.551) นอกจากนี้ตัวแปรเชิงพื้นที่เปลี่ยนจากมีนัยสำคัญทางสถิติในการวิเคราะห์ไปเป็นไม่มีความสำคัญในการวิเคราะห์เมื่อควบคุมอิทธิพลของตัวแปร ต่อไปนี้ ภูมิภาค ดัชนีความมั่งคั่ง สถานที่คลลอด ขนาดของเด็กแรกเกิด และ การเคยมีลูกก่อนหน้านี้ ดังนั้นนักวิจัยจึงแนะนำให้เพิ่มการเลี้ยงลูกด้วยนมแม่อย่างเดียวในประเทศไทยโดยคำนึงถึงปัจจัยที่เกี่ยวข้องเหล่านี้

ภาควิชา	ไม่สังกัดภาควิชา/เทียบเท่า	ลายมือชื่อนิสิต .....
สาขาวิชา	สาธารณสุขศาสตร์	ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก .....
ปีการศึกษา	2561	

6078858853 : MASTER OF PUBLIC HEALTH
Early initiation of breastfeeding Exclusive breastfeeding Factors Trend

Yuanpei Chen : TRENDS AND FACTORS ASSOCIATED WITH BREASTFEEDING IN THAILAND: A SECONDARY ANALYSIS OF THE MULTIPLE INDICATOR CLUSTER SURVEY 2005-2016. ADVISOR: Prof. Peter Xenos, Ph.D.

This cross-sectional study was based on secondary data of Thailand Multiple Indicator Cluster Survey (MICS round 3, 4 and 5) between 2005 and 2016 and aimed to identify trends and factors associated with breastfeeding in Thailand. Subjects were selected from the three MICS surveys and then pooled together to form final weighted samples of 9757 children under 2 years for studying early initiation of breastfeeding and 2568 children under 6 months for exclusive breastfeeding. Univariate and multivariate logistic regression analyses were applied to identify trends and factors. Results indicated that the overall breastfeeding rates were low in spite of an overall slight increase in early initiation of breastfeeding from 27.4% in 2005-2006 to 36.7% in 2015-2016 and a significant rise in exclusive breastfeeding from 6.3% to 27.1% during the decade in Thailand. Factors positively associated with early initiation of breastfeeding ($p < 0.05$) were north (adjusted OR = 1.530) and south regions (adjusted OR = 1.857), age of child (adjusted OR = 1.008), children ever born (adjusted OR = 1.175), average size of child at birth (adjusted OR = 1.180), and weight of child at birth (adjusted OR = 1.217), while negatively associated factors consisted of age of mother (adjusted OR = 0.973), fourth wealth index quintile (adjusted OR = 0.855), primary (adjusted OR = 0.568), secondary (adjusted OR = 0.706) and higher (adjusted OR = 0.504) education levels of mother, delivered in non-public medical sector (adjusted OR = 0.550), times of received antenatal care (adjusted OR = 0.984), and caesarean section (adjusted OR = 0.448). By contrast, factors found positively related to exclusive breastfeeding ($p<0.05$) included rural area (adjusted OR = 1.417), north (adjusted OR = 2.948) and northeast regions (adjusted OR = 1.551), age of mother (adjusted OR = 1.023), , female child (adjusted OR = 1.527), Richest wealth index quintile (adjusted OR = 1.675), mothers with secondary educational level (adjusted OR = 3.867), and children ever born (adjusted OR = 1.171), while negatively associated factors included age of child (adjusted OR = 0.637), delivered in non-public medical sector (adjusted OR = 0.621), weight of child at birth (adjusted OR = 0.518), times of received antenatal care (adjusted OR = 0.924), and caesarean section (adjusted OR = 0.551). In addition, the variable of area changed from significance in unadjusted to non-significance in adjusted analysis due to the influence of such variables as region, wealth index quintile, place of delivery, size of child at birth, and children ever born. Accordingly, the researcher recommends increasing exclusive breastfeeding practice in Thailand by considering associated factors.

Department:	Common Course	Student's Signature .....
Field of Study:	Public Health	Advisor's Signature .....
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Yuanpei Chen

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CHAPTER I
INTRODUCTION

1.1 Background and Rationale

The importance of breastfeeding for infants has been well acknowledged in almost all countries in the world, particularly in those low and middle income countries (Victora et al., 2016). According to United Nations Children's Fund et al. (2010), breastfeeding establishes a close connection between mothers and infants, helping infants feel safe and loved, and thus improving their nutrition, growth, and development; it provides infants first immunization and protections from many health problems such as diarrhea and infections of the ear and chest.

According to the WHO (2013), breastfeeding can benefit both infants and mothers in short term and long term. In the short term, breastfeeding can reduce morbidity and mortality rates in infants; early and early exclusive breastfeeding can be related to long time duration of breastfeeding for infants. Breastfeeding can protect mothers from depression and stimulate the release of oxytocin, which can prevent maternal bleeding by uterine contraction. On the other hand, the long term benefits of breastfeeding for infants including decreased risks for a variety of diseases, such as infections, diabetes, and leukemia, while amenorrhea due to breastfeeding help to delay pregnancy in the future and to reduce risks for breast cancer, ovarian cancer, and type 2 diabetes in mothers (WHO, 2013).

A variety of benefits from breastfeeding have been well proved in many previous studies. According to meta-analysis that reviewed 28 systematic reviews and meta-analyses, breastfeeding can benefit children by protecting them from illnesses such as infections and diabetes, enhancing their intelligence, and reducing risk of overweight; it can also protect women from diseases, such as breast cancer, ovarian cancer, and type-2 diabetes (Victora et al., 2016).

Indeed, the meta-analysis reported that results from 66 different researches, particularly in low and middle income countries, showed that breastfeeding could help to avoid diarrhea by approximately 50% and respiratory infections by one third. 72%

of hospital admissions due to diarrhea and 57% due to respiratory infections can be avoided with breastfeeding. Breastfeeding can protect children under 2 years old from otitis media and reduce malocclusions by 68% Peres, Cascaes, Nascimento, and Victora (2015). Also, breastfeeding could prevent 19% of risks for leukemia in children (Amitay & Keinan-Boker, 2015). In terms of the long term effects of breastfeeding, the meta-analysis found from 113 studies that breastfeeding with longer time could reduce 26% of the risks for overweight, and concluded from 11 studies that breastfeeding could reduce type-2 diabetes by 35%. Further, one study reviewed 16 observational studies and found that breastfeeding could improve children's performance in intelligence tests by 3.4 points (B. L. Horta, Loret de Mola, & Victora, 2015).

Breastfeeding benefits not only the children but also mothers. First, the meta-analysis by Victora et al. (2016) reported that breastfeeding could play an important role in birth spacing by reducing births with continued breastfeeding, which was found to have an association with longer periods of amenorrhea. An estimated 50% of births were prevented in countries with prevalence of continued breastfeeding in 2003 (Becker, Rutstein, & Labbok, 2003). Second, from an analysis of 50,000 cancer patients in 47 researches, breastfeeding was found strongly associated with lower risk for breast cancer (Lancet, 2002). As breastfeeding period increased by 12 months, the risk for breast cancer reduced by 4.3%. The meta-analysis by Victora et al. (2016) reviewed 41 relevant studies and found that longer breastfeeding would reduce ovarian cancer by 30%. In addition, in a meta-analysis of six cohort studies, breastfeeding was reported to be negatively associated with type-2 diabetes (Aune, Norat, Romundstad, & Vatten, 2014).

Breastfeeding was found to be associated with 50% reduction of risks in death among children at an age of 6-23 months old in low and middle income countries (Victora et al., 2016). used the lives saved tool to estimate lives saved for children and mothers and found that in the 75 low and middle income countries with high mortality in 2015, breastfeeding could have saved 823,000 deaths or 13.8% of deaths in children under 2 years if it had been increased to universal levels. Further, 87% of deaths in children under 6 months would be prevented with high prevalence of exclusive breastfeeding. Vicotra et al. (2016) also estimated from pooled studies that the current rates of breastfeeding in the world had reduced 19,464 deaths due to breast cancer in

each year, when comparing with no breastfeeding, and that increasing breastfeeding to 12 months for children in high income countries and 2 years in low and middle income countries would save another 22,216 lives each year.

According to UNICEF et al. (2010), breastfeeding alone is recommended by World Health Organization and UNICEF as the best strategy for infant under six months old, and breastfeeding should be initiated within one hour of birth and should be at least 8 times per day on demand. Even though breastfeeding has been highly recommended for a long period, the problem of low rates of breastfeeding has been persistent all the time for many countries in the world, especially in the low and middle income countries.

According to the meta-analysis analysis of 127 low and middle income countries and 37 high income countries (Victora et al., 2016), both early initiation of breastfeeding and exclusive breastfeeding were lower than 60% in all these countries. The meta-analysis also revealed that all indicators of breastfeeding, except early initiation of breastfeeding, declined as the country became wealthier. Indeed, 63% (36.3 million) of children under 6 months in the low and middle income countries were found not receiving exclusively breastfeeding, with 53% in low income countries, 61% in low middle income countries, and 63% in upper middle income countries. In those countries 101.1 million children did not receive breastfeeding following recommendations. The exclusive breastfeeding showed only a slightly increase from 24.9% to 35.7% during the period between 1993 and 2013; on the other hand, the rate for continued breastfeeding until 1 year even declined from 76.0% to 73.3% (Victora et al., 2016).

The low breastfeeding rates in Thailand have been a problem for many years. According to Thailand MICS reports, in 2005-2006, early initiation of breastfeeding in Thailand was 49.6%. This percentage declined slightly to 46.3% in 2012 and 39.9% in 2015-2016. On the other hand, the rate for exclusive breastfeeding in Thailand was only 5.4% in 2005-2006, even though the rate increased to 12.3% in 2012 and 23.1% in 2015-2016.

By contrast, the early initiation rate of breastfeeding in several other countries of Southeast Asia, such as Bangladesh and Nepal, was higher than that in Thailand, while Viet Nam and Lao PDR showed lower rate than Thailand. According to MICS reports, the early initiation rates of breastfeeding was 57.4% in Bangladesh in

2012-2013, 48.7% in Nepal in 2014, and 26.5% in Viet Nam in 2013-2014, when the sample round 5 of MICS surveys were conducted in those countries. In addition, the fourth round MICS survey in Lao PDR also showed 39.1% of early initiation rate. In terms of exclusive breastfeeding for under-6- month children, Thailand had the lowest rate among the above countries. The exclusive breastfeeding rate was 56.4% in Bangladesh, 56.9% in Nepal, 24.3% in Viet Nam, and 40.4% in Lao PDR, compared with 23.1% in Thailand. The lower breastfeeding rates in Thailand than in those other Asian countries may be due to the fact that Thailand is more developed than those countries, in which case women in Thailand have better economic status and are more likely to work in an urban area. Economic status and employment have been found to be negatively associated with breastfeeding in Thailand (Thepha, Marais, Bell, & Muangpin, 2017).

According to Shannon, O'Donnell, and Skinner (2007), the 20th century has changed of trends in the delivery of babies from home delivery to hospital delivery. In spite of the reduced maternal and infant mortality rates, this trend reduced the breastfeeding rates to only 22% of American women adopted breastfeeding as a result of the disappeared traditional support practice and strong medical authority in hospitals. Further, most health care providers believed formulas to be equal as breast milk in 20th century, making women believed that the benefits of formulas outweigh those of breastfeeding.

Today, barriers to breastfeeding are still enormous. One barrier is that women fear embarrassed to breastfeed in front of others and lack support from friends and relatives (Shannon et al., 2007). Many cultures regard breasts as sexual organs and people feel uncomfortable and have little toleration on breastfeeding. Another barrier for breastfeeding comes from the concerns about time commitment in breastfeeding and its negative effects on daily working lives (Shannon et al., 2007). Women usually have to face the conflict between leaving their babies at home and losing opportunities in their careers. In addition, some barriers result from the fact that women have little understanding of breastfeeding. They may concern that breastfeeding will hurt, their eating habit may cause harm to their baby, or they cannot provide enough milk for their babies (Shannon et al., 2007).

A variety of factors have been found associated with low breastfeeding rates in my previous studies. However, the results are inconsistent among different studies. A systematic review by Sharma and Byrne (2016) found out inconsistent results from different studies in South Asia in terms of the association between factors, such as occupation of women and wealth of household and early initiation of breastfeeding. Ndirangu, Gatimu, Mwinyi, and Kibiwott (2018) reported poor household wealth index could predict early initiation of breastfeeding in 2000 in Namibia, while other factors including urban residence, lack of antenatal care, small birth size, and large birth size were negatively associated with early initiation of breastfeeding in 2000. However, the study in 2013 reported different significant factors associated with early initiation of breastfeeding in Namibia. The associated factors in 2013 included maternal age, vaginal delivery, married mothers, delivery assistance, and birth order, while those factors in 2000 were not found. Further, in a study by Bui, Lee, Le, Dung, and Vu (2016), only factors such as the percentage of women with three children or more and *caesarean* section were reported significantly associated with early initiation of breastfeeding in Vietnam, while many other demographic, socioeconomic, delivery-related factors were found not significant. On the other hand, a study with Nigeria Demographic and Health Surveys from 1990 to 2008 found age of mother, education level of mother, living in urban area, singleton birth, antenatal visits, caesarean section, delivery at home, and first birth child were reported significant associated with early initiation of breastfeeding.

In terms of exclusive breastfeeding, Bui et al. (2016) found that the percentage of women with three children or more in the provincial level, the percentage of poverty, and the age of children were reported to be associated factors. However, Lawoyin, Olawuyi, and Onadeko (2001) surveyed 2794 women in Nigeria found that age of infant, maternal occupation, delivery place, and age of mothers were significantly associated with breastfeeding.

In Thailand, a qualitative study by Thepha, Marais, Bell, and Muangpin (2017) found out that mother's breastfeeding knowledge, intention to breastfeed, and social media were facilitators to exclusive breastfeeding, while perceptions, employment, and formula milk promotion were considered as barriers. Family, healthcare, and traditional food were perceived as both facilitators and barriers. In

another study in Thailand by Buttham, Kongwattanakul, Jaturat, and Soontrapa (2017) reported that 26.4% of non-exclusive breastfeeding was found in 12-week postpartum women. Nipple problems and pain (69.4%), and milk storage problems (59.1%) were main reasons for non-exclusive breastfeeding. Significant factors associated with non-exclusive breastfeeding included without confidence to exclusive breastfeeding or having no intention to exclusive breastfeeding (OR: 7.22, 95%CI: 3.26-14.24), no rooming-in (OR: 2.31, 95%CI: 1.04-5.12), and low milk quantity at first 2 weeks (OR: 3.75, 95%CI: 1.70-8.29). In addition, Aikawa, Pavadhgul, Chongsuwat, Sawasdivorn, and Boonshuyar (2015)found that the exclusive breastfeeding for 6 months was 38.1% in Thai working mothers. The study also found that women returning to job more than 3 months were significantly more likely to provide exclusive breastfeeding than those needing to return to job less than 3 months (OR: 4.15, 95%CI: 1.15-14.95).

Many studies found by the researcher were conducted in countries other than Thailand, while few studies that published in international journals were conducted in Thailand. No study using MICS data has been found the researcher to identify factors associated with breastfeeding in Thailand. Since MICS data are valuable resources for researchers to understand the breastfeeding situations in Thailand, the researcher thus found it necessary to identify factors and trends associated with early initiation of breastfeeding and exclusive breastfeeding in Thailand.

1.2 Research Questions

The research questions of the study including the following.

What are the trends of early initiation of breastfeeding and exclusive breastfeeding in Thailand?

What are the factors associated with early initiation of breastfeeding and exclusive breastfeeding in Thailand?

1.3 Research Objectives

The objectives of the study include general objective and specific objectives.

General Objective

To identify factors and trends associated with early initiation of breastfeeding and exclusive breastfeeding in Thailand

Specific Objectives

1. To explore the change of early initiation of breastfeeding over the period between 2005 and 2016

2. To explore the change of exclusive breastfeeding over the period between 2005 and 2016

3. To explore the association between demographic factors and early initiation of breastfeeding in Thailand

4. To explore the association between demographic factors and exclusive breastfeeding in Thailand

5. To explore the association between socioeconomic factors and early initiation of breastfeeding in Thailand

6. To explore the association between socioeconomic factors and exclusive breastfeeding in Thailand

7. To explore the association between delivery-related factors and early initiation of breastfeeding in Thailand

8. To explore the association between delivery-related factors and exclusive breastfeeding in Thailand

1.4 Research Hypotheses

Null Hypothesis

1. There is no change of early initiation of breastfeeding over the period between 2005 and 2016

2. There is no change of early exclusive breastfeeding over the period between 2005 and 2016

3. There is no association between demographic factors and early initiation of breastfeeding in Thailand

4. There is no association between demographic factors and exclusive breastfeeding in Thailand

5. There is no association between socioeconomic factors and early initiation of breastfeeding in Thailand

6. There is no association between socioeconomic factors and exclusive breastfeeding in Thailand

7. There is no association between delivery-related factors and early initiation of breastfeeding in Thailand

8. There is no association between delivery-related factors and exclusive breastfeeding in Thailand

Alternate hypothesis

1. There is a change of early initiation of breastfeeding over the period between 2005 and 2016

2. There is a change of early exclusive breastfeeding over the period between 2005 and 2016

3. There is an association between demographic factors and early initiation of breastfeeding in Thailand

4. There is an association between demographic factors and exclusive breastfeeding in Thailand

5. There is an association between socioeconomic factors and early initiation of breastfeeding in Thailand

6. There is an association between socioeconomic factors and exclusive breastfeeding in Thailand

7. There is an association between delivery-related factors and early initiation of breastfeeding in Thailand

8. There is an association between delivery-related factors and exclusive breastfeeding in Thailand

1.5 Conceptual Framework

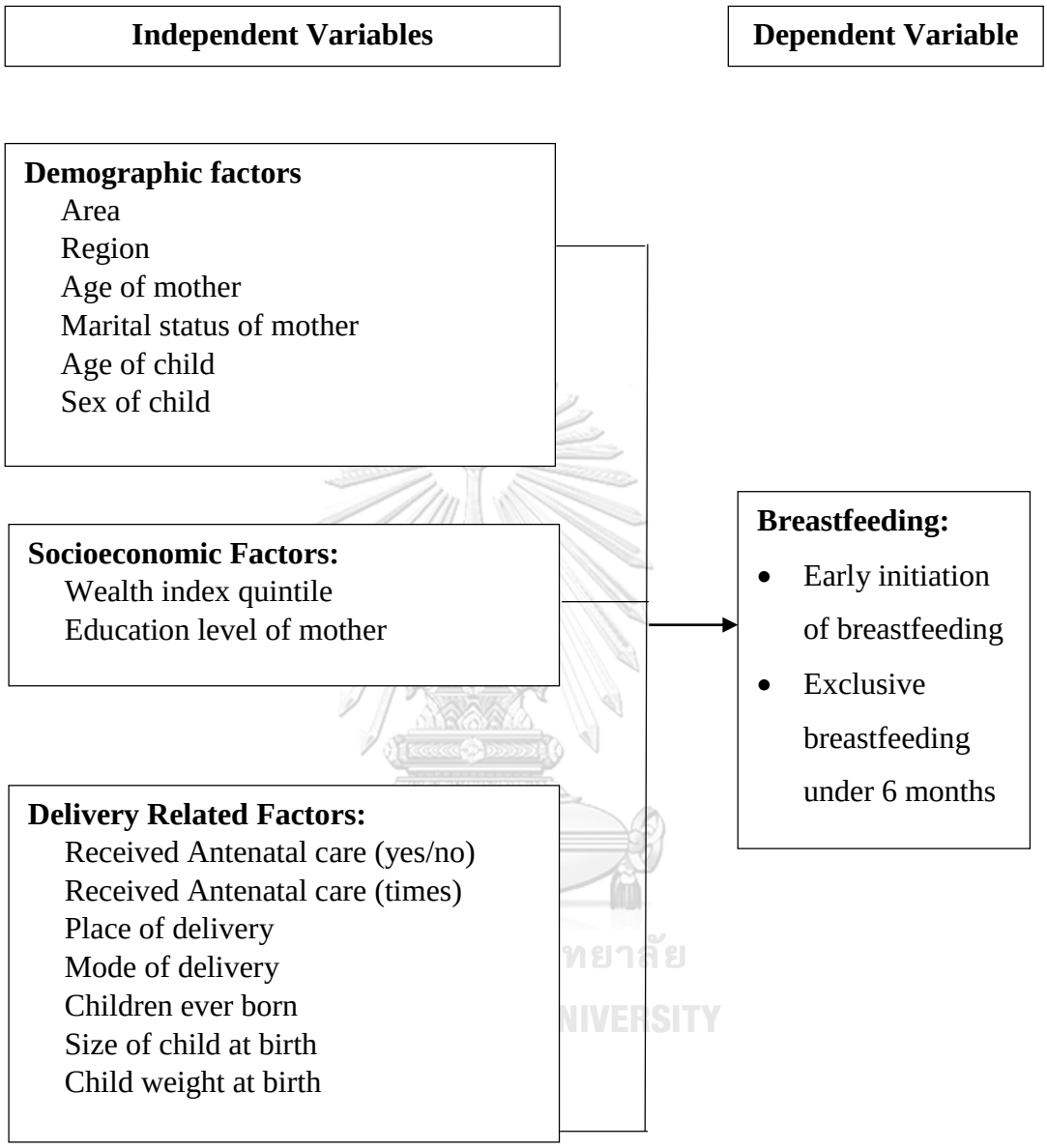

Figure 1 Research framework of factors associated with early initiation of breastfeeding and exclusive breastfeeding under 6 months

1.6 Operational definitions

Early initiation of breastfeeding

Early initiation of breastfeeding refers to "women with a live birth in the last 2 years who put their last newborn to the breast within one hour of birth" (UNICEF, 2016). It is measured by using questionnaire to ask those eligible women with a live birth.

Exclusive breastfeeding under 6 months

Exclusive breastfeeding under 6 months refers to "infants under 6 months of age who are exclusively breastfed", which means "[I]nfants receiving breast milk, and not receiving any other fluids or foods, with the exception of oral rehydration solution, vitamins, mineral supplements and medicines" (UNICEF, 2016). This variable is measured by a questionnaire asking the mothers of the infants under 6 months old about whether their infants received only breast milk, except vitamins, mineral supplements and medicine, in the previous day of the interview.

Area

In Thailand MICS survey, area refers to urban and rural places, and is measured by ask a multiple choice question in the household questionnaire.

Region

Thailand MICS survey divided region into Bangkok, central region, north region, northeast region, and south region, and is assessed by a multiple choice question in the household questionnaire.

Age

Age in years refers to an individual's latest birthday before the interview (UNICEF, 2016). Age of mother is measured by a question in the women questionnaire. Age of child is calculated by months and measured by a question in the children questionnaire.

Marital status

Marriage refers to a commitment between a man and women who live together as husband and wife, no matter there is a legal registration (UNICEF, 2016). Marital status refers to the status of marriage. Marital status of mother refers to the current status of marriage of the mother and measured by a question in the women questionnaire.

Sex of child

Sex refers to the characteristics of a person that are biologically determined (World Health Organization, 2018) and is assessed by a question in the children questionnaire.

Wealth index quintile

Wealth index quintile consists of a variety of important indicators measuring the accumulated living standards of a household. Those indicators include ownership of assets in the household, such as television; materials utilized in household building, such as bricks; accessible drinking water and water for general use; and sanitation facilities (UNICEF, 2016). Wealth index quintile is calculated by using analysis of principal factors, and is useful to analyze economic status of those living in countries without accessible data of incomes and expenses (UNICEF, 2016). The wealth index quintile in Thailand MICS survey is specifically designed and can only be comparable with other MICS surveys.

Education level of mother

Education refers to learning experience in the formal education system from pre-school to university, including open universities and distance learning universities, but not refers to short term vocational training not involving any certificates, diplomas, or degrees (UNICEF, 2016). Education consists of four different levels in the MICS survey: pre-school level, primary level, secondary level, and higher level. Education level of mother is assessed by a question in the women questionnaire.

Received antenatal care

Antenatal care refers to “the care provided by skilled health-care professionals to pregnant women and adolescent girls in order to ensure the best health conditions for both mother and baby during pregnancy” (Organization, 2016). Antenatal care consists of “risk identification; prevention and management of pregnancy-related or concurrent diseases; and health education and health promotion” (WHO, 2016). Received antenatal care is assessed with yes or no, as well as times, by questions in the women questionnaire.

Place of delivery

Place of delivery in Thailand MICS surveys refers to the delivery places such as home, public sector, private medical sector and others. Public and private sectors include hospitals, clinics, and others. Place of delivery is measured by a question in the women questionnaire: “where do you give birth to (name)”.

Mode of delivery

Mode of delivery in Thailand MICS surveys refers to whether the child delivery is conducted through caesarean section. Mode of delivery is measured a question in the women questionnaire. “Was (name) delivered by caesarean section? That is, do they cut your belly open to take the baby out?”.

Children ever born

In Thailand MICS surveys, children ever born refers to the total number of all live born children for a women aged 15-49, including those who are born alive but later dead. Children ever born are assessed by three relevant questions in the MICS survey: “how many sons/daughters live with you”, “how many sons/daughters are alive but do not live with you”, and “how many boys/girls have died”.

Size of child at birth

Size of child at birth in Thailand MICS surveys refers to the image of the size of child by the mother. It is measured by a question in women questionnaire, “when

(name) was born, was he or she very large, larger than average, average, smaller than average, or very small".

Child weight at birth

Child weight at birth in Thailand MICS surveys refers to the weight of child when he or she was born, and is measured by a question, "how much did (name) weigh". The question can be answered by either the mother with her recall or the record card if available.

CHAPTER II
LITERATURE REVIEW

2.1 Introduction of breastfeeding

Breastfeeding is unique in terms of providing infants ideal food for their growth and development, as well as significantly benefiting the health of the mother. According to the conclusions and recommendations of World Health Organization (2001), infants should receive exclusive breastfeeding for the first six months after birth for the best of their growth, development and health. After six months to two years or over, safe and adequate complementary foods are recommended for infants with continued breastfeeding. Exclusive breastfeeding is possible unless medical conditions and nonexclusive breastfeeding results in reduction of milk production.

The vital role of breastfeeding to infants can be seen from the unique composition of human breast milk. According to Ballard and Morrow (2013), human breast milk is the biologic standard for the nutrition of the infants and provides tens of thousands of vital bioactive molecules to protect infants from infections and to help maturation of their immune system, development of organs, and colonization of healthy microbial environment.

The first stage of breast milk secretion consists of the beginning fluid of mothers after delivery (Ballard & Morrow, 2013). This first fluid is in small volume, different appearance, and different composition. However, the first fluid, colostrum, contains rich immunologic components, developmental factors, but low lactose concentrations. As a result, its main function is not nutritional but immunologic. It also contains higher levels of sodium, chloride, and magnesium but lower levels of potassium and calcium than the breast milk produced later. After a few days of delivery, the second stage of breast milk secretion starts and transitional milk is produced with more milk amount to support in nutrition purpose of the infants (Ballard & Morrow, 2013). After five to two weeks, largely mature milk is produced; after four to five weeks, fully mature milk is secreted (Ballard & Morrow, 2013). Even though milk composition changes over the lactation period, human breast milk is similar in composition (Ballard & Morrow, 2013).

The human milk composition has been studied intensely during the past century; however, new components of human breast milk and the functions of the components still continue being discovered (Ballard & Morrow, 2013).

The nutritional components of human breast milk consisted of macronutrients and micronutrients. The macronutrients include protein, fat, lactose, and energy, which are comparable in different populations regardless of the nutrition status of the mother, while the micronutrients have a variety of vitamins and iodine, which are affected by maternal diet and body stores (Ballard & Morrow, 2013).

The bioactive components of human breast milk affect biological processes and thus are vital for body function and health. Most bioactive components act synergistically, which is one of the important reasons why human breast milk is better than other food substitutes (Ballard & Morrow, 2013).

Growth factors from human breast milk affect intestinal system, vasculature, endocrine system, and nervous system. Those factors consist of epidermal growth factor for intestinal maturation and repairmen, neuronal growth factors for developing nervous system, the insulin-like growth factor for tissue growth, vascular endothelial growth factor for regulating vascular system, erythropoietin for developing intestine and preventing anemia, calcitonin and somatostatin for regulating growth hormones, and adiponectin for regulating body metabolism (Ballard & Morrow, 2013).

Immunological factors in human breast milk are critical for helping infant survival from infection and inflammation. First, human breast milk transfers to infant's important cells, such as macrophages, T cells, stem cells, and lymphocytes, cytokines, chemokines, oligosaccharides, and acquired and innate factors (Ballard & Morrow, 2013).

When the practice of feeding human milk that separates from mother's breast can reduce the nutrient components due to the storage methods. According to ABM Clinical Protocol #8 (2017), freshly extracted human breast milk can be stored safely for 4 hours at room temperature of 16-29 ℃, 24 hours with ice pack at 15℃, 4 days in refrigeration at 4℃, and 6 months at freezing temperature of -4 to -20℃. However, fat, protein, and calories in stored breast milk will decline when freezing for more than 90 days, while acidity will increase at the same time. Bioactive factors will decline over the time of storage. Unfortunately, thawing and warming stored breast

milk can also destroy some of nutritional components of the breast milk, such as fat loss (Eglash, Simon, & Med, 2017).

2.2 Benefits of Breastfeeding

The benefits of breastfeeding have been recognized by WHO and proved in many previous studies. Breastfeeding can bring a variety of benefits ranging from short term effects to long term effects. In terms of short term effects of breastfeeding, a systematic review by Bernardo, Cesar, and Organization (2013) reported that breastfeeding was able to reduce the risk of diarrhea and pneumonia. Indeed, the review found from a variety of trials by using meta-analysis that breastfeeding can reduce diarrhea morbidity, with a pooled relative risk of 0.69 (95%CI: 0.49-0.96).

According to Bernardo et al. (2013), breastfeeding can protect children from gastrointestinal infections by a variety of mechanisms. First, breastfeeding provides children antimicrobial and anti-inflammatory factors, hormones, and enzymes, which can protect them against gastrointestinal infections. For example, oligosaccharides from breast milk can help to block pathogens from attaching mucosa of the infant; lactoferrin in breast milk can break down pathogens and reduce the symptoms of inflammation; breastfeeding can directly provide children antibodies from mothers, when they have been exposed to the pathogen. Second, breastfeeding can help to avoid contamination from other food sources or baby bottles. This can reduce the risk of gastrointestinal infections in children due to contamination of microorganisms. Finally, breastfeeding benefits children in terms of their general nutritional status. Breastfeeding can prevent children from malnutrition resulting from breast milk substitutes and repeated infections (Bernardo et al., 2013).

Another short term effect from breastfeeding is the reduction of respiratory infection. The systematic review with meta-analysis by Bernardo et al. (2013) found that breastfeeding could reduce the risk of respiratory infections by 57% (pooled RR: 0.43, 95%CI: 0.33-0.55) and thus the risk of hospitalization in children due to respiratory infection (pooled RR: 0.33, 95%CI: 0.24-0.46). The review also reported that breastfeeding could reduce the risk of death due to respiratory infection by 70%

(pooled RR: 0.30, 95%CI: 0.16-0.56) and the risk of morbidity of lower respiratory tract infection (pooled RR: 0.68, 95%CI: 0.60-0.77).

According to Bernardo et al. (2013), respiratory infection is the main cause of death in children under 5 years old in the world, with 1.384 million deaths caused by pneumonia in 2010, and breastfeeding has been recognized to be one of the most cost-effective ways to prevent death from pneumonia. Two main mechanisms can be used to explain the protective function of breastfeeding against respiratory infection in children. First, breast milk includes antimicrobial factors such as immune cells, antibodies, oligosaccharides, and growth modulators, which prevent children from respiratory infection. Second, breastfeeding can improve the nutrition status of children, especially in low income countries, which is vital for the child to fight with respiratory infections (Bernardo et al., 2013).

Breastfeeding can benefit children not only on short term but also in long term, in terms of overweight, blood pressure, cholesterol level, type-2 diabetes, and intelligence (B. Horta & Victora, 2013). First, according the systematic review by B. Horta and Victora (2013), breastfeeding can prevent children from overweight. The review found that breastfeeding could reduce the risk of overweight in children (pooled OR: 0.76, 95%CI: 0.71-0.81) and in adults (pooled OR: 0.89, 95%CI: 0.84-0.96).

According to (B. Horta & Victora, 2013), the protection effects of breastfeeding on overweight can be explained by several mechanisms. One explanation is that breastfeeding provides infants less amount of protein, which has been found to be associated with low risk of overweight in the later life of the child. Another explanation is that breastfeeding results in lower insulin response in children, which increases the risk of fat deposition. Finally, children who have been breastfed were more likely to take more fruit and vegetables in the later life.

As for the long term effects of breastfeeding on blood pressure, B. Horta and Victora (2013) found in a systematic review with meta-analysis that breastfeeding was significantly associated with lower systolic pressure (mean effect: -1.02, 95%CI: -1.45 to -0.59) and diastolic pressure (mean effect: -0.37, 95%CI: -0.71 to -0.04) in the later life of subjects. However, the effects of breastfeeding were found smaller in a systematic review by B. Horta and Victora (2013) (mean difference: -0.03, 95%CI: -0.08 to 0.01) than a previous systematic review in 2007. Further, breastfeeding could

reduce the risk for type-2 diabetes in children's later life (pooled OR: 0.66, 95%CI: 0.49-0.89). Finally, children who were breastfed had significantly better scores in intelligence tests (mean difference: 3.45 points, 95%CI: 1.92-4.98) (B. Horta & Victora, 2013).

Accordingly, WHO and UNICEF have recommended that breastfeeding alone is the best strategy for infant under six months old, should be initiated within one hour after birth, and should be at least 8 times per day on demand; infant should receive exclusive breastfeeding for the first six months and continued breastfeeding for two years or more; complementary feeding that is safe, nutritionally adequate, and age appropriate should only start after six month (UNICEF et al., 2010).

2.3 Promotion & Policy of Breastfeeding in Thailand

The National Breastfeeding Project in Thailand, which was started in 1992 with the cooperation of UNICEF, aimed to achieve a variety of goals by 1995 (Hangchaovanich & Voramongkol, 2006). The goals included exclusive breastfeeding for at least 4 moths, Baby-Friendly Hospital status for all hospitals, termination of donation and sale of infant formula in all government hospitals, and achievement of exclusive breastfeeding rate to 15%. The project applied three major activities, including the baby-friendly hospital initiative, maternity leave law, and the code of marketing substitutes for breast milk (Hangchaovanich & Voramongkol, 2006).

The baby-friendly hospital initiative targeted at the interference of health care providers on breastfeeding. It established the practice standards for health care providers, the ten steps to successful breastfeeding. Since 1993, a 90-day period of maternity leave in the Thai national law was established in order to support breastfeeding in women under employment. During the 90-day maternity leave, women employees from the government receive their full salary from government, while the women in private companies have their salary shared equally by both their employers and the National Social Security Fund. The code of marketing substitutes for breast milk in 1995 required that the government and the related company voluntarily make an agreement with 10 crucial provisions. This code aimed at support the baby-friendly hospital initiative in Thailand. In addition, mother support groups were established to

provide continuous support for breastfeeding (Hangchaovanich & Voramongkol, 2006).

2.4 Barriers of breastfeeding

Even though breastfeeding has been recommended by WHO and a variety of individual countries, breastfeeding rates in many countries are very low and even declining in developing countries in recent years. For example, Ndirangu, Gatimu, Mwinyi, and Kibiwott (2018) found a significant decline in early initiation of breastfeeding from 82.5% in 2000 to 74.9% in 2013 in Namibia. A study by Bui, Lee, Le, Van Dung, and Vu (2016) also reported significant declined trends for the early initiation of breastfeeding and exclusive breastfeeding in children under 6 months in Vietnam.

According to MICS reports, in 2005-2006, the percentage of early initiation of breastfeeding was 49.6% for the whole country in Thailand, 43.0% for the central region, 41.6% for northern region, 54.4% for northeastern region, and 58.3% for southern region. The rates for exclusive breastfeeding in 2005-2006 were only 5.4% in the whole country, 2.4% in central region, 10.9% in northern region, 6.0% in northeastern region, and 5.2% in southern region.

In 2012, the MICS report found that the rates for early initiation of breastfeeding in Thailand were 46.3% in the whole country, 29.2% in Bangkok, 40.9% in central region, 49.6% in north region, 47.0% in northeast region, and 60.9% in south region, while the rates for exclusive breastfeeding were 12.3% in the whole kingdom, 8.2% in Bangkok, 7.9% in central region, 19.6% in north region, 13.8% in northeast region, and 12.2% in south region.

In 2015-2016 MICS report, the early initiation of breastfeeding rate in Thailand was 39.9% in the whole kingdom, 27.9% in Bangkok, 33.3% in central region, 58.6% in north region, 44.1% in northeast region, and 37.3% in south region. The exclusive breastfeeding rate in the 2015-2016 MICS survey was 23.1% in the whole kingdom, 6.4% in Bangkok, 27.4% in central region, 36.7% in north region, 17.5% in northeast region, and 21.6% in south region.

A variety of barriers have been identified in the previous studies. A systematic review of studies in South Asia identified various barriers to early initiation of breastfeeding (Sharma & Byrne, 2016). First, supply-side barriers included lack of information or knowledge regarding breastfeeding was found to be a barrier. Lack of accessibility to early initiation of breastfeeding, such as antenatal and postnatal checkup, and delivery at home or without health professionals, was also supply-side barriers. The review also identified demand-side barriers. The barriers to acceptability from demand side were breastfeeding according to time of birth and priest suggestions, using prelacteal feeds and discarding colostrum, and influence from mother in law. The barriers to availability from the demand side included lack of available support and insufficiency breast milk. In addition, barriers to accessibility from the demand side consisted of lack of access to media due to low socio-economic status and lack of access of mothers in decision making (Sharma & Byrne, 2016).

According to Shannon, O'Donnell, & Skinner, (2007), the past century has witnessed the change of trends in the delivery of babies, as well as the decline of breastfeeding practice. At the beginning of 20th century, most women (95%) in America delivered their babies at home, where experienced relatives or friends guided new mothers about infant feeding. Late in 1930s, approximately 50% of women delivered their babies at a hospital, and in 1970s, nearly all women chose to deliver their babies in hospitals (Shannon et al., 2007). Even though this trend reduced the maternal and infant mortality rates, the breastfeeding rates declined to only 22% of American women adopted breastfeeding due to the loss of traditional support practice and medical authority in hospitals (Gibson, 2005).

Further, the advance of science makes it possible to know the components of breast milk and thus brings the formulas to the society, which was believed by many health care providers to be an equivalent to breast milk during the 20th century (Gibson, 2005). This made American women believed that the benefits of formulas outcome that of breastfeeding. As a result, breastfeeding rates declined.

The evidence-based research in the later 20th century proved the benefits of breastfeeding and the movement of women controlling their own childbirth recovered the breastfeeding practice (Shannon et al., 2007). However, women today still face various barriers to achieve the goal of breastfeeding.

In the first place, women confront fear of embarrassment to breastfeed in front of others and lack of support from friends and relatives (Shannon et al., 2007). Many cultures in the world view breasts as sexual organs and thus people usually feel uncomfortable when seeing breastfeeding. Breastfeeding has been often shown as embarrassing in public and the society has little toleration on women breastfeeding in public. Those facts have made barriers for promoting breastfeeding practice.

Another barrier for breastfeeding is the concerns about time commitment in breastfeeding and its effects on daily working or social lives (Shannon et al., 2007). Women usually have to face the conflict between leaving their babies at home and losing opportunities in their careers. Women in those double income families, which rely on incomes of both husband and wife, also need to consider losing financial benefits of working if they choose to breastfeeding their children.

In addition, women also face some other barriers of breastfeeding due to the myths or little understanding of breastfeeding (Shannon et al., 2007). Those myths make women concern that breastfeeding will hurt, their eating habit may cause harm to their baby, they cannot generate enough milk for breastfeeding their babies (Shannon et al., 2007).

2.5 Previous Studies of Factors Associated with Breastfeeding

2.5.1 Factors associated with early initiation of breastfeeding

A systematic review analyzed 25 studies related to early initiation of breastfeeding in South Asia between 1990 and 2013 and found that a variety of individual, geographic, socioeconomic, and health-related factors were associated with early initiation of breastfeeding (Sharma & Byrne, 2016). Associated individual factors included birth order, birth interval, teenage pregnancy, and sex of child. First-born child and female child were found to be less likely to receive early initiation of breastfeeding. Similarly, teenage mothers were less likely involved into early initiation of breastfeeding. Geographic factors, such as living urban areas or some administrative regions, were negatively associated with early initiation of breastfeeding. Many socioeconomic factors were identified to be associated with early initiation of

breastfeeding, including education level, occupation, wealth of household, family size and family type. Low education level of women and men was associated with delayed initiation of breastfeeding. However, inconsistent results were reported in the systematic review regarding the association between occupation of women and early initiation of breastfeeding. Similar inconsistent findings were reported in the review in terms of household wealth. Smaller families and fewer children were negatively associated with early initiation of breastfeeding. In the systematic review, a variety of health-related factors were reported to be associated with early initiation of breastfeeding. Health conditions of the mother, low birth weight, and caesarean section were associated with delayed early initiation of breastfeeding (Sharma & Byrne, 2016).

Ndirangu et al. (2018) studied the trends and factors associated with early initiation of breastfeeding in Namibia by using Demographic and Health Surveys between 2000 and 2013. The study found a significant decline in early initiation of breastfeeding from 82.5% in 2000 to 74.9% in 2013. The analysis of the study included maternal age, residence, marital status, education level, occupation, wealth, antenatal care visits, place of delivery, delivery mode, delivery assistance, birth order, and birth size. The study found that in 2000, poorer household wealth index was positively associated with early initiation of breastfeeding in Namibia (Adjusted OR: 1.82, 95%CI: 1.05-3.17), while other factors, including urban residence (Adjusted OR: 0.58, 95%CI: 0.36-0.93), lack of antenatal care (Adjusted OR: 0.14, 95%CI: 0.03-0.81), small birth size (Adjusted OR: 0.38, 95%CI: 0.24-0.63), and large birth size (Adjusted OR: 0.51, 95% CI: 0.37-0.79), were inversely associated with early initiation of breastfeeding. In 2013, significant factors associated with early initiation of breastfeeding included maternal age (Adjusted OR: 2.28, 95%CI: 1.22-4.24), vaginal delivery (Adjusted OR: 2.74, 95%CI: 1.90-3.93), married mothers (Adjusted OR: 1.57, 95%CI: 1.16-2.14), delivery assistance (Adjusted OR: 3.67, 95%CI: 1.23-10.9), and birth order (Adjusted OR: 1.52, 95%CI: 1.03-2.26) (Ndirangu et al., 2018).

In a study by Bui, Lee, Le, Van Dung, and Vu (2016), secondary data from MICS surveys in Vietnam was used to identify the trends and factors related to earlier initiation of breastfeeding in children under 2 years old. The study found significant declined trends for the early initiation of breastfeeding. The study found that the percentage of women with three children or more in the provincial level was

significantly associated with early initiation of breastfeeding (OR: 1.06, 95%CI: 1.02-1.11) in Vietnam. In addition, *caesarean* section was found to be strongly associated with early initiation of breastfeeding (OR: 0.10, 95%CI: 0.06-0.17). However, all other demographic, socioeconomic and delivery-related factors were not significantly associated with early initiation of breastfeeding (Bui et al., 2016).

Babatunde Yahya and Adebayo (2013) analyzed secondary data combined from four Nigeria Demographic and Health Surveys for 1990, 1999, 2003, and 2008. The study reported that early initiation of breastfeeding in Nigeria tend to increase during the period between 1990 and 2008. The study found that age of mother (OR = 1.144, P = 0.003), education level of mother (OR = 0.740, P < 0.001), living in urban area (OR = 1.119, P = 0.033), singleton birth (OR = 0.834, P = 0.069), and antenatal visits (OR = 0.916, P = 0.013) were found to be significantly associated with early initiation of breastfeeding in Nigeria. By contrast, caesarean section (OR = 0.914, P = 0.018), delivery at home (OR = 1.117, P = 0.002), and first birth child (OR = 1.153, P = 0.001) are associated with delayed initiation of breastfeeding (Babatunde Yahya & Adebayo, 2013).

2.5.2 Factors associated with exclusive breastfeeding under 6 months

Bui et al. (2016) studied factors associated with exclusive breastfeeding in children under 6 months. The study found significant declined trends for the exclusive breastfeeding over years. The study also found that the percentage of women with three children or more in the provincial level was significantly associated with exclusive breastfeeding (OR: 0.94, 95%CI: 0.88-1.01) in Vietnam. Further, the percentage of poverty in the provincial level was also significantly associated with exclusive breastfeeding (OR: 1.07, 95%CI: 1.02-1.13). Moreover, the age of children was found strongly significantly related to exclusive breastfeeding in children under 6 months (OR: 0.57, 95%CI: 0.46-0.70). However, all other demographic, socioeconomic and delivery-related factors were not significantly associated with exclusive breastfeeding (Bui et al., 2016).

Lawoyin et al. (2001) investigated 2794 women from infant welfare clinics for studying exclusive breastfeeding and its associated factors in Ibadan, Nigeria. The study reported that the exclusive breastfeeding rate declined from 57,4% to 23.4%

between children aged one month and children aged 6 months. In the study, younger age of baby, better maternal occupation, and delivery in higher level of hospitals were found to be significantly associated with exclusive breastfeeding. On the other hand, the study also found that younger age of mothers was associated with nonexclusive breastfeeding.

Morillo et al. (2017) studied the comparison of the factors related to cessation of exclusive breastfeeding in 532 children under three and 512 children under six months in Spain. The study found that 64.4% of the subjects at three months and 31.4% of the subjects at six months remained exclusive breastfeeding practice. At three months, significant factors associated with cessation of breastfeeding included pacifier use (OR: 4.49, 95%CI: 2.96-6.83), without degree from college (OR: 2.01, 95%CI: 1.35-3.01), without joining breastfeeding support groups (OR: 1.96, 95%CI: 1.22-3.12). At six months, significant associated factors consisted of reintegration of work (OR, 4.49, 95%CI: 2.96-6.83), pacifier use (OR: 3.49, 95%CI: 2.24-5.43), and primiparity (OR: 1.61, 95%CI: 1.05-2.46).

A study by Islam, Baird, Mazerolle, and Broidy (2017) explored the psychosocial factors associated with exclusive breastfeeding in Bangladesh by surveying 426 mothers with children under 6 months. The study revealed that the exclusive breastfeeding rate was 43.7%. Associated psychosocial factors included after-delivery mothers who experienced physical intimate partner violence (OR: 0.17, 95%CI: 0.01-0.40), and psychological intimate partner violence (OR: 0.51, 95%CI: 0.26-1.00), mother who experienced sexual abuse (OR: 0.32, 95%CI: 0.13-0.80), and postpartum depression (OR: 0.20, 95%CI: 0.09-0.44). On the other hand, mothers with planned pregnancy and high level of social support were more likely to exclusive breastfeed their children.

Pitonyak, Jessop, Pontiggia, and Crivelli-Kovach (2016) used the Life Course Health Development framework to analyze factors associated with exclusive breastfeeding over four months in 1226 subjects the United States. The study found that positively associated factors included college education (OR: 2.14, 95%CI: 1.58-2.89), and married (OR: 2.19, 95%CI: 1.43-3.37), compared with negatively associated factors such as return to work (OR: 0.57, 95%CI: 0.43-0.74), living in the south (OR: 0.67, 9%CI: 0.47-0.95), and postpartum depression (OR: 0.43, 95%CI: 0.28-0.66).

Zhang, Zhu, Zhang, and Wan (2018) studied factors associated with exclusive breastfeeding by applying the theory of planned behavior. The study was conducted in Shanghai, China, with 400 first-time mothers at 4-month postnatal. The study reported that the rate of exclusive breastfeeding was 34.4%. Factors found to be positively associated with exclusive breastfeeding included better breastfeeding knowledge (OR: 1.09, 95%CI: 1.04-1.14), higher score of attitude (OR: 1.11, 95%CI: 1.02-1.20), good subjective norm (OR: 1.22, 95%CI: 1.11-1.34), and better practice control (OR: 1.11, 95%CI: 1.02-1.20).

Shepherd, Walbey, and Lovell (2017) studied social-cognitive and emotional factors associated with breastfeeding duration in 375 mothers. The studied variables included attitude, subjective norm, perceived control, self-efficacy, fear of inadequate nutrition from breastfeeding, damaging physical appearance from breastfeeding, pride toward breastfeeding, guilt, shame, and regret for not breastfeeding. The study found that self-efficacy, pride, and regret were positively associated with exclusive breastfeeding, while higher subjective norm, fear about inadequate nutrition from breastfeeding were negative associated factors toward exclusive breastfeeding.

In Thailand, Thepha, Marais, Bell, and Muangpin (2017) conducted a qualitative study and found that mother's knowledge of breastfeeding, their intention toward breastfeed, and social media were positively associated with exclusive breastfeeding; on the other hand, perceptions, employment, and formula milk promotion were negative associated factors. In addition, family, healthcare, and traditional food were found to be both positive and negative. Buttham, Kongwattanakul, Jaturat, and Soontrapa (2017) studied non-exclusive breastfeeding in Thailand and found that non-exclusive breastfeeding was found to be 26.4% in 12-week postpartum women. Two major reasons for non-exclusive breastfeeding were nipple problems and pain (69.4%), and milk storage problems (59.1%). Significant factors associated with non-exclusive breastfeeding consisted of without confidence to exclusive breastfeeding or having no intention to exclusive breastfeeding (OR: 7.22, 95%CI: 3.26-14.24), no rooming-in (OR: 2.31, 95%CI: 1.04-5.12), and low milk quantity at first 2 weeks (OR: 3.75, 95%CI: 1.70-8.29). In another study, Aikawa, Pavadhgul, Chongsuwat, Sawasdivorn, and Boonshuyar (2015) found that 38.1%. Thai working mothers

exclusive breastfed their children for 6 months. The study also found that women returning to job more than 3 months were significantly more likely to exclusive breastfed their children than those needing to return to job less than 3 months (OR: 4.15, 95%CI: 1.15-14.95).

A narrative review by Thepha, Marais, Bell, and Muangpin (2017) studied facilitators and barriers toward exclusive breastfeeding by analyzing 74 Thai and English articles between 2001 and 2016. The study reported that mother factors, family support, situation and social context, infant factors, and health care related factors were five major categories of factors associated with exclusive breastfeeding. The study identified maternal characteristics, such as age, marital status, economic status, level of education, and knowledge level of exclusive breastfeeding. Further, maternal beliefs, intentions, self-efficacy, complications, employment, and previous breastfeeding experience were also identified. Family, situation and social context, infant, health care related factors were other identified factors associated with exclusive breastfeeding. Even though this narrative review included a large number of articles, it did not evaluate the quality of those articles and some of them were even unpublished. Furthermore, the review simply summarized the significant findings from those previous studies but did not comparing these findings with non-significant ones. As a result, it is necessary to have further strong research to confirm the findings in this review.

2.6 Summary

Breastfeeding is the optimal way to provide children appropriate nutrients, contribute to their development and help them fight against illness during the beginning of the lives, especially the first 6 months. Even though there are numerous proved benefits from breastfeeding, the rates for breastfeeding, particularly exclusive breastfeeding rate, are still low in many countries, as well as in Thailand. A variety of previous studies have been conducted to understand the factors associated with low breastfeeding rates in many different countries around the world. However, not many recent studies focusing on the factors associated with low breastfeeding rates in Thailand have been found by the researcher. As a result, the researcher finds it necessary to study the trends of breastfeeding in Thailand and identify factors

associated with low breastfeeding rates in Thailand, since breastfeeding behavior of Thai mothers is influenced by Thai culture (Dornan et al., 2015), as well as the working culture in Thailand (Yimyam, 2011).

CHAPTER III
METHODOLOGY

3.1 Research Design

This research is a cross sectional study based on secondary data of Multiple Indicator Cluster Surveys (MICS). The MICS 2015-2016 (Round 5), MICS 2012 (Round 4), and MICS 2005-2006 (Round 3) are pooled together to identify trends and factors associated with early initiation of breastfeeding and exclusive breastfeeding in Thailand.

3.2 Study Area

The MICS surveys collected data from the whole Thailand, including Bangkok, central, north, northeast, and south regions. The MICS surveys also included both urban and rural areas in Thailand. The current study used those Thailand MICS surveys from round 3 to round 5 to analyze data.

3.3 Study Population

The MICS 2015-2016 survey consists of four sub-surveys: households, children under five, women aged 15-49, and men aged 15-49, which are contained in four separate datasets. The MICS 2012 and MICS 2005-2006 only included three sub-surveys: households, children under five, and women aged 15-49. The population of the current study included children aged under 2 years old and children under 6 months and their mothers in Thailand.

Inclusion Criteria

1. Children under 6 months old for exclusive breastfeeding
2. Children under 2 years old for early initiation of breastfeeding

Exclusion criteria

1. Subjects with missing data in the MICS datasets.

3.4 Sampling Technique

According to Thailand National Statistical Office and United Nations Children's Fund (2006), the MICS surveys for Thailand were conducted to estimate indicators on a national level. A two-stage sampling method was used in 2005-2006 MICS survey in Thailand. The first stage identified primary sample units including blocks in urban area and villages in rural area. Thirty collective households were then systematically selected from a household list. Within each interviewed household, all the eligible women were interviewed with individual questionnaire. For all children under 5 years in each household, the mothers or caretakers of those children were interviewed with under-5 children questionnaire (Thailand NSO and UNICEF, 2006, page 5).

According National Statistical Office et al. (2013), multiple-stage stratified cluster sampling was applied to select samples for the 2012 MICS surveys. First, the main sampling strata were identified according to the urban and rural areas within Bangkok, central region, north region, northeast region, and south region. Second, a certain number of census enumeration areas were identified from each stratum by using systematic probability method. Lastly, a systematic sample of 20 households was selected from a household list in each enumeration area. Within each interviewed household, all the eligible women were selected for interview with individual questionnaire. For all children under 5 years in each household, the mothers or caretakers of those children were surveyed with under-5 children questionnaire (NSO et al., 2013, page 9).

According to National Statistical Office and United Unations Children's Fund (2016), in the 2015-2016 Thailand MICS, the main sampling strata consisted of urban and rural areas in each province. A certain number of census enumeration areas were systematically identified from each stratum. With a household list, a systematic sample of 20 households was selected in each selected enumeration area. 10 out of the 20 selected households had children under 5 years old, while the other 10 out of selected households did not include children under 5 years. Apart from interview those women age 15-49 and children at an age of under 5 in each selected household, the 2015-2016 Thailand MICS also interviewed individual men aged 15-49 in each household with

individual men questionnaire. The current study is based on the MICS surveys for Thailand and will apply inclusion and exclusion criteria for sample selection from these MICS datasets (NSO and UNICEF, 2016, page 3-5).

3.5 Sample Size

The MICS 2015-2016 for Thailand interviewed 28,652 households, 12,250 mothers/ caretakers for children under five, 25,614 women, and 23,183 men from the whole nation of Thailand. The Thailand MICS 2012 survey interviewed 24,119 households, 21,981 women aged 15-49 years old, and 9,716 children under 5 years in those interviewed households. The Thailand MICS 2005-2006 surveyed 40,511 households, 36,960 eligible women aged 15-49, and 9,409 children under the age of five. The Thailand MICS 2015-2016 included 4077 children who were aged under 2 years old. The total number of children under 2 years old was 3403 in Thailand MICS 2012. A total of 3958 children under 2 years old were surveyed in the Thailand MICS survey 2005-2006.

The current study calculated its sample size after applying the inclusion and exclusion criteria of the study. Samples from individual MICS surveys was pooled together to achieve pooled sample sizes of children under 2 years and children under 6 months. In order to give equal representative weights for each of the three MICS rounds, the pooled sample sizes were then weighted by using the equation below, where n1, n2, and n3 represent the sample size in each of the three MICS rounds after adjusted by children's sample weight.

$$\text{Weighted sample size in each MICS round} = \frac{n1 + n2 + n3}{3}$$

The total number of children under 2 years that were selected from the three MICS surveys was 8119, consisting of 2920 from MICS 2005-2006, 2370 from MICS 2012, and 2829 from MICS 2015-2016. The total weighted number of children under 2 years was 9575, with 3192 subjects in each MICS round. Further, a total of 1795 children under 6 months from the three MICS rounds were selected for study exclusive

breastfeeding. MICS2005-2006 had a selected number of 761 children under 6 months, MICS 2012 had 485 children under 6 months, and MICS 2015-2016 had 549 children under 6 months. The total weighted number of children under 6 months was 2568, which consisted of 856 cases from each MICS survey round.

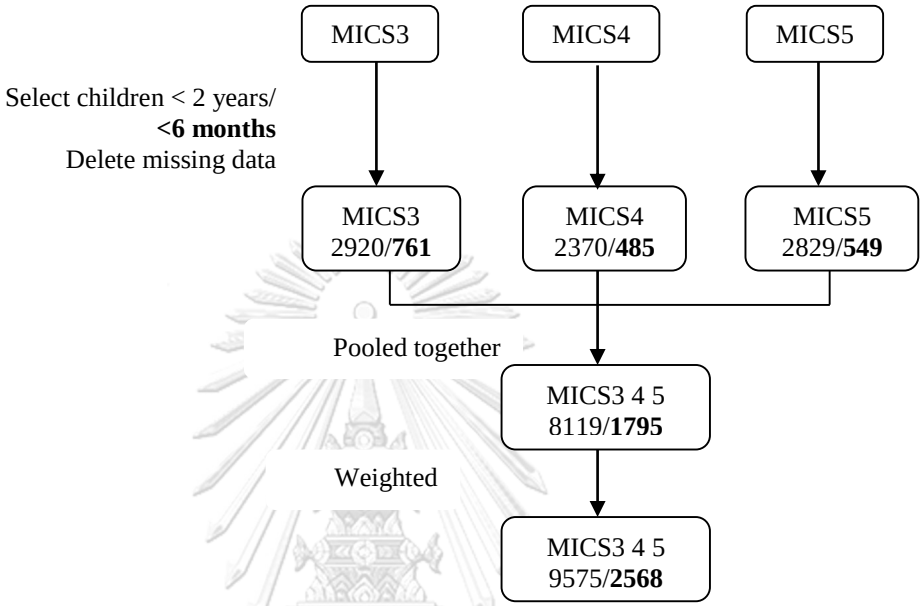

Figure 2 Sample selection and sample size

3.6 Study Period

The Thailand MICS survey 2015-2016 was conducted from November 2015 to March 2016; the MICS 2012 for Thailand was carried out between September and November 2012, while the MICS 2005-2006 for Thailand was done between December 2005 and February 2006. The period of the current study was carried out between October 2018 and November 2018.

3.7 Measurement Tools

The study used secondary data from Thailand MICS survey to identify factors associated with breastfeeding and trends of breastfeeding in Thailand. The Thailand MICS survey consisted of four different questionnaires to collect data for households, children under five, women, and men. The household questionnaire was

used to sample households in the national level of Thailand. The questionnaire for children under five was used to interview mothers or caretakers of those eligible children in Thailand. The questionnaires for women and men were used to survey eligible women and men aged 15-49 in those household interviewed. All the tools were well constructed by professionals and pretested in the country applied. The questionnaires used in MICS 2005-2006, MICS 2012, and MICS 2015-2016 are similar and comparable. The MICS 2015-2016 used all the four questionnaires, while the MICS 2005-2006 and MICS 2012 used only three questionnaires: households, children under five, and women questionnaires. The current study extracted data only from household questionnaire, children questionnaire, and women questionnaire.

3.8 Validity and Reliability

The questionnaires used in recent study were used and validated by MICS program. The MICS survey has evolved over more than 20 years and used extensive efforts to validate its questionnaires. The questionnaires used in Thailand MICS 2015-2016 survey were modified from standard questionnaires of MICS5. First, the MICS 5 standard questionnaires in English were customized and translated into Thai. After that, the translated questionnaires were pre-tested for three rounds in Thailand: Sing Buri and Phra Nakhon Si Ayutthaya during July 13-17, 2015, Bangkok on July 27, 2015, and Satun during August 9-18, 2015. According to the results of pre-tests, the questionnaires were modified. In addition, similar validity procedures had been done for MICS 2005-2006 and MICS 2012 questionnaires.

3.9 Ethical Consideration

The current study was based on secondary data from the Thailand MICS surveys, where no the identifiable personal information is recorded. The original MICS surveys were conducted with well confidential protection after received consent from surveyed subjects. The survey datasets from MICS website are completely anonymized, and no individual or household that participated in the surveys can be identifiable. In

addition, the researcher had received ethic approval from Chulalongkorn University (ethic code no. 223.1/61and approval date of 29 October, 2019).

3.10 Data Collection

The current study used secondary data from Thailand MICS survey. The researcher extracted its data from Thailand MICS survey after applying the inclusion and exclusion criteria of the current study. The MICS datasets are available for research purpose with free of charge when one registered successfully as a MICS data user on its website. After logging in the website, one can immediately download the datasets available on the website. After research is completed, researchers are requested to send copies of the reports to UNICEF office and the cooperative government partner, which is the National Statistical office of Thailand in the current research. The researcher of the current study has successfully registered as a data user in the MICS website, and has downloaded the available Thailand datasets for the research.

Further, the researcher used the cluster number, household number, and line number (each individual in the surveyed household was given a different line number) in the household, women, and children datasets to connect and combine different variables in these separate datasets.

In addition, the variables in the current study were selected by the researcher after reviewing the literature related to breastfeeding and reviewing the three Thailand MICS final reports and the whole questionnaires used in those MICS surveys. Potential variables from literature review and surveyed in all the three MICS rounds were finally selected for the study.

The items related to the studied variables in the conceptual framework were then selected from questionnaires and related datasets. Details of selected questions were as follows.

Items from Household Questionnaire

Area

- Area: Urban/Rural

Region

- Region: Bangkok/ Central/ North/ Northeast/ South

Wealth index quintiles

- Wealth index quintiles: Poorest/ Second/ Middle/ Fourth/ Richest

  Wealth index quintiles are constructed by using data on housing characteristics, household and personal assets, and on water and sanitation via principal components analysis. The wealth index quintiles were calculated and provided in the household dataset of MICS surveys.

Sex of child

- Is (name) male or female?

Items from Questionnaire for Individual Women (age 15-49 years)

Early initiation of breastfeeding

- How long after birth did you first put (name) to the breast?

Age of mother

- In what month and year were you born?
- How old are you?

  Probe: How old were you at your last birthday?

Marital status of mother

- What is your marital status now: Are you widowed, divorced or separated?

Educational level of mother

- What is the highest level of school you attended? Preschool, primary, secondary, associate/commercial college degree, diploma, bachelor degree, master degree, or doctoral degree

Received antenatal care (yes/no, times)

- Did you see anyone for antenatal care during your pregnancy with (name)?
- How many times did you receive antenatal care during this pregnancy?

Place of delivery

- Where did you give birth to (name)? Home/ Public sector/ Private sector/ Other

Mode of delivery

- Was (name) delivered by caesarean section? This is, did they cut your belly open to take the baby out?

Children ever born

- How many sons live with you?
- How many daughters live with you?
- How many sons are alive but do not live with you?
- How many daughters are alive but do not live with you?
- How many boys have died?
- How many girls have died?
- Sum answers to all the above questions

Size of child at birth

- When (name) was born, was he/she very large, larger than average, average, smaller than average, or very small?

Child weight at birth

- How much did (name) weight? If a card is available, record weight from card.

Items from Questionnaire for Children under Five

Exclusive breastfeeding under 6 months

- Is (name) still being breastfed?
- Did (name) drink (name of item) yesterday during the day or night?
- Did (name) eat (name of food) yesterday during the day or night?

Age of child

- On what day, month and year was (name) born? Probe: What is his/her birthday?
- How old is (name)? Probe: How old was (name) at his/her last birthday?

3.11 Data Analysis

The current study analyzed its data with descriptive and inferential statistical methods. The study will apply a statistical significant α level of 0.05 for all inferential statistics. All the statistical analysis was based on weighted samples after pooling the three MICS rounds. Pooled data were applied in order to achieve an overall larger sample size, because some categorical variables have fewer cases in certain groups within one single MICS survey. The pooled reflected the adjusted children weights of the original samples, resulting in the same weighted sample sizes in the three MICS rounds, which were close to the unweighted or actual sample sizes.

Descriptive statistics: The researcher described continuous variables with numbers, percentages, means, and standard deviations. By contrast, the researcher used numbers and percentages to describe those variables with categorical data.

Inferential statistics:

First, Binary logistic regression was applied to explore the trends of breastfeeding in Thailand, by comparing the differences in breastfeeding rates among the surveyed years of three MICS rounds.

Second, univariate and multivariate logistic regression were applied to identify the factors associated with breastfeeding rates in Thailand. Univariate logistic regression included only one independent variable in the regression model and gave unadjusted odds ratio, representing the unadjusted effects of a single independent variable on breastfeeding. Multivariate logistic regress, on the other hand, analyze all the studied independent variables in the study within one regression model, which produced adjusted odds ratio, the odds ratio of a independent variable adjusted by all other independent variables.

In addition, the variable Area was examined with an additional multivariate logistic regression model because the OR for Area changed drastically between univariate and multivariate models. The additional model suggests the factors that seems to lie behind this pattern of the ORs.

Table 1 Summary of statistics and used in all independent variables

Factors	Descriptive	Inferential
Categorical		
Early initiation of breastfeeding	Number, Percentage	Univariate & Multivariate logistic regression
Exclusive breastfeeding	Number, Percentage	Univariate & Multivariate logistic regression
Area	Number, Percentage	Univariate & Multivariate logistic regression
Region	Number, Percentage	Univariate & Multivariate logistic regression
Marital status of mother	Number, Percentage	Univariate & Multivariate logistic regression
Sex of child	Number, Percentage	Univariate & Multivariate logistic regression
Wealth index quintile	Number, Percentage	Univariate & Multivariate logistic regression
Educational level of mother	Number, Percentage	Univariate & Multivariate logistic regression
Place of delivery	Number, Percentage	Univariate & Multivariate logistic regression
Size of child at birth	Number, Percentage	Univariate & Multivariate logistic regression
Received ANC (yes/no)	Number, Percentage	Univariate & Multivariate logistic regression
Mode of delivery	Number, Percentage	Univariate & Multivariate logistic regression
Continuous		
Age of mother	Number, Percentage, Mean, SD	Univariate & Multivariate logistic regression
Age of child	Number, Percentage, Mean, SD	Univariate & Multivariate logistic regression
Children ever born	Number, Percentage, Mean, SD	Univariate & Multivariate logistic regression
Weight of child at birth	Number, Percentage, Mean, SD	Univariate & Multivariate logistic regression
Received ANC (times)	Number, Percentage, Mean, SD	Univariate & Multivariate logistic regression

CHAPTER IV
RESULTS

The study aimed to identify factors associated with early initiation of breastfeeding in children under 2 years and exclusive breastfeeding in children under 6 months. The original samples of this study consisted of 8119 children under 2 years and 1795 children under 6 months, while the weighted samples were 9575 children under 2 years and 2568. All the data used in the current study were secondary data extracted from three Thailand MICS surveys: MICS3 (2005-2006), MICS4 (2012), and MICS5 (2015-2016). This chapter provides information about the findings of data analysis of the current study as follows.

4.1 Characteristics of Children under 2 years

4.2 Characteristics of Children under 6 months

4.3 Features of early initiation of breastfeeding and exclusive breastfeeding

4.4 Trends of breastfeeding in Thailand

4.5 Factors associated with early initiation of breastfeeding in Thailand

4.6 Factors associated with exclusive breastfeeding in Thailand

4.7 Factors related to changed effects of area on early initiation of breastfeeding

4.1 Characteristics of Children under 2 years

According to Table 1, the total weighted sample consisted of 9575 children under 2 years, with 3192 in each of the three MICS surveys. In the three surveys, a large number of children were male (52.8%) and in the age group of 12-23 months (48%). Over half of the children under 2 years surveyed were from rural area (61.6%); however, the largest number of children (37.3%) were in central region including Bangkok. The gaps between those children from poorer families and those from richer families were not large, ranging from 16.4% to 22.6%.

Mothers of those children had the largest proportion in the age group of 25-29 (25.8%), and this was also true in each round of the MICS surveys. Most of the

mothers were married (95.5%) and just over half of them had a secondary educational level (51.3%). All most all mothers (99.1%) received antenatal care and 60.7% of them received 6-10 times of antenatal care. Most children (90.1%) were delivered in public medical sector and only 32% by caesarean section. Most mothers had born 1-3 children (95.4%), with a mean of 1.79 children (SD = 0.97). Over half of mothers considered their children within average size at birth (69%), while 89.9% of the children were in normal birth weight. More details are shown in the Table 4.1.

Table 2 Descriptive results of children under 2 years

	Total		MICS3		MICS4		MICS5	
Variables	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Total	9575	100	3192	100	3192	100	3192	100
Area								
Urban	3681	38.4	1001	31.4	1293	40.5	1388	43.5
Rural	5894	61.6	2191	68.6	1899	59.5	1804	56.5
Region								
Bangkok	-	-	-	-	298	9.3	331	10.4
Central (including Bangkok)**	3575	37.3	1096	34.3	826	25.9	1024	32.1
North	1485	15.5	476	14.9	435	13.6	574	18.0
Northeast	2786	29.1	1018	31.9	1073	33.6	696	21.8
South	1729	18.1	602	18.9	560	17.5	567	17.8
Age of mother (year) (Mean, SD)	27.9	6.5	28.2	6.2	27.8	6.8	27.8	6.5
15-19	1032	10.8	278	8.7	378	11.8	376	11.8
20-24	2176	22.7	692	21.7	740	23.2	744	23.3
25-29	2472	25.8	905	28.3	784	24.6	783	24.5
30-34	2200	23.0	788	24.7	706	22.1	706	22.1
35-39	1330	13.9	413	12.9	448	14.0	469	14.7
40-45	334	3.5	105	3.3	119	3.7	110	3.4
45-49	31	0.3	11	0.3	16	0.5	4	0.1
Marital status of mother								
Unmarried	429	4.5	106	3.3	159	5.0	164	5.1
Married	9146	95.5	3086	96.7	3032	95.0	3028	94.9
Age of child (month) (Mean, SD)	11.1	6.8	11.0	6.7	10.7	6.6	11.4	6.9
0-5	2574	26.9	849	26.6	871	27.3	854	26.7
6-11	2401	25.1	830	26.0	883	27.7	688	21.6
12-23	4600	48.0	1513	47.4	1437	45.0	1650	51.7
Sex of child								
Male	5058	52.8	1673	52.4	1596	50.0	1788	56.0
Female	4517	47.2	1518	47.6	1595	50.0	1404	44.0

	Total		MICS3		MICS4		MICS5	
Variables	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Wealth index quintile								
Poorest	1566	16.4	609	19.1	468	14.7	489	15.3
Second	2119	22.1	651	20.4	700	21.9	768	24.0
Middle	2087	21.8	681	21.3	795	24.9	611	19.2
Fourth	2168	22.6	655	20.5	669	21.0	844	26.4
Richest	1636	17.1	596	18.7	560	17.6	480	15.0
Educational level of mother								
None	307	3.2	95	3.0	87	2.7	125	3.9
Primary	2365	24.7	1213	38.0	701	22.0	451	14.1
Secondary	4914	51.3	1398	43.8	1675	52.5	1841	57.7
Higher	1989	20.8	486	15.2	729	22.8	774	24.2
Received ANC (yes/no)*								
No	58	0.9	-	-	33	1.0	26	0.8
Yes	6325	99.1	-	-	3159	99.0	3166	99.2
Received ANC (times)* (Mean, SD)	8.9	3.9	-	-	9.3	4.6	8.5	3.0
None	58	0.9	-	-	33	1.0	26	0.8
1-5	843	13.2	-	-	416	13.0	428	13.4
6-10	3872	60.7	-	-	1799	56.4	2073	64.9
11-15	1441	22.6	-	-	803	25.2	638	20.0
16-20	142	2.2	-	-	119	3.7	23	0.7
>20	27	0.4	-	-	22	0.7	5	0.2
Place of delivery								
Public medical sector	8626	90.1	2846	89.2	2926	91.7	2854	89.4
Non-public medical sector	949	9.9	346	10.8	266	8.3	338	10.6
Mode of delivery*								
No cesarean section	4341	68.0	-	-	2206	69.1	2135	66.9
Cesarean section	2042	32.0	-	-	986	30.9	1057	33.1
Children ever born (Mean, SD)	1.8	1.0	1.9	1.1	1.8	1.0	1.7	0.9
1-3	9134	95.4	3017	94.5	3046	95.4	3072	96.2
4-6	395	4.1	151	4.7	130	4.1	115	3.6
7-9	46	0.5	25	0.8	16	0.5	5	0.2
Size of child at birth								
Smaller than average	1034	10.8	385	12.1	295	9.3	354	11.1
Average	6607	69.0	1838	57.6	2434	76.3	2335	73.2
Larger than average	1934	20.2	969	30.4	462	14.5	503	15.8
Weight of child at birth (kg) (Mean, SD)	3.0	0.5	3.1	0.5	3.1	0.5	3.0	0.4
Low (0.910-2.499) / <2.5	756	7.9	269	8.4	211	6.6	276	8.7
Normal (2.5-3.999)	8611	89.9	2849	89.3	2904	91.0	2858	89.5
High (4-6.000) / >=4	208	2.2	74	2.3	77	2.4	58	1.8

* The total number of cases from MICS 4 and MICS5 is 1712; ** Including Bangkok in Total and MICS3, but not including Bangkok in MICS4 and MICS5 Note: The table shows the combined sample, weighted by rescaling the survey weights for children so that the three surveys have the same weighted sample size approximately equal to the actual sample size (i.e., each of the surveys gets the same weight in the pooled dataset).

4.2 Characteristics of Children under 6 months

The total weighted number of children under 6 months was 2568, with 856 in each of the three MICS surveys. Overall, just over half (55.5%) of those children were male, and 39.8% of them were in 2-3 months old. Most of the children under 6 months were from rural area, but 39.7% of them were in central region including Bangkok. Not many those children were in the poorest (14.2%) or riches families (17.4%).

The largest percentage of those children's mothers was married and in the age group of 25-29 years (26.2%). Just over half of those mothers had secondary educational level (55.6%). Almost all mothers (98.6%) from MICS 4 and MICS 5 received antenatal care, with an average of 8.97 times (SD = 5.1). Most mothers delivered their babies in the public health sector (89.6%) without caesarean section (64.2%). 95.3% of all those mothers had born 1-3 children, with a mean of 1.76 (SD = 0.97). Most mothers considered their children's sizes as average, while 89.4% of those children had normal birth weights.

Table 3 Descriptive results of children under 6 months

	MICS3 4 5		MICS3		MICS4		MICS5	
Variables	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Total	2568	100	856	100	856	100	856	100
Area								
Urban	1015	39.5	275	32.2	380	44.4	359	42.0
Rural	1553	60.5	581	67.8	476	55.6	496	58.0
Region								
Bangkok	-	-	-	-	125	14.6	103	12.0
Central (including Bangkok)**	994	38.7	287	33.6	219	25.6	260	30.4
North	410	16.0	112	13.1	131	15.3	167	19.5
Northeast	710	27.6	294	34.3	242	28.2	175	20.4
South	454	17.7	163	19.0	140	16.4	151	17.7
Age of mother (year) (Mean, SD)	27.0	6.5	27.2	6.2	26.8	6.9	27.2	6.3
15-19	379	14.8	103	12.0	149	17.4	128	14.9
20-24	584	22.7	200	23.4	202	23.5	182	21.3
25-29	673	26.2	251	29.3	193	22.5	229	26.8
30-34	561	21.9	183	21.4	179	20.9	199	23.3
35-39	291	11.3	95	11.1	101	11.8	94	11.0
40-45	75	2.9	24	2.8	28	3.3	23	2.7
45-49	5	0.2	0	0.0	5	0.6	0	0.0

	MICS3 4 5		MICS3		MICS4		MICS5	
Variables	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Marital status of mother								
Unmarried	86	3.4	26	3.0	22	2.6	38	4.5
Married	2482	96.6	831	97.0	834	97.4	817	95.5
Age of child (month) (Mean, SD)	2.6	1.6	2.7	1.6	2.6	1.5	2.7	1.6
0-1	689	26.8	218	25.5	230	26.9	240	28.1
2-3	1023	39.8	339	39.6	376	43.9	308	36.0
4-5	857	33.4	299	34.9	250	29.2	308	36.0
Sex of child								
Male	1426	55.5	460	53.7	491	57.3	475	55.5
Female	1143	44.5	396	46.3	366	42.7	381	44.5
Wealth index quintile								
Poorest	366	14.2	143	16.7	114	13.3	109	12.7
Second	581	22.6	190	22.1	178	20.8	213	24.9
Middle	584	22.8	191	22.3	234	27.3	160	18.7
Fourth	590	23.0	171	20.0	183	21.3	237	27.7
Richest	447	17.4	162	18.9	149	17.4	137	16.0
Educational level of mother								
None	67	2.6	29	3.4	17	2.0	21	2.4
Primary	552	21.5	285	33.2	170	19.8	98	11.4
Secondary	1428	55.6	420	49.1	491	57.4	517	60.4
Higher	521	20.3	123	14.3	178	20.8	220	25.7
Received ANC (yes/no)*								
No	24	1.4	-	-	8	0.9	16	1.9
Yes	1688	98.6	-	-	849	99.1	839	98.1
Received ANC (times)* (Mean, SD)	9.0	5.1	-	-	9.6	6.4	8.4	3.1
None	24	1.4	-	-	8	0.9	16	1.9
1-5	214	12.5	-	-	95	11.1	119	13.9
6-10	1043	60.9	-	-	491	57.3	552	64.6
11-15	392	22.9	-	-	228	26.6	163	19.1
16-20	29	1.7	-	-	25	2.9	4	0.5
>20	10	0.6	-	-	10	1.2	0	0.0
Place of delivery								
Public medical sector	2302	89.6	757	88.4	777	90.7	768	89.8
Non-public medical sector	266	10.4	99	11.6	80	9.3	88	10.2
Mode of delivery*								
No cesarean section	1099	64.2	-	-	580	67.7	519	60.7
Cesarean section	613	35.8	-	-	277	32.3	336	39.3
Children ever born (Mean, SD)	1.8	1.0	1.8	1.0	1.8	1.1	1.7	0.8
1-3	2448	95.3	810	94.6	808	94.4	830	97.0
4-6	107	4.2	43	5.1	38	4.4	26	3.0
7-9	14	0.5	3	0.3	11	1.2	0	0.0

	MICS3 4 5		MICS3		MICS4		MICS5	
Variables	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Size of child at birth								
Smaller than average	300	11.7	110	12.9	68	7.9	122	14.3
Average	1738	67.7	509	59.4	659	77.0	570	66.6
Larger than average	530	20.6	237	27.7	130	15.1	164	19.1
Weight of child at birth (kg) (Mean, SD)	3.0	0.5	3.1	0.4	3.1	0.5	3.0	0.5
Low (0.910-2.499) / <2.5	214	8.3	54	6.3	47	5.5	113	13.3
Normal (2.5-3.999)	2296	89.4	786	91.8	787	91.8	724	84.6
High (4-5.500) / >=4	58	2.3	16	1.9	23	2.7	18	2.1

* The total number of cases from MICS 4 and MICS5

** Including Bangkok in Total and MICS3, but not including Bangkok in MICS4 and MICS5

Note: The table shows the combined sample, weighted by rescaling the survey weights for children so that the three surveys have the same weighted sample size approximately equal to the actual sample size (i.e., each of the surveys gets the same weight in the pooled dataset).

4.3 Features of Early initiation of breastfeeding and exclusive breastfeeding

4.3.1 Early initiation of breastfeeding in children under 2 years

The overall early initiation rate of breastfeeding in MICS 3, MICS 4 and MICS 5 was 37.2% and fluctuated during the period from 2005 to 2016, with 27.4% in MICS 3, 47.5% in MICS 4, and 36.7% in MICS 5. The early initiation rates were slightly higher in rural area (39.4%) and in South region (47.8%). Interestingly, within the age groups of mothers, the highest early initiation rate was in mothers aged 45-49 years (56.1%) and without education (51.8%). However, similar early initiation rates were shown in different married status of mother, sex of child, and wealth index quintile. A slightly higher early initiation rate was seen in mothers received antenatal care (42.1%) and delivery in public health sector yielded a higher initiation rate of 338.9%, but Caesarean section reduced the initiation rate to 26.4%. Mothers born 7-9 children had highest early initiation rate of breastfeeding (51.7%). Details of early initiation rates of breastfeeding are shown in Table 4.3 as follows.

Table 4 Number and Prevalence of early initiation rates of breastfeeding in children under 2 years

Variables	MICS3 4 5		MICS3		MICS4		MICS5	
	Early initiation (N)	**Prevalence**	**Early initiation (N)**	**Prevalence**	**Early initiation (N)**	**Prevalence**	**Early initiation (N)**	**Prevalence**
Total	3562	37.2	875	27.4	1515	47.5	1172	36.7
Area								
Urban	1241	33.7	250	25.0	509	39.4	482	34.7
Rural	2321	39.4	625	28.5	1006	53.0	690	38.2
Region								
Bangkok	-	-	-	-	92	30.7	72	21.8
Central (including Bangkok)**	1115	31.2	290	26.4	364	44.1	297	29.0
North	639	43.1	110	23.1	216	49.8	313	54.5
Northeast	982	35.2	223	21.9	490	45.7	268	38.5
South	826	47.8	252	41.8	353	63.0	221	39.0
Age of mother (year) (Mean, SD)	27.3	6.6	27.9	6.3	27.0	6.8	27.4	6.7
15-19	468	45.4	83	29.7	211	55.7	175	46.6
20-24	836	38.4	197	28.4	386	52.2	253	34.0
25-29	939	38.0	259	28.7	383	48.8	297	37.9
30-34	756	34.4	200	25.4	310	43.9	246	34.8
35-39	407	30.6	98	23.7	156	34.9	153	32.5
40-45	138	41.2	32	30.5	60	50.6	45	41.2
45-49	17	56.1	6	56.7	9	55.0	2	58.4
Marital status of mother								
Unmarried	161	37.5	27	25.7	51	32.0	83	50.5
Married	3401	37.2	848	27.5	1464	48.3	1089	36.0
Age of child (month) (Mean, SD)	11.2	6.6	11.2	6.5	11.0	6.7	11.6	6.6
0-5	917	35.6	232	27.3	397	45.6	288	33.8
6-11	853	35.5	213	25.7	388	43.9	252	36.6
12-23	1792	39.0	431	28.5	730	50.8	631	38.3
Sex of child								
Male	1916	37.9	451	26.9	782	49.0	683	38.2
Female	1646	36.4	424	27.9	733	46.0	488	34.8
Wealth index quintile								
Poorest	624	39.8	141	23.2	243	52.0	240	49.0
Second	873	41.2	195	30.0	341	48.8	337	43.8
Middle	854	40.9	197	29.0	417	52.5	240	39.3

Variables	MICS3 4 5		MICS3		MICS4		MICS5	
	Early initiation (N)	**Prevalence**	**Early initiation (N)**	**Prevalence**	**Early initiation (N)**	**Prevalence**	**Early initiation (N)**	**Prevalence**
Fourth	753	34.8	182	27.8	321	47.9	251	29.7
Richest	457	27.9	159	26.8	193	34.4	104	21.8
Educational level of mother								
None	159	51.8	36	38.2	59	68.1	64	50.8
Primary	865	36.6	329	27.1	347	49.5	189	41.9
Secondary	1982	40.3	380	27.2	860	51.4	742	40.3
Higher	556	28.0	130	26.8	249	34.2	177	22.9
Received ANC (yes/no)*								
No	23	39.5	-	-	11	34.5	12	45.8
Yes	2664	42.1	-	-	1504	47.6	1160	36.6
Received ANC (times)* (Mean, SD)	8.7	3.3	-	-	9.0	3.4	8.3	3.1
None	23	39.5	-	-	11	34.5	12	45.8
1-5	369	43.7	-	-	219	52.8	150	35.0
6-10	1639	42.3	-	-	870	48.4	769	37.1
11-15	592	41.1	-	-	362	45.0	230	36.1
16-20	60	42.1	-	-	48	40.8	11	48.9
>20	4	15.9	-	-	4	19.8	0	0.0
Place of delivery								
Public medical sector	3360	38.9	793	27.9	1460	49.9	1106	38.8
Non-public medical sector	202	21.3	82	23.7	55	20.7	65	19.3
Mode of delivery*								
No cesarean section	2148	49.5	-	-	1208	54.8	940	44.0
Cesarean section	538	26.4	-	-	307	31.1	231	21.9
Children ever born (Mean, SD)	1.9	1.0	1.9	1.1	1.8	1.0	1.9	1.0
1-3	3360	36.8	803	26.6	1432	47.0	1126	36.6
4-6	178	44.9	66	44.1	70	54.1	41	35.8
7-9	24	51.7	6	23.9	13	81.3	5	88.2
Size of child at birth								
Smaller than average	342	33.1	98	25.3	102	34.4	143	40.5
Average	2559	38.7	517	28.1	1189	48.9	854	36.6
Larger than average	660	34.1	261	26.9	225	48.6	175	34.8
Weight of child at birth (kg) (Mean, SD)	3.1	0.4	3.1	0.5	3.1	0.4	3.1	0.4
Low (0.910-2.499) / <2.5	226	29.9	66	24.6	72	34.1	88	31.8

Variables	MICS3 4 5		MICS3		MICS4		MICS5	
	Early initiation (N)	**Prevalence**	**Early initiation (N)**	**Prevalence**	**Early initiation (N)**	**Prevalence**	**Early initiation (N)**	**Prevalence**
Normal (2.5-3.999)	3259	37.8	789	27.7	1413	48.7	1057	37.0
High (4-6.000) / >=4	77	37.0	20	27.1	30	39.2	27	46.8

* The total number of cases from MICS 4 and MICS5

** Including Bangkok in Total and MICS3, but not including Bangkok in MICS4 and MICS5

Note: The table shows the combined sample, weighted by rescaling the survey weights for children so that the three surveys have the same weighted sample size approximately equal to the actual sample size (i.e., each of the surveys gets the same weight in the pooled dataset)

4.3.2 Exclusive breastfeeding in children under 6 months

The overall exclusive breastfeeding rate for the three MICS rounds was only 15.7%, and this rate increased from 6.3% in MICS 3 to 27.1% in MICS 5. Urban area showed an even lower exclusive breastfeeding rate of 12.2%, while a high of 27.9% was shown in North region. 18.7% of mother aged 40-45 exclusively breastfed their children, and more married mother provided exclusive breastfeeding (15.9%). A large proportion of children aged 0-1 received exclusive breastfeeding than children in the other two older age groups. Female children (18.7%) and poor wealth index quintile (20.7%) received a slightly higher exclusive breastfeeding rate. Interestingly, mothers received antennal care had lower exclusive breastfeeding rate (20.2%). Delivery in public medical sector (16.2%) and no caesarean section (22.3%) had higher exclusive breastfeeding. In addition, children with low birth weight saw higher exclusive breastfeeding rate (23.7%). Details were shown in Table 4.4.

Table 5 Number and prevalence of exclusive breastfeeding rates in children under 6 months.

Variables	MICS3 4 5		MICS3		MICS4		MICS5	
	Exclusive (N)	**Prevalence**	**Exclusive (N)**	**Prevalence**	**Exclusive (N)**	**Prevalence**	**Exclusive (N)**	**Prevalence**
Total	403	15.7	54	6.3	117	13.7	232	27.1
Area								
Urban	124	12.2	10	3.8	42	11.0	72	19.9
Rural	279	17.9	43	7.4	75	15.7	161	32.4
Region								
Bangkok	-	-	-	-	2	1.5	6	6.2

Variables	MICS3 4 5		MICS3		MICS4		MICS5	
	Exclusive (N)	Prevalence	Exclusive (N)	Prevalence	Exclusive (N)	Prevalence	Exclusive (N)	Prevalence
Central (including Bangkok)**	109	11.0	8	2.7	20	9.1	73	28.2
North	114	27.9	14	12.9	30	22.7	70	42.1
Northeast	115	16.1	22	7.5	46	19.1	46	26.6
South	64	14.2	10	5.8	19	13.7	36	23.6
Age of mother (year) (Mean, SD)	27.7	6.4	27.1	6.2	27.8	7.4	27.7	5.9
15-19	46	12.1	6	5.8	14	9.6	26	20.0
20-24	88	15.0	16	7.8	29	14.5	43	23.6
25-29	103	15.4	10	3.9	23	11.8	71	30.9
30-34	99	17.7	17	9.4	26	14.7	56	28.0
35-39	52	18.0	5	4.9	15	15.0	32	34.6
40-45	14	18.7	0	1.2	9	33.2	4	19.5
45-49	0	0.0	0	0.0	0	0.0	0	0.0
Marital status of mother								
Unmarried	8	9.6	1	3.8	6	27.2	1	3.3
Married	394	15.9	53	6.3	111	13.3	231	28.3
Age of child (month) (Mean, SD)	1.8	1.4	1.4	1.5	1.6	1.3	2.0	1.4
0-1	191	27.7	29	13.2	64	27.7	98	40.8
2-3	155	15.2	18	5.4	38	10.2	99	32.0
4-5	56	6.6	6	2.1	15	5.9	35	11.5
Sex of child								
Male	189	13.2	28	6.1	55	11.1	106	22.3
Female	214	18.7	25	6.4	62	17.0	126	33.1
Wealth index quintile								
Poorest	76	20.7	14	9.4	25	22.0	37	34.1
Second	83	14.3	12	6.3	29	16.2	42	19.9
Middle	92	15.7	11	5.6	34	14.7	47	29.2
Fourth	74	12.5	5	3.0	18	10.1	50	21.2
Richest	78	17.5	12	7.6	10	6.9	56	40.6
Educational level of mother								
None	8	11.3	1	1.8	7	40.6	0	0.3
Primary	66	12.0	16	5.5	25	14.7	25	25.9
Secondary	262	18.3	31	7.5	74	15.1	156	30.2
Higher	67	12.9	6	4.8	10	5.9	51	23.1
Received ANC (yes/no)*								
No	8	31.1	-	-	7	84.0	1	5.1
Yes	342	20.2	-	-	110	13.0	231	27.6
Received ANC (times)* (Mean, SD)	8.1	3.0	-	-	8.2	3.5	8.1	2.8
None	8	31.1	-	-	7	84.0	1	5.1
1-5	64	30.1	-	-	19	20.0	45	38.1
6-10	211	20.2	-	-	62	12.6	149	27.0

Variables	MICS3 4 5		MICS3		MICS4		MICS5	
	Exclusive (N)	Prevalence	Exclusive (N)	Prevalence	Exclusive (N)	Prevalence	Exclusive (N)	Prevalence
11-15	66	16.8	-	-	29	12.8	37	22.4
16-20	0	0.8	-	-	0	0.9	0	0.0
>20	0	0.0	-	-	0	0.0	0	0.0
Place of delivery								
Public medical sector	372	16.2	53	7.0	117	15.0	203	26.4
Non-public medical sector	30	11.4	1	0.7	0	0.3	29	33.6
Mode of delivery*								
No cesarean section	245	22.3	-	-	101	17.4	144	27.7
Cesarean section	104	17.0	-	-	16	5.8	88	26.2
Children ever born (Mean, SD)	1.9	1.0	1.7	0.8	2.1	1.4	1.8	0.8
1-3	380	15.5	53	6.5	103	12.8	224	27.0
4-6	17	15.9	1	2.2	9	22.6	8	29.3
7-9	5	39.4	0	0.0	5	46.9	0	100.0
Size of child at birth								
Smaller than average	55	18.4	3	2.3	1	1.7	52	42.2
Average	264	15.2	41	8.0	95	14.4	128	22.4
Larger than average	84	15.8	10	4.3	20	15.8	53	32.4
Weight of child at birth (kg) (Mean, SD)	3.0	0.5	3.1	0.3	3.0	0.4	2.9	0.6
Low (0.910-2.499) / <2.5	51	23.7	0	0.2	2	4.7	48	42.7
Normal (2.5-3.999)	349	15.2	53	6.8	113	14.3	183	25.3
High (4-5.500) / >=4	3	4.7	0	1.7	2	9.1	0	1.9

* The total number of cases from MICS 4 and MICS5

** Including Bangkok in Total and MICS3, but not including Bangkok in MICS4 and MICS5

Note: The table shows the combined sample, weighted by rescaling the survey weights for children so that the three surveys have the same weighted sample size approximately equal to the actual sample size (i.e., each of the surveys gets the same weight in the pooled dataset).

4.4 Trends of breastfeeding in Thailand

4.4.1 Trend of early initiation of breastfeeding

In the current study of a weighted sample of 9575 children under 2 years, the overall trend of early initiation of breastfeeding showed slightly increase during the period between 2005 and 2016. Indeed, the year 2012 (OR = 2.394, P = 0.000) and the year 2015-2016 (OR = 1.536, P = 0.000) saw significant strong increases in early initiation rates of breastfeeding, compared with the year 2005-2006. The highest early initiation rate was seen in 2012, being 47.5%. However, the early initiation rates

declined significantly from 2012 to 2015-2016 (OR = 0.850, P = 0.004). Details are shown in Table 4.5.

Table 6 Trend of early initiation of breastfeeding in children under 2 years

		Early Initiation			95%CI		
	Total N	**N**	**%**	**OR**	**Lower**	**Upper**	**P value**
Total	9575	3562	37.2				
Survey Years of MICS							
2005-2006	3192	875	27.4	Ref.			
2012	3192	1515	47.5	2.394	2.157	2.657	0.000**
2015-2016	3192	1172	36.7	1.536	1.381	1.707	0.000**
2012				Ref.			
2015-2016				0.850	0.762	0.948	0.004**

*Significant level at 0.05; **Significant level at 0.01

Note: The table shows the combined sample, weighted by rescaling the survey weights for children so that the three surveys have the same weighted sample size approximately equal to the actual sample size (i.e., each of the surveys gets the same weight in the pooled dataset).

4.4.2 Trend of exclusive breastfeeding

Overall, the trend of exclusive breastfeeding witnessed a considerable increase over the period from 2005 to 2016. In fact, the exclusive breastfeeding rates increased significantly from 6.31% in 2005-2006 to 27.10% in 2015-2016. Compared with the year 2005-2006, the year 2012 (OR = 1.688, P = 0.000) and the year 2015-2016 (OR = 4.071, P = 0.000) showed significant increases in exclusive breastfeeding. Similarly, in contrast with the year 2012, the year 2015-2016 saw significantly increased exclusively breastfeeding rates (OR = 1.673, P = 0.001). Details can be seen in Table 4.6.

Table 7 Trend of exclusive breastfeeding in children under 6 months

		Exclusive breastfeeding			95%CI		
	Total N	**N**	**Percent**	**OR**	**Lower**	**Upper**	**P value**
Total	2568	403	15.7				
Survey Years of MICS							
2005-2006	856	54	6.31	Ref.			
2012	856	117	13.67	2.368	1.688	3.322	0.000**
2015-2016	856	232	27.10	5.578	4.071	7.644	0.000**
2012				Ref.			
2015-2016				1.673	1.240	2.256	0.001**

*Significant level at 0.05; **Significant level at 0.01

Note: The table shows the combined sample, weighted by rescaling the survey weights for children so that the three surveys have the same weighted sample size approximately equal to the actual sample size (i.e., each of the surveys gets the same weight in the pooled dataset).

4.5 Factors associated with early initiation of breastfeeding in Thailand

Rural area was significantly associated with early initiation of breastfeeding in univariate analysis (unadjusted OR = 1.277, P = 0.000); however, the association became insignificant in the adjusted OR. Region was strongly significantly associated with early initiation of breastfeeding in both unadjusted and adjusted analysis, with Bangkok having lower early initiation breastfeeding rate. In the univariate analysis, children from the fourth (unadjusted OR = 0.804, P = 0.001) and richest wealth index quintile (unadjusted OR = 0.585, P = 0.000) were significantly less likely to receive early initiation of breastfeeding; however, only the fourth quintile (adjusted OR = 0.855, P = 0.048) had lower early initiation rate than the poorest quintile in the multivariate analysis.

Age of mother was found significantly associated with early initiation of breastfeeding (unadjusted OR = 0.978, adjusted OR = 0.973, P = 0.000), with older mothers being less likely to provide early initiation of breastfeeding. Similarly, education of mother had a strong negative association with early initiation of breastfeeding; mothers with education were less likely to have early initiation of breastfeeding, compared with no education. Compared with smaller than average size, mothers who considered their children to be average size were more likely to provide

early initiation of breastfeeding (unadjusted OR = 1.278, P = 0.001; adjusted OR = 1.180, P = 0.037).

Age of child was also positively associated with early initiation of breastfeeding (unadjusted OR = 1.006, P = 0.042; adjusted OR = 1.008, P = 0.011). Children delivered in non-public medical sector were less likely to have early initiation of breastfeeding (unadjusted OR = 0.424, P = 0.000; adjusted OR = 0.550, P = 0.000). In unadjusted analysis, birth weight of child was found significantly associated with early initiation of breastfeeding (unadjusted OR = 1.102, P = 0.038), and this positive effect became even stronger in the adjusted analysis (adjusted OR = 1.217, P = 0.001). More details are shown in the Table 4.7.

Table 8 Results of logistic regression for early initiation of breastfeeding in children under 2 years (MICS3, 4 &5)

Variables	Unadjusted OR	95%CI		P value	Adjusted OR#	95%CI		P value
		Lower	Upper			Lower	Upper	
Area								
Urban	Ref.				Ref.			
Rural	1.277	1.172	1.391	0.000**	1.021	0.927	1.123	0.678
Region								
Central (including Bangkok)	Ref.				Ref.			
North	1.669	1.473	1.891	0.000**	1.530	1.341	1.747	0.000**
Northeast	1.200	1.081	1.334	0.001**	1.019	0.904	1.149	0.756
South	2.017	1.792	2.269	0.000**	1.857	1.637	2.106	0.000**
Age of mother	0.978	0.972	0.985	0.000**	0.973	0.965	0.981	0.000**
Marital status of mother								
Unmarried	Ref.				Ref.			
Married	0.986	0.807	1.205	0.891	1.094	0.891	1.344	0.389
Age of child	1.006	1.000	1.013	0.042*	1.008	1.002	1.015	0.011*
Sex of child								
Male	Ref.				Ref.			
Female	0.939	0.864	1.021	0.140	0.945	0.867	1.029	0.193
Wealth index quintile								
Poorest	Ref.				Ref.			
Second	1.058	0.926	1.209	0.404	1.046	0.912	1.201	0.520
Middle	1.047	0.916	1.196	0.503	1.022	0.885	1.181	0.765
Fourth	0.804	0.703	0.920	0.001**	0.855	0.732	0.999	0.048*
Richest	0.585	0.504	0.678	0.000**	0.834	0.695	1.001	0.052
Educational level of mother								

Variables	Unadjusted OR	95%CI		P value	Adjusted OR#	95%CI		P value
		Lower	Upper			Lower	Upper	
None	Ref.				Ref.			
Primary	0.536	0.422	0.681	0.000**	0.568	0.444	0.727	0.000**
Secondary	0.629	0.499	0.792	0.000**	0.706	0.552	0.901	0.005**
Higher	0.361	0.283	0.461	0.000**	0.504	0.385	0.658	0.000**
Place of delivery								
Public medical sector	Ref.				Ref.			
Non-public medical sector	0.424	0.361	0.498	0.000**	0.550	0.463	0.653	0.000**
Children ever born	1.114	1.068	1.162	0.000**	1.175	1.111	1.242	0.000**
Size of child at birth								
Smaller than average	Ref.				Ref.			
Average	1.278	1.112	1.468	0.001**	1.180	1.010	1.379	0.037*
Larger than average	1.047	0.892	1.229	0.571	0.861	0.708	1.046	0.132
Weight of child at birth	1.102	1.005	1.209	0.038*	1.217	1.085	1.366	0.001**

*Significant level at 0.05; ** Significant level at 0.01. # adjusted OR: adjusted by all variables in the table.
Note: The table shows the combined sample, weighted by rescaling the survey weights for children so that the three surveys have the same weighted sample size approximately equal to the actual sample size (i.e., each of the surveys gets the same weight in the pooled dataset).

From Table 4.8, which provides results from analyzing pooled MICS 4 and MICS 5, Times of received antenatal care were negatively associated with early initiation of breastfeeding (unadjusted OR = 0.976, P = 0.001; adjusted OR = 0.984, P = 0.039). Likewise, caesarean section had significant negative association with early initiation of breastfeeding (unadjusted OR = 0.365, P = 0.000; adjusted OR = 0.448, P = 0.000).

Table 9 Results of logistic regression for early initiation of breastfeeding in children under 2 years (MICS4&5)

Variables	Unadjusted OR	95%CI		P value	Adjusted OR#	95%CI		P value
		Lower	Upper			Lower	Upper	
Received ANC (yes/no)								
No	Ref.				Ref.			
Yes	1.116	0.658	1.891	0.684	1.456	0.822	2.579	0.197
Received ANC (times)	0.976	0.962	0.990	0.001**	0.984	0.969	0.999	0.039*
Mode of delivery								
No cesarean section	Ref.				Ref.			
Cesarean section	0.365	0.326	0.410	0.000**	0.448	0.395	0.508	0.000**
Area								
Urban	Ref.				Ref.			

Variables	Unadjusted OR	95%CI		P value	Adjusted OR[#]	95%CI		P value
		Lower	Upper			Lower	Upper	
Rural	1.441	1.301	1.595	0.000**	1.014	0.900	1.142	0.825
Region								
Bangkok	Ref.				Ref.			
Central	1.580	1.291	1.933	0.000**	1.228	0.981	1.536	0.073
North	3.136	2.525	3.895	0.000**	2.583	2.022	3.298	0.000**
Northeast	2.132	1.743	2.608	0.000**	1.461	1.153	1.850	0.002**
South	2.950	2.384	3.650	0.000**	2.273	1.785	2.893	0.000**
Age of mother	0.976	0.968	0.983	0.000**	0.976	0.965	0.986	0.000**
Marital status of mother								
Unmarried	Ref.				Ref.			
Married	1.031	0.822	1.294	0.790	1.214	0.955	1.544	0.113
Age of child	1.007	1.000	1.014	0.062	1.008	1.000	1.016	0.042*
Sex of child								
Male	Ref.				Ref.			
Female	0.900	0.814	0.994	0.038*	0.892	0.802	0.992	0.035*
Wealth index quintile								
Poorest	Ref.				Ref.			
Second	0.843	0.716	0.992	0.040*	0.960	0.809	1.140	0.643
Middle	0.862	0.731	1.016	0.077	1.086	0.907	1.301	0.370
Fourth	0.596	0.506	0.702	0.000**	0.934	0.770	1.133	0.489
Richest	0.393	0.327	0.473	0.000**	0.931	0.738	1.176	0.550
Educational level of mother								
None	Ref.				Ref.			
Primary	0.633	0.471	0.852	0.002**	0.656	0.480	0.898	0.009**
Secondary	0.609	0.460	0.806	0.001**	0.684	0.504	0.927	0.014*
Higher	0.288	0.214	0.387	0.000**	0.473	0.340	0.658	0.000**
Place of delivery								
Public medical sector	Ref.				Ref.			
Non-public medical sector	0.311	0.253	0.383	0.000**	0.604	0.480	0.759	0.000**
Children ever born	1.169	1.107	1.234	0.000**	1.170	1.087	1.260	0.000**
Size of child at birth								
Smaller than average	Ref.				Ref.			
Average	1.238	1.045	1.465	0.013*	1.160	0.952	1.414	0.140
Larger than average	1.166	0.951	1.430	0.140	1.067	0.824	1.382	0.621
Weight of child at birth	1.100	0.984	1.230	0.093	1.191	1.029	1.377	0.019*

*Significant level at 0.05; **Significant level at 0.01, [#] adjusted OR: adjusted by all variables in the table.

Note: The table shows the combined sample, weighted by rescaling the survey weights for children so that the three surveys have the same weighted sample size approximately equal to the actual sample size (i.e., each of the surveys gets the same weight in the pooled dataset).

4.6 Factors associated with exclusive breastfeeding in Thailand

According to Table 4.9, children from rural area (unadjusted OR = 1.574, P = 0.000; adjusted OR = 1.417, P = 0.010) were more likely to be exclusively breastfed than those from urban area. Similarly, children from North (unadjusted OR = 3.142, P = 0.000; adjusted OR = 2.948, P = 0.000) and Northeast regions (unadjusted OR = 1.516, P = 0.002; adjusted OR = 1.551, P = 0.011) were more likely to receive exclusive breastfeeding than those from Central region (including Bangkok). Compared with the poorest quintile, children from second and fourth quintile were less likely to have exclusive breastfeeding in the univariate analysis, but only the riches quintile (adjusted OR = 1.675, P = 0.030) were significantly associated with exclusively breastfeeding after adjustment.

Age of child were significantly associated with exclusive breastfeeding (unadjusted OR = 0.642, P = 0.000; adjusted OR = 0.637, P = 0.000); the older the children, the less likely they received exclusively breastfeeding. On the other hand, age of mother (unadjusted RO = 1.017, P = 0.043; adjusted OR = 1.023, P = 0.048) showed positive association with exclusive breastfeeding. After adjusted, mother with secondary education level (adjusted OR = 3.867, P = 0.004) were found more likely to provide exclusive breastfeeding than those without education.

Children delivered in the non-public medical sector (unadjusted OR = 1.177, P = 0.001; adjusted OR = 1.171, P = 0,032) were less likely to receive exclusive breastfeeding. The birth weight of child was significantly associated with exclusive breastfeeding (unadjusted OR = 0.631, P = 0.000; adjusted OR = 0.518, P = 0.000); children with higher birth weight were less likely to received exclusive breastfeeding. All other variables in Table 4.9 were not significantly associated with exclusive breastfeeding, with details shown as follows.

Table 10 Results of logistic regression for exclusive breastfeeding in children under 6 months (MICS3, 4&5)

Variables	Unadjusted OR	95%CI		P value	Adjusted OR[#]	95%CI		P value
		Lower	Upper			Lower	Upper	
Area								
Urban	Ref.				Ref.			
Rural	1.574	1.253	1.978	0.000**	1.417	1.088	1.845	0.010*

Variables	Unadjusted OR	95%CI		P value	Adjusted OR#	95%CI		P value
		Lower	Upper			Lower	Upper	
Region								
Central (including Bangkok)	Ref.				Ref.			
North	3.142	2.343	4.214	0.000**	2.948	2.105	4.128	0.000**
Northeast	1.561	1.177	2.069	0.002**	1.551	1.105	2.177	0.011*
South	1.338	0.962	1.861	0.084	1.177	0.820	1.690	0.376
Age of mother	1.017	1.001	1.034	0.043*	1.023	1.000	1.047	0.048*
Marital status of mother								
Unmarried	Ref.				Ref.			
Married	1.777	0.862	3.666	0.120	1.339	0.616	2.908	0.461
Age of child	0.642	0.594	0.693	0.000**	0.637	0.587	0.691	0.000**
Sex of child								
Male	Ref.				Ref.			
Female	1.508	1.218	1.866	0.000**	1.527	1.211	1.924	0.000**
Wealth index quintile								
Poorest	Ref.				Ref.			
Second	0.641	0.455	0.904	0.011*	0.778	0.534	1.133	0.190
Middle	0.715	0.510	1.001	0.051	1.061	0.723	1.557	0.763
Fourth	0.549	0.386	0.780	0.001**	0.954	0.619	1.470	0.830
Richest	0.815	0.573	1.158	0.253	1.675	1.051	2.669	0.030*
Educational level of mother								
None	Ref.				Ref.			
Primary	1.065	0.480	2.363	0.878	2.090	0.839	5.205	0.113
Secondary	1.759	0.817	3.786	0.149	3.867	1.551	9.641	0.004**
Higher	1.159	0.522	2.573	0.716	2.193	0.835	5.759	0.111
Place of delivery								
Public medical sector	Ref.				Ref.			
Non-public medical sector	0.667	0.450	0.989	0.044*	0.621	0.395	0.978	0.040*
Children ever born	1.177	1.065	1.301	0.001**	1.171	1.014	1.352	0.032*
Size of child at birth								
Smaller than average	Ref.				Ref.			
Average	0.793	0.576	1.092	0.155	1.200	0.807	1.784	0.369
Larger than average	0.832	0.573	1.209	0.335	1.527	0.934	2.498	0.092
Weight of child at birth	0.631	0.499	0.796	0.000**	0.518	0.379	0.708	0.000**

*Significant level at 0.05; **Significant level at 0.01, # adjusted OR: adjusted by all variables in the table.

Note: The table shows the combined sample, weighted by rescaling the survey weights for children so that the three surveys have the same weighted sample size approximately equal to the actual sample size (i.e., each of the surveys gets the same weight in the pooled dataset).

According to Table 4.10, times of received antenatal care (unadjusted OR = 0.923, P = 0.000; adjusted OR = 0.924, P = 0.001) were found negatively associated

with exclusive breastfeeding in children under 6 months. Further, children delivered by caesarean section were less likely to receive exclusive breastfeeding (unadjusted OR = 0.716, P = 0.010; adjusted OR = 0.551, P = 0.001).

Table 11 Results of logistic regression for exclusive breastfeeding in children under 6 months (MICS4&5)

Variables	Unadjusted OR	95%CI		P value	Adjusted OR#	95%CI		P value
		Lower	Upper			Lower	Upper	
Received ANC (yes/no)								
No	Ref.				Ref.			
Yes	0.561	0.235	1.340	0.194	0.867	0.304	2.475	0.789
Received ANC (times)	0.923	0.890	0.957	0.000**	0.924	0.880	0.970	0.001**
Mode of delivery								
No cesarean section	Ref.				Ref.			
Cesarean section	0.716	0.556	0.924	0.010**	0.551	0.387	0.784	0.001**
Area								
Urban	Ref.				Ref.			
Rural	1.764	1.377	2.261	0.000**	1.153	0.852	1.560	0.358
Region								
Bangkok	Ref.				Ref.			
Central	6.457	3.103	13.435	0.000**	7.709	3.427	17.342	0.000**
North	13.509	6.463	28.236	0.000**	16.515	7.261	37.561	0.000**
Northeast	7.655	3.674	15.950	0.000**	9.512	4.149	21.808	0.000**
South	6.196	2.909	13.200	0.000**	5.543	2.404	12.780	0.000**
Age of mother	1.022	1.004	1.040	0.017*	1.035	1.007	1.065	0.014*
Marital status of mother								
Unmarried	Ref.				Ref.			
Married	1.902	0.871	4.155	0.107	1.473	0.584	3.714	0.412
Age of child	0.650	0.597	0.709	0.000**	0.581	0.526	0.642	0.000**
Sex of child								
Male	Ref.				Ref.			
Female	1.690	1.334	2.142	0.000**	1.709	1.301	2.244	0.000**
Wealth index quintile								
Poorest	Ref.				Ref.			
Second	0.574	0.389	0.847	0.005**	0.846	0.540	1.325	0.465
Middle	0.669	0.457	0.980	0.039*	1.000	0.633	1.581	0.999
Fourth	0.506	0.342	0.747	0.001**	1.031	0.615	1.727	0.908
Richest	0.775	0.518	1.158	0.213	2.189	1.238	3.870	0.007**
Educational level of mother								

Variables	Unadjusted OR	95%CI		P value	Adjusted OR#	95%CI		P value
		Lower	Upper			Lower	Upper	
None	Ref.				Ref.			
Primary	1.013	0.424	2.423	0.977	2.347	0.794	6.940	0.123
Secondary	1.295	0.565	2.968	0.541	2.932	0.999	8.611	0.050*
Higher	0.795	0.337	1.880	0.602	1.820	0.576	5.744	0.307
Place of delivery								
Public medical sector	Ref.				Ref.			
Non-public medical sector	0.827	0.546	1.253	0.371	1.406	0.780	2.532	0.257
Children ever born	1.279	1.139	1.436	0.000**	1.135	0.948	1.359	0.168
Size of child at birth								
Smaller than average	Ref.				Ref.			
Average	0.577	0.407	0.818	0.002**	1.213	0.744	1.976	0.439
Larger than average	0.872	0.577	1.317	0.514	2.625	1.411	4.885	0.002**
Weight of child at birth	0.606	0.472	0.778	0.000**	0.497	0.345	0.715	0.000**

*Significant level at 0.05; **Significant level at 0.01, # adjusted OR: adjusted by all variables in the table.

Note: The table shows the combined sample, weighted by rescaling the survey weights for children so that the three surveys have the same weighted sample size approximately equal to the actual sample size (i.e., each of the surveys gets the same weight in the pooled dataset).

4.7 Factors related to changed effects of area on early initiation of breastfeeding

As for Table 4.11, after adjusted for region, wealth index quintile, place of delivery, size of child at birth, and children ever born, area (adjusted OR = 0.605, P = 1.128) was no longer significantly associated with early initiation of breastfeeding in children under 2 years.

Table 12 Factors attribute to changed effects (unadjusted vs. adjusted) of area on early initiation of breastfeeding in children under 2 years

Variables	Urban		Rural		Adjusted OR#	95%CI		P value
	N	%	N	%		Lower	Upper	
Total	3681	100.0	5894	100.0				
Area								
Urban					Ref.			
Rural					1.128	1.025	0.932	0.605
Region								
Central (including Bangkok)**	2085	56.6	1491	25.3	Ref.			
North	444	12.1	1041	17.7	1.676	1.470	1.290	0.000**
Northeast	667	18.1	2119	36.0	1.078	0.958	0.851	0.472

Variables	Urban		Rural		Adjusted OR[#]	95%CI		P value
	N	%	N	%		Lower	Upper	
South	486	13.2	1243	21.1	2.013	1.779	1.572	0.000**
Wealth index quintile								
Poorest	265	7.2	1301	22.1	Ref.			
Second	567	15.4	1551	26.3	1.181	1.030	0.899	0.667
Middle	708	19.2	1379	23.4	1.117	0.970	0.843	0.676
Fourth	1078	29.3	1090	18.5	0.895	0.772	0.665	0.001**
Richest	1063	28.9	573	9.7	0.788	0.565	0.667	0.000**
Place of delivery								
Public medical sector	3056	83.0	5570	94.5	Ref.			
Non-public medical sector	626	17.0	324	5.5	0.615	0.437	0.518	0.000**
Size of child at birth								
Smaller than average	321	8.7	713	12.1	Ref.			
Average	2708	73.6	3899	66.2	1.528	1.151	1.326	0.000**
Larger than average	652	17.7	1282	21.8	1.223	0.883	1.039	0.643
Children ever born (Mean, SD)	1.67	0.84	1.87	1.04	1.114	1.021	1.067	0.004**
1-3	3579	97.2	5554	94.2				
4-6	97	2.6	298	5.1				
7-9	5	0.1	41	0.7				

*Significant level at 0.05; **Significant level at 0.01, [#] adjusted OR: adjusted by all variables in the table.

Note: The table shows the combined sample, weighted by rescaling the survey weights for children so that the three surveys have the same weighted sample size approximately equal to the actual sample size (i.e., each of the surveys gets the same weight in the pooled dataset).

CHAPTER V
DISCUSSION

The summary of the significant factors is shown in Table 5.1, with many factors significantly associated with early initiation of breastfeeding and exclusive breastfeeding. This chapter provides information about the discussion of the current study in the following items: 1) trends of early initiation of breastfeeding and exclusive breastfeeding, 2) factors associated with early initiation of breastfeeding, and 3) factors associated with exclusive breastfeeding.

Table 13 Summary of significance in factors

	Early initiation of breastfeeding		**Exclusive breastfeeding**	
Factors	**Univariate**	**Multivariate**	**Univariate**	**Multivariate**
Categorical				
Area	Significant	None	Significant	Significant
Region	Significant	Significant	Significant	Significant
Marital status of mother	None	None	None	None
Sex of child	None	None	Significant	Significant
Wealth index quintile	Significant	Significant	Significant	Significant
Educational level of mother	Significant	Significant	None	Significant
Place of delivery	Significant	Significant	Significant	Significant
Size of child at birth	Significant	Significant	None	None
Received ANC (yes/no)	None	None	None	None
Mode of delivery	Significant	Significant	Significant	Significant
Continuous				
Age of mother	Significant	Significant	Significant	Significant
Age of child	Significant	Significant	Significant	Significant
Children ever born	Significant	Significant	Significant	Significant
Weight of child at birth	Significant	Significant	Significant	Significant
Received ANC (times)	Significant	Significant	Significant	Significant

5.1 Trends of early initiation of breastfeeding and exclusive breastfeeding

The current study found that both early initiation rate of breastfeeding and exclusive breastfeeding rate increased from the year 2005-2006 to the year 2015-2016. Overall, a slightly increase was identified in early initiation of breastfeeding during the decade, while exclusive breastfeeding had a significant increase during the same period.

Indeed, the early initiation rate of breastfeeding increased from 27.4% in 2005-2005 to 47.5% in 2012, but then declined to 36.7% in 2015-2016. By contrast, the exclusive breastfeeding rate increased from 6.31% in 2005-2006 to 13.67% in 2012 and then to 27.10% in 2015-2016. The trends found in the current study are consistent with the MICS reports, except the early initiation rate of breastfeeding in 2005-2006, which reported higher rate of 49.6% in timely initiation of breastfeeding. The difference can be explained by the fact that MICS 3 report included immediate and hours into timely initiation of breastfeeding, while early initiation of breastfeeding only consists of immediate breastfeeding (within one hour). Even though the exclusive breastfeeding rate increased during the period, the exclusive rate in the year of 2015-2016 was still at a low of 27.1%. This is consistent with a precious study by Aikawa et al. (2015), in which only 38.1% of the Thai working mothers exclusively breastfed their children under 6 months. The increased trend of breastfeeding rates could be attribute to the promotion and policies of breastfeeding in Thailand in the past ten years, such as baby-friendly hospital initiative, maternity leave law, and the code of marketing substitutes for breast milk (Hangchaovanich & Voramongkol, 2006).

On the other hand, when compared with other surrounding countries, such as Bangladesh, Nepal, Viet Nam, and Lao PDR, the breastfeeding rates in Thailand were still in the low level. One reason may be caesarean section. Caesarean section rates were very high in Thailand, particularly in those private hospitals. A study by Kankoon et al. (2018) found that 34.1% of 18,043 deliveries were performed by caesarean section in Khon Kaen province, Thailand. This is higher than the recommended caesarean rate of 10-15% (WHO, 1985) and also higher than average caesarean rate of 19% in the 150 countries of the global between 1990 and 2014 (Betran et al., 2016). Delivery by caesarean section usually required mothers to be recovered from anesthesia and thus separated from their children for more than one hour, missing

the best opportunities for early initiation of breastfeeding. Another attribute factor of low breastfeeding rates may be the potential misleading information from infant formula promotion and advertisement, which was not controlled by law until the Control of Marketing of Infant and Young Child Food Act of 2017. Finally, the criteria of early initiation in some Thailand hospitals accepted giving the first breastfeeding within 2 hours, instead of within 1 hour.

5.2 Factors associated with early initiation of breastfeeding

A variety of factors were identified to be associated with early initiation of breastfeeding in children under 2 years. These factors included area, region, wealth index quintile, age of mother, education of mother, size of child at birth, age of child, place of delivery, and weight of child at birth.

Area

In the univariate analysis of the current study, children from rural area (unadjusted OR = 1.277, P = 0.000) were more likely to received early initiation of breastfeeding than those from urban area. However, after adjusted by other factors, area was no longer significantly associated with early initiation of breastfeeding. Those factors influence the change in effects of area on early initiation of breastfeeding were found to be region, wealth index quintile, place of delivery, size of child at birth, and children ever born, as shown in Table 4.11. This means that significant finding in unadjusted analysis was due to the differences in distribution of those adjusted factors between rural and urban area. Further, this finding of insignificant effects of area were in line with the study by Bui et al, (2016), who found that area was not an associated factor to early initiation breastfeeding in both adjusted and unadjusted analysis in Vietnam. However, different result was reported by Sharma and Byrne (2016) and Ndirangu et al. (2018), who identified urban area to be negatively associated with early initiation of breastfeeding in South Asia and Namibia respectively, and also inconsistent with the study by Babatunde Yahya and Adebayo (2013), who found that urban area was positively associated with early initiation of breastfeeding in Nigeria. The different findings between those studies and the current study may due to the

differences in the characteristics of studied context or the differences in studied variable included among those studies.

Region

In the current study, region was significantly associated with early initiation of breastfeeding. To be specific, compared with those from central region including Bangkok, North, Northeast, and South regions were more likely to have early initiation of breastfeeding in unadjusted analysis. After adjusted by other factors, North (adjusted OR = 1.530, P = 0.000) and South (adjusted OR = 1.857, P = 0.000) were still significant associated with early initiation of breastfeeding. When Bangkok were separated from central area in the analysis including MICS 4 and MICS 5, North (adjusted OR = 2.583, P = 0.000), Northeast (adjusted OR = 1.461, P = 0.002), and South (adjusted OR = 2.273, P = 0.000) regions were positively associated with early initiation of breastfeeding, compared with Bangkok. The findings in the current study were congruent with previous study by Sharma and Byrne (2016), who reported some administration regions in countries in South Asia were significantly associated with early initiation of breastfeeding. Explanation of the significant association between area and early initiation of breastfeeding could be that Bangkok is the most developed region in Thailand and consists of large working population. Those working population may concerned about the conflict between breastfeeding and occupation, and thus less willing to provide breastfeeding.

Wealth index quintile

In unadjusted analysis, children from fourth (unadjusted OR = 0.804, P = 0.001) and richest (unadjusted OR = 0.585, P = 0.000) quintiles showed significant less likely to have early initiation of breastfeeding when compared with the poorest quintile. However, after adjusted by other factors, only children from fourth quintile (adjusted OR = 0.855, P = 0.048) remains to be a significant factor. This finding is different from a systematic review by Sharma and Byrne (2016), in which inconsistent findings were reported about the association between household wealth and early initiation of breastfeeding. The significant results in the current study could be explained by the delivery choice of the mothers in wealth families. Those mothers could be more likely

to deliver their babies in private hospitals, where lower early initiation rate (21.3%) were found, compared with 38.9% in public medical sector.

Age of mother

In the current study, age of mother was negatively associated with early initiation of breastfeeding (unadjusted OR = 0.978, P = 0.000; adjusted OR = 0.973, P = 0.000). This is different from previous studies (Ndirangu et al., 2018; Sharma & Byrne, 2016; Babatunde Yahya & Adebayo, 2013). Sharma and Byrne (2016) reported that teenage mothers were less likely to provide early initiation of breastfeeding, while Ndirangu et al. (2018) and Babatunde Yahya and Adebayo (2013) found positive association between age of mother and early initiation of breastfeeding. This negative association found by the current study could be explained by the reason that the benefits or effects of early initiation of breastfeeding cannot be seen immediately, and thus experienced older mothers may consider it not important to provide early initiation of breastfeeding.

Education of mother

In the current study, education of mother was significantly associated with early initiation of breastfeeding in children under 2 years. Compared with non-education, mother with primary (unadjusted OR = 0.536, P = 0.000; adjusted OR = 0.568, P = 0.000), secondary (unadjusted OR = 0.629, P = 0.000; adjusted OR = 0.706, P = 0.005), and higher (unadjusted OR = 0.361, P = 0.000; adjusted OR = 0.504, P =0.000) education were less likely to give early initiation of breastfeeding. This is consistent with the study by Babatunde Yahya and Adebayo (2013), who reported negative association between age of mother and early initiation of breastfeeding in Nigeria. Educated mother were more likely to be working mothers, and thus needed to face the conflict between working and breastfeeding. As a result, they were less likely to breastfeed their children.

Size of child at birth & weight of child at birth

Compared with children smaller than average, children in average size at birth were more likely to receive early initiation of breastfeeding (unadjusted OR =

1.278, P = 0.001). This relationship became less significant (adjusted OR = 1.180, P = 0.037) after adjusted by other factor. Similarly, weight of child at birth was positively associated with early initiation of breastfeeding (unadjusted OR = 1.102, P = 0.038; adjusted OR = 1.217, P = 0.001). This is congruent with the findings by Ndirangu et al. (2018), who reported that children in small birth size were less likely to be given early initiation of breastfeeding when compared with average birth size. Babies with small birth size may be often considered as unhealthy and health care providers may pay more attention to monitor the health conditions of those babies, instead of early initiation of breastfeeding (Vieira et al., 2010).

Age of child

In the current study, age of children was positively associated with early initiation of breastfeeding rate (unadjusted OR = 1.006, P = 0.042; adjusted OR = 1.008, P = 0.011). This finding could be explained by the change in development in Thailand. As developing country, mothers in Thailand could be more and more involved in occupations instead of staying in family and looking after children. This could change the willing of mothers to provider breastfeeding, with increased fewer mothers not provide breastfeeding. Thus, children in younger age could receive fewer opportunities for early initiation of breastfeeding.

Place of delivery

In the current study, children who were delivered in non-public medical sector (unadjusted OR = 0.424, P = 0.000; adjusted OR = 0.550, P = 0.000), including private medical sector and home, were less likely to receive early initiation of breastfeeding in children under 2 years than those delivered in public medical sector. This is consistent with the study by Babatunde Yahya and Adebayo (2013), who reported that delivery at home was associated with delayed initiation of breastfeeding. Public medical sector was mainly under the control of government, thus breastfeeding promotions from the government side, such as baby-friendly hospital initiative, can have more effects in the public medical sector. As a result, better early initiation of breastfeeding could be achieved.

Children ever born

In the current study, children ever born had a positive association with early initiation of breastfeeding in children under 2 years (unadjusted OR = 1.114, P = 0.000; adjusted OR = 1.175, P = 0.000). Mothers with more born children could have better knowledge about breastfeeding and could thus more easily to early breastfeed their babies.

Received antenatal care (times)

Current study showed a negative association between times of antenatal care and early initiation of breastfeeding (unadjusted OR = 0.976, P = 0.000; adjusted OR = 0.984, P = 0.039). This is different from the study by Ndirangu et al. (2018), who reported negative effects of non-antenatal care on early initiation of breastfeeding, and the study by Babatunde Yahya and Adebayo (2013), who reported positive attribution of antenatal care to early initiation of breastfeeding. The negative association in the current study could be explained by the fact that an unusual larger number of antenatal care visits are commonly found in mothers with complications during pregnancy, during which pregnant mother are required to be screened for complications. Those mothers could be less likely to give early initiation, since health care providers could consider this situation of risk pregnancy and take care of the baby more, instead of promote early initiation of breastfeeding. By contrast, the current study did not find significant association between received antenatal care (yes/no) and early initiation of breastfeeding in Thailand. This is possible since in the current study, most mothers in Thailand (98.6%) were found to have received antenatal care, while only a fewer of them did not received.

Mode of delivery

In the current study, children delivered by caesarean section were less likely to receive early initiation of breastfeeding (unadjusted OR = 0.365, P = 0.000; adjusted OR = 0.448, P = 0.000). This is consistent with previous studies (Ndirangu et al., 2018; Sharma & Byrne, 2016; Babatunde Yahya & Adebayo, 2013). Ndiragu et al. (2018) reported that vaginal delivery had a significant positive association with early initiation

of breastfeeding, and Sharma and Byrne (2016) and Babatunde Yahya and Adebayo (2013) reported positive association between caesarean section and delayed initiation of breastfeeding. Delivery by caesarean section usually required mothers to be recovered from anesthesia and thus separated from their children for more than one hour, missing the best opportunities for early initiation of breastfeeding.

5.3 Factors associated with exclusive breastfeeding

Various factors were recognized as factors associated with exclusive breastfeeding in children under 6 months in Thailand. Those factors included area, region, age of mother, age of child, sex of child, wealth index quintile, educational level of mother, place of delivery, children ever born, and weight of child at birth.

Area

In the current study, children from rural area (unadjusted OR = 1.574, P = 0.000; adjusted OR = 1.417, P = 0.010) were more likely to receive exclusively breastfeeding than those from urban area. This finding is different from previous studies (Bui et al., 2016; Senarath et al., 2010), which found no significant association between area and exclusive breastfeeding in Vietnam and in five East and Southeast Asian countries. In a developing Thailand, mothers from urban area could face higher working stress than in the rural area, contributing to the difference in practice of exclusive breastfeeding, which usually conflicts the occupation of mothers.

Region

Children from North (unadjusted OR = 3.142, P = 0.000; adjusted OR = 2.948, P = 0.000) and Northeast regions (unadjusted OR = 1.516, P = 0.002; adjusted OR = 1.551, P = 0.011) were more likely to have exclusive breastfeeding than those from Central region (including Bangkok). When analyzing the data of only MICS 4 and MICS 5, Central, North, Northeast, and South regions were all significantly associated with better exclusive breastfeeding than Bangkok. This is consistent with the study by Senarath, Dibley, and Agho (2010), who reported that geographical region was significantly associated with exclusive breastfeeding in Timor-Leste, Indonesia, and

Cambodia. This findings of the current study may due to Bangkok is a more developed region, which could have mothers to have a decent work, who are less likely to exclusive breastfeeding for 6 months (Senarath et al., 2010).

Age of mother

Age of mother (unadjusted RO = 1.017, P = 0.043; adjusted OR = 1.023, P = 0.048) showed positive association with exclusive breastfeeding. This is consistent with a study by Senarath et al. (2010), who reported positively association between mother's age and exclusive breastfeeding. Older mother could be consider as having more knowledge about breastfeeding, and thus were easily to practice exclusive breastfeeding.

Age of child

Age of child were significantly associated with exclusive breastfeeding (unadjusted OR = 0.642, P = 0.000; adjusted OR = 0.637, P = 0.000). This is also reported by previous studies (Senarath et al., 2010) and Bui et al. (2016). In these two studies, age of children was negative associated with exclusive breastfeeding. This means that fewer children would receive exclusive breastfeeding over their ages. Exclusive breastfeeding was recommended to last for 6 months, but children with working mothers could not have enough time to be exclusively breastfed.

Sex of child

In the current study, female children under 6 months (unadjusted OR = 1.508, P = 0.000; adjusted OR = 1.527, P = 0.000) were more likely receive exclusive breastfeeding than those male children. This is different from previous studies (Bui et al., 2016; Senarath et al., 2010), where no significant association were identified. The difference in exclusive breastfeeding between male and female children could be the unique culture system in Thailand.

Wealth index quintile

Compared with the poorest quintile, only the riches quintile (adjusted OR = 1.675, P = 0.030) were significantly associated with exclusively breastfeeding after

adjustment. This is consistent with the study by Senarath et al. (2010), who reported significant association between household wealth index and exclusive breastfeeding in Indonesia. In the current study, mothers from the richest quintile could have more opportunities to receive better health care, contributing to better exclusive breastfeeding among them.

Educational level of mother

After adjusted, mother with secondary education level (adjusted OR = 3.867, P = 0.004) were found more likely to provide exclusive breastfeeding than those without education. This is different from previous studies (Bui et al., 2016; Senarath et al., 2010). Mothers with a secondary education level may help them to better understand and thus follow the breastfeeding instructions from health care providers than those without educational level.

Place of delivery

Children delivered in the non-public medical sector (unadjusted OR = 0.667, P = 0.044; adjusted OR = 0.621, P = 0.040) were less likely to receive exclusive breastfeeding. This is inconsistent with the study by Senarath et al. (2010), in which no significance was reported in association between place of delivery and exclusive breastfeeding. In the current study in Thailand, public medical sector was under the control of government, thus breastfeeding promotions from the government side, such as baby-friendly hospital initiative, can have more effects in the public medical sector. As a result, worsen exclusive breastfeeding could be found in those private health, without enough support from the government.

Children ever born

In the current study, the number of children ever born was found to be significantly associated with exclusive breastfeeding in children under 6 months (unadjusted OR = 1.177, P = 0.001; adjusted OR = 1.171, P = 0,032). Mothers with more born children could be better understand about breastfeeding and could thus more easily to exclusively breastfeed their children.

Weight of child at birth

The birth weight of child was significantly associated with exclusive breastfeeding (unadjusted OR = 0.631, P = 0.000; adjusted OR = 0.518, P = 0.000). Mothers may consider higher weight as stronger or healthier, thus reducing the effort to provide exclusive breastfeeding for those children.

Received antenatal care (times)

In the current study, times of received antenatal care (unadjusted OR = 0.923, P = 0.000; adjusted OR = 0.924, P = 0.001) were negatively associated with exclusive breastfeeding in children under 6 months. This is inconsistent with the study by Senarath et al. (2010), who reported positive association between times of received antenatal care and nonexclusive breastfeeding rate in Philippines. Usually, more times of antenatal care means better knowledge passed from health care providers to mothers; however, in Thailand, it could be another explanation that those required more times of received antenatal care could be trouble pregnancy. As a result, after delivery, those children were less likely to receive exclusive breastfeeding.

Mode of delivery

In the current study, children delivered by caesarean section were less likely to receive exclusive breastfeeding (unadjusted OR = 0.716, P = 0.010; adjusted OR = 0.551, P = 0.001). This is in line with the study by Senarath et al. (2010), where caesarean section predicted significant higher percentage of exclusive breastfeeding. Mother may worry about consequence of caesarean section due to pain after delivery.

CHAPTER VI
CONCLUSION

6.1 Summary of the Study

The current study is a cross sectional study by using secondary data from three MICS surveys. Data from the three MICS surveys were pooled together to identify trends and factors associated with early initiation of breastfeeding and exclusive breastfeeding. The study area consisted of the whole Thailand. Data was selected according to certain inclusion and exclusion criteria. The total sample size consisted of 8119 children under 2 years and 1795 children under 6 months. Pooled data were then weighted by new calculated child weight. The weighted sample then consisted of 9575 children under 2 years and 856 children under 6 months. The weighted samples were then put into further statistical analysis.

In the three surveys of children under 2 years old, a large proportion of children were male (52.8%) and in the group aged 12-23 months (48%). Over half of the children under 2 years (61.6%) were from rural area; the largest percentage of children (37.3%) was in central region including Bangkok. On the other hand, 55.5% of the children under 6 months were male, and 39.8% of them were 2-3 months old. Most of the children under 6 months (60.5%) were from rural area, while 39.7% of them were from central region including Bangkok.

The overall early initiation rate of breastfeeding in MICS 3, MICS 4 and MICS 5 was 37.2% and fluctuated during the period from 2005 to 2016, with 27.4% in MICS 3, 47.5% in MICS 4, and 36.7% in MICS 5. By contrast, the overall exclusive breastfeeding rate for the three MICS rounds was only 15.7%, and this rate increased from 6.3% in MICS 3 to 27.1% in MICS 5.

The year 2012 and the year 2015-2016 saw significant increases in early initiation rates of breastfeeding when compared with the year 2005-2006. The highest early initiation rate was seen in 2012, being 47.5%. Similarly, the exclusive breastfeeding rates in the three MICS rounds increased significantly from 6.31% in 2005-2006 to 27.10% in 2015-2016.

A number of factors were identified to be significantly associated with early initiation of breastfeeding in children under 2 years, including area, region, wealth index quintile, age of mother, education of mother, size of child at birth, age of child, place of delivery, and weight of child at birth. Likewise, a number of factors were identified to be factors significantly associated with exclusive breastfeeding in children under 6 months in Thailand. Those factors consisted of area, region, age of mother, age of child, sex of child, wealth index quintile, educational level of mother, place of delivery, children ever born, and weight of child at birth.

6.2 Recommendations

First, future programs are recommended to target at increasing the early initiation of breastfeeding and exclusive breastfeeding in Thailand by considering those significant factors associated with early initiation of breastfeeding and exclusive breastfeeding.

Second, the literature review of the current study has identified that Thailand has lower breastfeeding rates comparing to many other countries in Southeast Asia. In order to do the comparison analysis, the current study first has investigated the factors associated with breastfeeding in Thailand, in order to understand the situation in Thailand. As a result, further research is suggested in the future to find out the reason for the lower breastfeeding rates in Thailand by comparing differences in associated factors between Thailand and other countries in Southeast Asia.

Third, since nearly all Thailand mothers delivered their babies in a hospital, health care providers are usually in charge of early initiation of breastfeeding and thus other factors included in the current study could be less influential. However, future study of comparisons with other countries will be easier since such factors might be important for countries where the proportion of births occurring in hospitals is not so high as in Thailand.

6.3 Limitations of the Study

The current study has to design in a way to apply secondary data from Thailand MICS survey, so other potential factors that are not included in the Thailand MICS survey cannot be analyzed and identified in the current study. Those potential factors that have been identified in previous studies include birth interval, occupation, psychological factors, etc. Further, factors related to fathers are not included in the current study, even though fathers may have an influence on breastfeeding practice.

REFERENCES

Aikawa, T., Pavadhgul, P., Chongsuwat, R., Sawasdivorn, S., & Boonshuyar, C. (2015). Maternal return to paid work and breastfeeding practices in Bangkok, Thailand. *Asia Pac J Public Health, 27*(2), NP1253-1262. doi:10.1177/1010539511419647

Amitay, E. L., & Keinan-Boker, L. (2015). Breastfeeding and Childhood Leukemia Incidence: A Meta-analysis and Systematic Review. *JAMA Pediatr, 169*(6), e151025. doi:10.1001/jamapediatrics.2015.1025

Aune, D., Norat, T., Romundstad, P., & Vatten, L. J. (2014). Breastfeeding and the maternal risk of type 2 diabetes: a systematic review and dose-response meta-analysis of cohort studies. *Nutr Metab Cardiovasc Dis, 24*(2), 107-115. doi:10.1016/j.numecd.2013.10.028

Babatunde Yahya, W., & Adebayo, S. B. J. C. D. R. (2013). Modelling the trend and determinants of breastfeeding initiation in Nigeria. *2013*.

Ballard, O., & Morrow, A. L. (2013). Human milk composition: nutrients and bioactive factors. *Pediatr Clin North Am, 60*(1), 49-74. doi:10.1016/j.pcl.2012.10.002

Becker, S., Rutstein, S., & Labbok, M. H. (2003). Estimation of births averted due to breast-feeding and increases in levels of contraception needed to substitute for breast-feeding. *Journal of Biosocial Science, 35*(4), 559-574. doi:10.1017/S0021932003005996

Bernardo, H., Cesar, V., & Organization, W. H. (2013). Long-term effects of breastfeeding: a systematic review.

Betran, A. P., Ye, J. F., Moller, A. B., Zhang, J., Gulmezoglu, A. M., & Torloni, M. R. (2016). The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990-2014. *Plos One, 11*(2). doi:ARTN e014834310.1371/journal.pone.0148343

Bui, Q. T. T., Lee, H. Y., Le, A. T. K., Dung, D. V., & Vu, L. T. H. (2016). Trends and determinants for early initiation of and exclusive breastfeeding under six months in Vietnam: results from the Multiple Indicator Cluster Surveys, 2000-2011. *Global Health Action, 9*, 49-61. doi:ARTN 2943310.3402/gha.v9.29433

Buttham, S., Kongwattanakul, K., Jaturat, N., & Soontrapa, S. (2017). Rate and factors affecting non-exclusive breastfeeding among Thai women under the breastfeeding promotion program. *International Journal of Womens Health, 9*, 689-694. doi:10.2147/Ijwh.S148464

Dornan, L., Sinclair, M., Kernohan, W., Stockdale, J., Khuwuthyakorn, V., & Suppasan, P. J. E. B. M. (2015). Thai cultural influences on breastfeeding behaviour.

Eglash, A., Simon, L., & Med, A. B. (2017). ABM Clinical Protocol #8: Human Milk Storage Information for Home Use for Full-Term Infants, Revised 2017. *Breastfeeding Medicine, 12*(7), 390-395. doi:10.1089/bfm.2017.29047.aje

Gibson, M. E. (2005). Getting back to basics - The curious history of breastfeeding in the United States. *American Journal of Nursing, 105*(10), 72c-72d.

Hangchaovanich, Y., & Voramongkol, N. (2006). Breastfeeding promotion in Thailand. *J Med Assoc Thai, 89 Suppl 4*, S173-177.

Horta, B., & Victora, C. (2013). Short-Term Effects of Breastfeeding: A Systematic Review on the Benefits of Breastfeeding on Diarrhoea and Pneumonia Mortality. Geneva, Switzerland: World Health Organization; 2013. In.

Horta, B. L., Loret de Mola, C., & Victora, C. G. (2015). Breastfeeding and intelligence: a systematic review and meta-analysis. *Acta Paediatr, 104*(467), 14-19. doi:10.1111/apa.13139

Islam, M. J., Baird, K., Mazerolle, P., & Broidy, L. (2017). Exploring the influence of psychosocial factors on exclusive breastfeeding in Bangladesh. *Arch Womens Ment Health, 20*(1), 173-188. doi:10.1007/s00737-016-0692-7

Kankoon, N., Lumbiganon, P., Kietpeerakool, C., Sangkomkamhang, U., Betran, A. P., & Robson, M. (2018). Cesarean rates and severe maternal and neonatal outcomes according to the Robson 10-Group Classification System in Khon Kaen Province, Thailand. *Int J Gynaecol Obstet, 140*(2), 191-197. doi:10.1002/ijgo.12372

Lancet, C. G. o. H. F. i. B. C. J. T. (2002). Breast cancer and breastfeeding: collaborative reanalysis of individual data from 47 epidemiological studies in 30 countries, including 50 302 women with breast cancer and 96 973 women without the disease. *360*(9328), 187-195.

Lawoyin, T. O., Olawuyi, J. F., & Onadeko, M. O. (2001). Factors associated with exclusive breastfeeding in Ibadan, Nigeria. *J Hum Lact, 17*(4), 321-325. doi:10.1177/089033440101700406

Morillo, A. F. C., Duque, M. D., Lopez, A. B. H., Miguel, C. M., Rodriguez, B. M., Prim, A. O., . . . Gabriel, M. A. M. (2017). A Comparison of Factors Associated with Cessation of Exclusive Breastfeeding at 3 and 6 Months. *Breastfeeding Medicine, 12*(7), 430-435. doi:10.1089/bfm.2017.0045

National Statistical Office, United Nations Children's Fund, Ministry of Public Health, National Health Security Office, Thai Health Promotion Foundation, & International Health Policy Program. (2013). *Thailand Multiple Indicator Cluster Survey 2012*.

National Statistical Office, & United Unations Children's Fund. (2016). *Thailand Multiple Indicator Cluster Survey 2015-2016: Final report*.

Ndirangu, M. N., Gatimu, S. M., Mwinyi, H. M., & Kibiwott, D. C. (2018). Trends and factors associated with early initiation of breastfeeding in Namibia: analysis of the Demographic and Health Surveys 2000-2013. *BMC Pregnancy Childbirth, 18*(1), 171. doi:10.1186/s12884-018-1811-4

Organization, W. H. (2016). *WHO recommendations on antenatal care for a positive pregnancy experience*: World Health Organization.

Peres, K. G., Cascaes, A. M., Nascimento, G. G., & Victora, C. G. (2015). Effect of breastfeeding on malocclusions: a systematic review and meta-analysis. *Acta Paediatr, 104*(467), 54-61. doi:10.1111/apa.13103

Pitonyak, J. S., Jessop, A. B., Pontiggia, L., & Crivelli-Kovach, A. (2016). Life Course Factors Associated with Initiation and Continuation of Exclusive Breastfeeding. *Matern Child Health J, 20*(2), 240-249. doi:10.1007/s10995-015-1823-x

Senarath, U., Dibley, M. J., & Agho, K. E. (2010). Factors associated with nonexclusive breastfeeding in 5 east and southeast Asian countries: a multilevel analysis. *J Hum Lact, 26*(3), 248-257. doi:10.1177/0890334409357562

Shannon, T., O'Donnell, M. J., & Skinner, K. (2007). Breastfeeding in the 21st century: overcoming barriers to help women and infants. *Nurs Womens Health, 11*(6), 568-575. doi:10.1111/j.1751-486X.2007.00244.x

Sharma, I. K., & Byrne, A. (2016). Early initiation of breastfeeding: a systematic literature review of factors and barriers in South Asia. *Int Breastfeed J, 11*, 17. doi:10.1186/s13006-016-0076-7

Shepherd, L., Walbey, C., & Lovell, B. (2017). The Role of Social-Cognitive and Emotional Factors on Exclusive Breastfeeding Duration. *J Hum Lact, 33*(3), 606-613. doi:10.1177/0890334417708187

Thailand National Statistical Office, & United Nations Children's Fund. (2006). *Thailand Multiple Indicator Cluster Survey December 2005- February 2006*.

Thepha, T., Marais, D., Bell, J., & Muangpin, S. J. J. C. P. H. N. (2017). Facilitators and barriers to exclusive breastfeeding in Thailand: a narrative review. *3*(160), 2.

United Nations Children's Fund, World Health Organization, United Nations Educational, Scientific and Cultural Organization, United Nations Population Fund, United Nations Development Programme, . . . World Bank. (2010). *Facts for life* (4th ed.).

Victora, C. G., Bahl, R., Barros, A. J., Franca, G. V., Horton, S., Krasevec, J., . . . Lancet Breastfeeding Series, G. (2016). Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *Lancet, 387*(10017), 475-490. doi:10.1016/S0140-6736(15)01024-7

Vieira, T. O., Vieira, G. O., Giugliani, E. R. J., Mendes, C. M. C., Martins, C. C., & Silva, L. R. (2010). Determinants of breastfeeding initiation within the first hour of life in a Brazilian population: cross-sectional study. *Bmc Public Health, 10*. doi:Artn 76010.1186/1471-2458-10-760

WHO. (2013). Beyond Survival: Integrated Delivery Care Practices for Long-Term Maternal and Infant Nutrition, Health and Development. In: Pan American Health Organization Washington, DC.

World Health Organization. (2001). *Global strategy for infant and young child feeding: The optimal duration of exclusive breastfeeding*.

World Health Organization. (2018). Gender: Definitions. Retrieved from http://www.euro.who.int/en/health-topics/health-determinants/gender/gender-definitions

Yimyam, S. (2011). Breastfeeding beliefs and practices among employed women: a Thai cultural perspective. In *Infant Feeding Practices* (pp. 125-140): Springer.

Zhang, Z. H., Zhu, Y., Zhang, L. J., & Wan, H. W. (2018). What factors influence exclusive breastfeeding based on the theory of planned behaviour. *Midwifery, 62*, 177-182. doi:10.1016/j.midw.2018.04.006

APPENDICES

Appendix A: Ethic Approval

AF 02-12

The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University
Jamjuree 1 Building, 2nd Floor, Phyathai Rd., Patumwan district, Bangkok 10330, Thailand,
Tel/Fax: 0-2218-3202 E-mail: eccu@chula.ac.th

COA No. 250/2018

Certificate of Approval

Study Title No. 223.1/61 : TRENDS AND FACTORS ASSOCIATED WITH BREASTFEEDING IN THAILAND: A SECONDARY ANALYSIS OF THE MULTIPLE INDICATOR CLUSTER SURVEY 2005-2016S

Principal Investigator : MR. YUANPEI CHEN

Place of Proposed Study/Institution : College of Public Health Sciences, Chulalongkorn University

The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University, Thailand, has approved constituted in accordance with the International Conference on Harmonization – Good Clinical Practice (ICH-GCP).

Signature: ..... Signature: .....

(Associate Professor Prida Tasanapradit, M.D.) Chairman

(Assistant Professor Nuntaree Chaichanawongsaroj, Ph.D.) Secretary

Date of Approval : 29 October 2018 Approval Expire date : 28 October 2019

The approval documents including

1) Research proposal
2) Researcher

Protocol No. 223.1/61
Date of Approval 29 OCT 2018
Approval Expire Date 28 OCT 2019

The approved investigator must comply with the following conditions:

1. *The research/project activities must end on the approval expired date of the Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University (RECCU). In case the research/project is unable to complete within that date, the project extension can be applied one month prior to the RECCU approval expired date.*
2. *Strictly conduct the research/project activities as written in the proposal.*
3. *Using only the documents that bearing the RECCU's seal of approval with the subjects/volunteers (including subject information sheet, consent form, invitation letter for project/research participation (if available).*
4. *Report to the RECCU for any serious adverse events within 5 working days*
5. *Report to the RECCU for any change of the research/project activities prior to conduct the activities.*
6. *Final report (AF 03-12) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project. For thesis, abstract is required and report within 30 days after the completion of the research/project.*
7. *Annual progress report is needed for a two- year (or more) research/project and submit the progress report before the expire date of certificate. After the completion of the research/project processes as No. 6.*

Appendix B: Selected Questions

The items related to the studied variables in the conceptual framework were selected from questionnaires and related datasets. Details of selected questions were as follows.

Items from Household Questionnaire

Area

- Area:

  Urban…….1

  Rural……2

Region

- Region:

  Bangkok…….1

  Central……2

  North……3

  Northeast…….4

  South…….5

Wealth index quintiles

- Wealth index quintiles:

  Poorest……1

  Second…….2

  Middle…….3

  Fourth……4

  Richest……5

  Wealth index quintiles are constructed by using data on housing characteristics, household and personal assets, and on water and sanitation via principal components analysis. The wealth index quintiles were calculated and provided in the household dataset of MICS surveys.

Sex of child

- Is (name) male or female?

  Male…….1

  Female……...2

Items from Questionnaire for Individual Women (age 15-49 years)

Early initiation of breastfeeding

- How long after birth did you first put (name) to the breast?

  If less than 1 hour, record "00" hours

  If less than 24 hours, record hours

  Otherwise, record days

  Immediately……000

  Hours……1

  Days……2

  DK/Don't remember…….998

Age of mother

- In what month and year were you born?

  Date of birth

  Month……

  DK month…….98

  Year……

  DK year……..9998

- How old are you?

  Probe: How old were you at your last birthday?

  Age (in complete years) …….

Marital status of mother

- Are you currently married or living together with a man as if married?

  Yes, currently married……1

  Yes, living with a man…….2

  No, not in union…….3

- Have you ever been married or lived together with a man as if married?

Yes, formerly married…….1

Yes, formerly lived with a man……2

No……3

- What is your marital status now: Are you widowed, divorced or separated?

  Widowed……1

  Divorced…….2

  Separated…….3

Educational level of mother

- What is the highest level of school you attended?

  Preschool…….00

  primary …….01

  secondary ……02

  associate/commercial college degree…….03

  diploma…….04

  bachelor degree…….05

  master degree…….06

  doctoral degree……07

Received antenatal care (yes/no, times)

- Did you see anyone for antenatal care during your pregnancy with (name)?

  Yes…….1

  No……2

- How many times did you receive antenatal care during this pregnancy?

  Probe to identify the number of times antenatal care was received. If a range is given, record the minimum number of times antenatal care received.

  Number of times…….

  DK……

Place of delivery

- Where did you give birth to (name)?

Probe to identify the type of source.

If unable to determine whether public or private, write the name of the place.

Home

Respondent's home……11

Other home…….12

Public sector

Government hospital……21

Government clinic/health center…….22

Other public (specify)……26

Private medical sector

Private hospital……31

Private clinic…….32

Other private medical (specify)……36

Other (specify)……96

Mode of delivery

- Was (name) delivered by caesarean section? This is, did they cut your belly open to take the baby out?

  Yes…….1

  No……2

Children ever born

- How many sons live with you?
- How many daughters live with you?
- How many sons are alive but do not live with you?
- How many daughters are alive but do not live with you?
- How many boys have died?
- How many girls have died?
- Sum answers to all the above questions

  Sum …….

Size of child at birth

- When (name) was born, was he/she very large, larger than average, average, smaller than average, or very small?

  Very large……1

  Large than average…….……2

  Average……3

  Smaller than average…….4

  Very small…….5

  DK…….6

Child weight at birth

- How much did (name) weight?

  If a card is available, record weight from card.

  From card……1(kg)……

  From recall……2(kg)…….

  DK…….99998

Items from Questionnaire for Children under Five

Exclusive breastfeeding under 6 months

- Is (name) still being breastfed?

  Yes……1

  No…….2

  DK……3

- Did (name) drink (name of item) yesterday during the day or night?
- Did (name) eat (name of food) yesterday during the day or night?

Age of child

- On what day, month and year was (name) born?

  Probe: What is his/her birthday?

  Date of birth

  Day……

  DK day…….98

  Month……

  Year……255_

Appendix C: Test of Assumption

1. Testing Assumptions of Multicollinearity

Munro (2005) stated that the problem of multicollinearity was implied in high correlations among variables (r > .85). As shown in the following tables, the correlations between variables in the current study were no more than 0.85. Therefore, there was no existence of multicollinearity problem in the current study.

Table 14 Correlation matrix among all independent variables in children under 6 months in MICS3 4 5

	1	2	3	4	5	6	7	8	9	10	11	12
Area (1)	1											
Region (2)	.262**	1										
	.000											
Age of Mother (3)	-.040*	-.007	1									
	.043	.736										
Married status of mother (4)	.037	.072**	.104**	1								
	.063	.000	.000									
Age of child (months) (5)	-.035	-.042*	.020	-.117**	1							
	.076	.035	.303	.000								
Sex (6)	-.004	.059**	.003	.018	.007	1						
	.830	.003	.896	.375	.734							
Wealth index quintile (7)	-.297**	-.255**	.254**	.046*	.101**	.006	1					
	.000	.000	.000	.019	.000	.772						
Education of mother (8)	-.097**	-.120**	-.034	.024	-.025	-.019	.381**	1				
	.000	.000	.083	.223	.204	.330	.000					
Place of delivery (9)	-.176**	-.208**	.136**	.009	.021	-.020	.244**	.138**	1			
	.000	.000	.000	.650	.294	.300	.000	.000				
Children ever born (10)	.081**	.108**	.501**	.052**	-.024	.053**	-.048*	-.314**	-.015	1		
	.000	.000	.000	.009	.218	.008	.015	.000	.452			
Size of child at birth (11)	-.004	.012	-.062**	.010	.005	-.006	-.045*	-.050*	-.043*	.008	1	
	.851	.558	.002	.620	.803	.751	.023	.012	.030	.691		
Weight at birth (12)	-.014	.042*	.023	.049*	.011	-.046*	.018	-.006	-.102**	.058**	.544**	1
	.494	.032	.251	.013	.581	.020	.358	.772	.000	.003	.000	

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

VITA

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