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Examining Exclusive Breastfeeding Practice in Indonesia, and Its Association to Maternal Socio-Demographic Determinants, to Inform Intervention Efforts Aimed at Reducing Infant Mortality

Putri Lenggogeni

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**EXAMINING EXCLUSIVE BREASTFEEDING PRACTICE IN INDONESIA,
AND ITS ASSOCIATION TO MATERNAL SOCIO-DEMOGRAPHIC
DETERMINANTS, TO INFORM INTERVENTION EFFORTS AIMED
AT REDUCING INFANT MORTALITY**

by

PUTRI LENGGOGENI

GEORGIA STATE UNIVERSITY

**A Thesis Submitted to the Graduate Faculty
of Georgia State University in Partial Fulfillment**

of the

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MASTER OF PUBLIC HEALTH

ATLANTA, GEORGIA

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APPROVAL PAGE

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April 20, 2016

ABSTRACT

Putri Lenggogeni

Examining Exclusive Breastfeeding Practice in Indonesia, and its Association to Maternal Socio-demographic Determinants, to Inform Intervention Efforts Aimed at Reducing Infant Mortality

(Under the direction of Jenelle Shanley Chatham, Ph.D)

Introduction Exclusive breastfeeding, the gold standard of infant feeding practices, has been identified as the single most effective strategy to improve child survival. However, this recommendation is not highly practiced in Indonesia, while Indonesia's infant and under five mortality is still high. Interventions to promote, protect, and support breastfeeding practice are critical public health needs in Indonesia.

Aim The current study examined socio-demographic factors associated with exclusive breastfeeding practice in Indonesia: whether maternal age, level of education, occupation status, wealth index, and region of residence, as well as breastfeeding initiation are associated with exclusive breastfeeding practice in Indonesia for mothers having infants up to age five months.

Methods This study analyzed 1695 women having infant aged 0-5 month old data from the 2012 Indonesia Demographic Health Survey. Chi-square test was used for preliminary analysis and logistic regression analyses were used to primary analysis by using SAS 9.4 program.

Results Exclusive breastfeeding practice in Indonesia was low (36.1%). Mothers aged 30-39 years old were more likely to exclusively breastfeed compare to mothers under 20 years old (OR=1.56, 95% CI 1.04-2.35). Mothers with high education level had higher odds to exclusively breastfeed compare to low education mothers. Unemployed mother were more likely to exclusively breastfeed than working mothers (OR=1.65, 95% CI 1.28-2.13). Mothers coming from richer wealth index were less likely to exclusively breastfeed compare to mothers having poorest wealth index (OR= 0.49, 95% CI 95% 0.34-0.72). Those who initiated breastfeeding early had increased odds to exclusively breastfeed than mothers who delayed breastfeeding initiation (OR=1.47 95% CI 1.19-1.83). Finally, mothers who lived in Eastern Indonesia were more likely to exclusively breastfeed compare to mothers who lived in Sumatera and Kalimantan (OR=1.82, 95% CI 1.30-2.55).

Conclusion This study found characteristics of Indonesian mothers who were more likely to exclusively breastfeed compared to the reference group: aged 30-39 years old, high education level, unemployed, richer wealth index, and those who live in Eastern Indonesia; as well as, mother who initiate breastfeeding early. Having tailored strategies and interventions to targeted at-risk populations may increase the likelihood of exclusive breastfeeding practices, and ultimately, decreasing infant mortality rates in Indonesia.

Index words: exclusive breastfeeding, infant feeding, infant mortality, developing country

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LIST OF ABBREVIATIONS

AAP: American Academy of Pediatricians

AOR: Adjusted Odds Ratio

CI: Confidence Intervals

COR: Crude Odds Ratio

DHS: Demographic Health Survey

EBF: Exclusive Breastfeeding

IMR: Infant Mortality Rate

IYCF: Infant and Young Child Feeding

MDGs: Millennium Development Goals

OR: Odds Ratio

SAS: Statistical Analysis System

SES: Socioeconomic Status

UNICEF: United Nations Children's Fund

WHO: World Health Organization

Chapter I

1. Introduction

1.1 Background

Exclusive breastfeeding, the gold standard of infant feeding practices (WHO, 1991, 2000; WHO-UNICEF, 2003, UNICEF, 2011) has been identified as one of the crucial strategies to mitigate childhood morbidity and mortality in developed and developing countries (WHO, 2000; Jones 2003; Lauer et al., 2006; Victora et al., 2008,2016; Nabulsi, 2014). Delayed early initiation of breastfeeding, non-exclusive breastfeeding, and early complementary infant feeding are practices associated with high rates of child morbidity and mortality in developing countries (WHO, 2000; UNICEF, 2013; Jones, 2003). The risk of death from infectious diseases in the first two year of life and suffering non-communicable disease later in life is lower for infants who have been breastfed optimally, and positive outcomes associated with breastfeeding are well-established (WHO, 2014). Exclusive breastfeeding is also beneficial for mothers by improving maternal survival rate and lowering the risk to non-communicable diseases (WHO, 2000,2011; APA, 2011, Victora, 2008, Nabulsi, 2014).

Although, the benefits of breastfeeding are clear and well-documented (WHO,2000;2013, APA, 2011, NHS, 2014, Jones 2003;Roberts, 2013, Rollins, 2016, Nabulsi, 2014), the rate of exclusive breastfeeding at six months and continued breastfeeding up to 2 years are still low in many countries (WHO, 2011, UNICEF, 2011, Jones, 2003). The World Health Organization (WHO) and United Nations Children's Fund (UNICEF) recommended early breastfeeding initiation (i.e., within one hour after birth) and exclusive breastfeeding for the first 6 months of life in both developing and developed countries to improve infant's health outcome and reached Millennium Development Goals- 4 and -5 of improving infants' and mothers' life (WHO, 1991,

2000, 2003, UNICEF, 2011, 2015, Agarwal, 2008). These optimal breastfeeding practices are reported as the single most effective strategy to improve child survival in developing countries by preventing an estimated 13% of under-five mortality (Jones, 2003; Nabulsi et al., 2014; Lauer et al., 2006; Victora et al., 2016, UNICEF, 2011).

The Republic of Indonesia is the fourth most populous country in the world (Statistics Indonesia et al., 2013), with an estimated population size of around 240 million, and 4.4 million infants are born annually (Statistics Indonesia et al., 2013). Although the past decades have seen some major improvements in the health of the Indonesian people (UNICEF Indonesia, 2009), the poorer segments of the population still suffer from lack of access to adequate hygiene, sanitation, food and health care. Twenty-one percent of the population lives below the international poverty line of less than USD 1.25 per person per day, which means that approximately 50 million Indonesians are living in poverty (World Bank, 2010). The poorer 60% of the population spends between USD 3.70–11 on food per month per person (World Bank 2010, Statistics Indonesia et al., 2013).

Indonesia is one of many developing countries that continues struggling to improve children and mother's health outcome (Statistics Indonesia et al., 2013). Although Indonesia's infant and under five mortality rates have decreased, the rates in 2012 were still high: 26 and 31 per 1,000 live births respectively (Statistics Indonesia et al., 2013). In Indonesia, 1 in every 38 babies dies before reaching age 1, and 1 in every 32 children dies between their first and fifth birthday. Sixty percent of infant dies during the first month of life (neonatal period), and eighty percent of child deaths occurred during infancy (Statistics Indonesia et al., 2013). Infant mortality rates in Indonesia are highest among children whose mother gave birth at age 40 or

older, who had high parity (3 or higher), and become pregnant after a short birth interval/less than 24 months (Statistics Indonesia et al., 2013). The rate is also highest for children living in rural areas, children whose mothers have no education, and children in the lowest wealth index (Statistics Indonesia et al., 2013).

According to the 2012 Indonesia Demographic Health Survey (IDHS), only one third of Indonesian mothers follow WHO-UNICEF (2003) recommendation to provide breast milk only (exclusively breastfeeding practice) for the first six months of infant's life (Statistics Indonesia et al., 2013). Median for exclusive breastfeeding in Indonesia is 0.7 month (Statistics Indonesia et al., 2013). However, among infants who are breastfed, they are generally breastfed until well into their second year or beyond, and the median duration of any breastfeeding is 21 months (Statistics Indonesia et al., 2013).

Interventions that promote optimal breastfeeding practices may promote a significant decrease in infant and under-five mortality rates in Indonesia (WHO, 2014). Mothers, who plays important role in infant feeding practices, may have some characteristics that increase their likelihood of applying the recommended infant feeding practices. A study analyzing a national representative survey, Indonesia Demographic and Health Surveys 2002/2003 and 2007, reported that socio-economic, environmental, pregnancy-birthing characteristics, and maternal health services were factors associate with exclusive breastfeeding practices in Indonesia (Titaley et al., 2014). According this study, infants from high household wealth-index, infants whose parents were employed, infants whose mothers had obstetric complication at childbirth, and infants who not live in Eastern Indonesia had significantly decreased odds of exclusive breastfeeding (Titaley et al., 2014).

1.2 Purpose of study

Several studies in developing countries have focused on examining factors associating with exclusive breastfeeding practices (Ukegbu et al., 2013; Onah et al., 2014, Mekuria et al., 2015; Joshi et al., 2014, Egata, 2014; Gultie et al, 2016, Gayawan et al, 2014). In Indonesia, very limited studies examined exclusive breastfeeding practices (Inayati, 2012; Titaley et al, 2014). One study conducted by Titaley et al. (2014) using two national representative surveys, IDHS 202/2003 and 2007, reported poor breastfeeding practices in Indonesia. Public health interventions that promote, protect, and support breastfeeding are critical in Indonesia (Titaley et al., 2014, Inayati et al., 2012). Efforts to target particular populations who are least likely to breastfeed may increase exclusive breastfeeding behavior (WHO 2003; UNICEF, 2011). The current study examined factors associated with exclusive breastfeeding practice Indonesian: whether maternal age, level of education, occupation status, wealth index, and region of residence, as well as breastfeeding initiation are associate with exclusive breastfeeding practice in Indonesia for infants up to age five months.

Chapter II

Review of The Literature

2.1. Breastfeeding Practices to Reduce Infant Mortality

2.1.1. International Focus to Promote, Protect, and Support Breastfeeding

“Inappropriate feeding practices lead to infant malnutrition, morbidity, and mortality in all countries, and improper practices in the marketing of breast milk substitutes and related products can contribute to these major public health problems. (*International Code of Marketing of Breast-milk Substitutes* Preamble) (UNICEF, 2011; Mannel, Martens, and Walker, 2013).

International initiatives to promote, protect, and support breastfeeding was initiated in 1979 due to the alarming situation over the unnecessary deaths related to the industry-created bottle-feeding culture. The meeting on Infant and Young Child Feeding was held by two agencies of the United Nations, the World Health Organization/WHO), and the United Nations Children’s Fund/UNICEF) (Mannel, Martens, and Walker, 2013). In 1990, in Florence, Italy, the Innocenti Declaration on the Protection, Promotion, and Support of Breastfeeding was adopted at the meeting sponsored jointly by UNICEF, WHO, the United States Agency for International Development, and the Swedish International Development Authority (WHO, 2003; UNICEF, 2011; Mannel, Martens, and Walker, 2013). Attainment of Innocenti goals which called for concrete actions for government to take by 1995, require, the reinforcement of a “breastfeeding culture” and the vigorous defense against incursion of a “bottle-feeding culture” in many countries (UNICEF, 2011). The ultimate outcome of this meeting was the creation of the *International Code of Marketing of Breast-Milk Substitutes* which was adopted by the World Health Assembly. In addition, WHO and UNICEF formed the *Ten Steps to Successful*

Breastfeeding, the core of the Baby Friendly Hospital Initiatives/BFHI (UNICEF, 2011; Mannel, Martens, and Walker, 2013).

In 2002, WHO and UNICEF jointly endorsed the Global Strategy for Infant and Young Child Feeding/IYCF (UNICEF, 2011; Mannel, Martens, and Walker, 2013). This publication renewed the commitment of the UN organization to sustaining joint efforts including the BFHI, the International Code of Marketing of Breast-milk Substitutes, and the Innocenti Declaration (WHO, 2003; UNICEF, 2011; Mannel, Martens, and Walker, 2013). The Global Strategy urges countries to “formulate, implement, monitor, and evaluate a comprehensive national policy of infant and young child feeding” and includes “ensuring sufficient maternity leave to promote exclusive breastfeeding” (WHO, 2003, UNICEF, 2011). Even though there have been international policies related to infant and young child feedings, there is an enormous amount of work yet to be done. Poor feeding practices are a major threat to social and economic development; they are among the most serious obstacles to attaining and maintaining health that face infants (WHO, 2003).

Optimal Infant and Young Child Feeding (IYCF) is presented in the WHO/UNICEF Global Strategy for Infant and Young Child Feeding (WHO-UNICEF, 2003) as follows:

“As a global public health recommendation, infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health. Thereafter, to meet their evolving nutritional needs, infants should receive safe and nutritionally adequate complementary foods while breastfeeding continues for up to two years of age or beyond. Exclusive breastfeeding from birth is possible except for a few rare medical conditions as specified by WHO and UNICEF, and virtually every mother can breastfeed”.

The Global Strategy calls for action that all government should develop and implement a comprehensive policy on infant and young child feeding (in the context national policies for nutrition), all mothers should have access to skilled support to initiate and sustain exclusive breastfeeding for six months, and ensure the timely introduction of adequate and safe complementary foods with continued breastfeeding up to two years and beyond (UNICEF, 2011; WHO, 2003).

Interventions to protect, promote, and support breastfeeding as the principles of infant and young children feeding are critical public health needs (UNICEF, 2011; WHO, 2003; Jones, 2003, Nabulsi et al., 2014; Rollins et al., 2016). Studies reported that these interventions are the keys to meet the target of Millennium Development Goals (MDGs) number 4 of reducing child mortality, and MDGs number 5 of improving maternal health that was encourage to be achieve by 2015 (WHO, 2003; Jones, 2003).

2.1.2. Breastfeeding as the gold standard of Infant and Young Child Feeding

Breastfeeding, the gold standard of infant and young feeding (WHO, 2003, UNICEF, 2011; Health Promotion Administration, Ministry of Health and Welfare/HPA MHW, Taiwan R.O.C., 2016; APA, 2012) is a public health imperative and not only a lifestyle choice (American Academy of Pediatrics/APA, 2012). It is the foundation of good nutrition and protects children against disease (WHO, 1991, 2000, 2003; UNICEF, 2011, 2015; APA, 2012).

For human infants, there is nothing equal than the human milk (WHO, 2003; UNICEF, 2011,2015; Jones, 2003, APA, 2011). Breast milk cannot be duplicated by any artificial means; it is unique in its composition and function; and no infant formula can even resembles mother's milk

(WHO, 2003; UNICEF, 2011; APA, 2011, NHS, 2014; Mannel, Martens, Walker, 2013). Breast milk contains living protective immune factors; contains an ideal balance of nutrients that the infant can easily digest along with digestive enzymes (Victora et al., 2015, UNICEF, 2011, Mannel, Martens, Walker, 2013, APA, 2011). Moreover, breast milk changes over time, and even over the course of a day, to meet the changing needs of the growing child (Mannel, Martens, Walker, 2013, UNICEF, 2011). Mother's milk contains substances essential for optimal development of the infant's brain, with effects on both cognitive and visual function (UNICEF, 2011; Mannel, Martens, Walker, 2013, APA, 2011, NHS, 2014). Human milk provides growth factors that combine to mature the infant gut, supplies the infant with immune factors manufactured to fight illnesses specific to the mother's and infant's environment (Jones, 2003; APA, 2011; UNICEF, 2011). Breast milk provides protection against ear infections (Victora, 2001, 2008). Moreover, human milk contains components which are being discovered regularly, such as oligosaccharides (sugars) in which normal intestinal micro flora thrive, coating the lining of the baby's digestive system and protecting it (APA, 2011, Victora, 2008; UNICEF, 2011). Furthermore, breast milk is especially beneficial for the preterm infant (Victora, 2001, 2008; UNICEF, 2011, WHO, 2003). Preterm human milk contains higher concentrations of immunoglobulins, other anti-infective factors such as lysozyme, *lactoferrin* and *interferon*, and more anti-inflammatory and *immunomodulating* components, thus providing some protection from infection to these vulnerable infants. Both fresh and pasteurized human milk help lower rates of infections (Victora, 2001; UNICEF, 2011, NHS, 2014).

The World Health Organization and UNICEF (2003) jointly recommend the recent child growth standards based on the premise that breastfed baby is the norm for healthy growth among infants and call for creating conditions to achieve optimal breastfeeding (UNICEF, 2011, Mannel,

Martens, Walker, 2013). The three principles of *optimal* infant and young child feeding practices, defined on The Global Strategy on Infant and Young Child Feeding (WHO-UNICEF, 2003), are timely initiation of breastfeeding (within one hour after delivery), exclusive breastfeeding for the first six months of infant's life, and continued breastfeeding up to 2 years or beyond, along with the introduction of nutritionally adequate, safe, and appropriate complementary foods from the 6th month onwards, as well as appropriate feeding practices of infants living in especially difficult circumstances (low birth weight infants, infants of whose mother suffering HIV positive, infants in emergency situations, malnourished infants, etc.) (WHO, 2003, UNICEF, 2011).

This study will focus on exclusive breastfeeding practice during the first six months of infant's life. According to WHO (2003, UNICEF, 2011), an infant is exclusively breastfed if the infant only receives breast milk as the only food source including expressed breast milk; and excluding water, other liquids, breast milk substitutes, and solid foods; however infants in this category may receive vitamin drops, minerals, oral rehydration solution, and other oral medications, but may not receive any other foods or fluids. The rate of exclusive breastfeeding infants during the first four months of life are only 35% worldwide (WHO, 2003, UNICEF, 2011).

2.1.3. Benefits of Breastfeeding and its impact to Infant Mortality and Morbidity

Breastfeeding is considered as a cost-effective public health measure that has a significant impact on maternal health, infant morbidity, and mortality (Jones, 2003; WHO, 2000, 2003, UNICEF, 2011; Victora, 2001, 2008, 2016). The benefits of breastfeeding to infants' and mothers' health have been well-documented (WHO, 2000, 2003, UNICEF, 2011; Victora et al., 2001, 2008, 2016; AAP, 2011). To illustrate, The United States Surgeon General released a Call to Action to

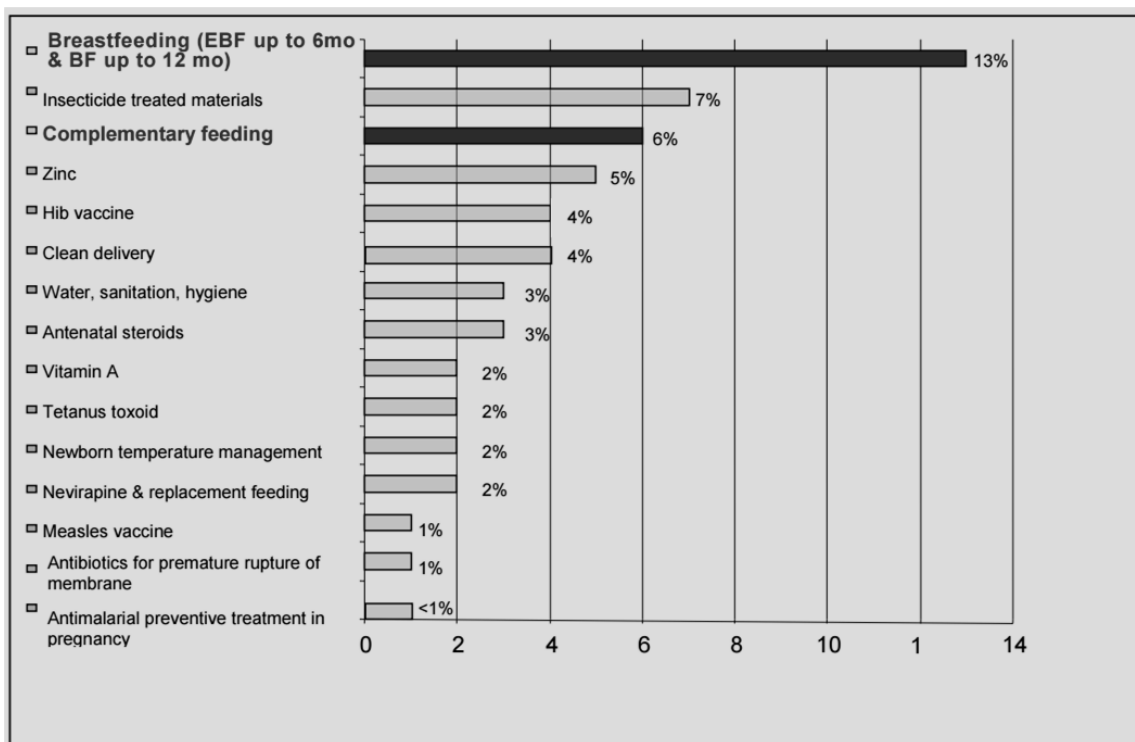
Support Breastfeeding in 2011 that started with the statement, “ One of the most highly effective preventive measures a mother can take to protect the health of her infant and herself is to breastfeed” (U.S Department of Health and Human Services, 2011).

According to the Lancet Survival Series (Jones, 2003), exclusive breastfeeding up to six months and sustaining breastfeeding up to one years are reported as the single most effective strategy to improve child survival in developing countries by preventing an estimated 13% of under-five mortality, see Figure 1 (Jones, 2003; Nabulsi et al., 2014; Lauer et al., 2006; Victora et al., 2016, UNICEF, 2011). The combination of both breastfeeding practices has the greatest potential impact on child survival of all preventive interventions (Jones et al., 2003). Jones (et al., 2003) conducted, an analysis of low-cost, highly effective child survival intervention calculated that exclusive breastfeeding in the first six months of life and continued breastfeeding for 6-11 months, if increased to 90%, could prevent 13% of deaths among under-five children (UNICEF, 2011). In comparison to another vital intervention required to prevent under-five mortality, only 7% of deaths could be prevented by use of insecticide-treated materials (Jones et al., 2003). Furthermore, they found that if mothers in developing countries breastfeed their infants as recommended, more than 800.000 children would be alive in their fifth-birthday, or almost one-fifth of under-five mortality in these developing countries (Jones et al., 2003). Breastfed children also have at least six times greater chance of survival in the early months than non-breastfed children (Jones et al., 2003).

Moreover, exclusive breastfeeding, was estimated to prevent potentially 1.4 million deaths every year among children under five (out of the approximately 10 million annual deaths), according to The 2008 Lancet Nutrition Series (WHO, 2008, Victora et al., 2016, UNICEF, 2011). An exclusively breastfed infant is 14 times less likely to die in the first six months than a non-breastfed child (Jones et al.,

2003, Victora et al., 2008, 2016). In addition, exclusive breastfed infant are 3-4 times less likely to acquire HIV infection through breast milk of an HIV-positive mother than mixed-fixed HIV-exposed infants in the first six months (WHO, 2008, Victora et al., 2016, UNICEF, 2011).

Figure 1. Percent of child deaths that could be prevented with 99% coverage of the preventive interventions

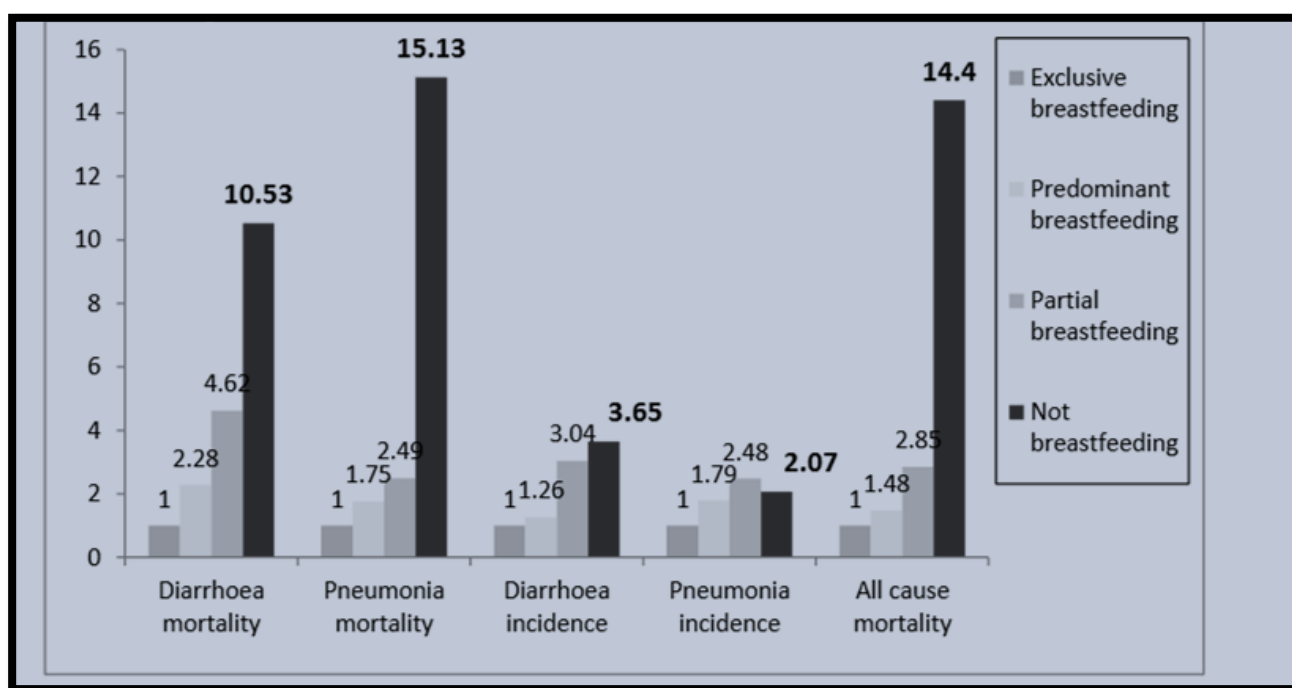


Source: Jones et al. (2003), The Lancet Child Survival Series 2003

The biggest impact of exclusive breastfeeding can be seen in terms of reduction of morbidity and mortality from diarrhea and pneumonia/ acute respiratory infection, two major child killer in developing countries, see figure 1. (Jones, 2003, WHO, 2000, 2003, UNICEF, 2011, Victora et al., 2008, 2016). *Non-breastfed* infants aged 0-5 months have seven-fold increased risk of death from diarrhea, and five-fold increased risk to pneumonia, compared with exclusive breastfed infants (WHO, 2000, 2003; Victora et al, 2008, UNICEF, 2011). At the same age, *non-*

exclusive (rather than exclusive breastfeeding) has two-fold increased risks of dying from diarrhea and pneumonia (Arefeen, et al. 2001). According to Jones (2003), breastfeeding has a protective effect on *Haemophilus*, one of the causative agents of respiratory infections. In addition, breast milk is uncontaminated and contains all the nutrients necessary for infants that age (WHO, 2000, 2014, 2015; AAP, 2012). According to UNICEF (2011), breastfeeding provides protection to infants through two mechanisms: 1) reduced risk of bacteria from contaminated formula, other liquids and complementary foods, and 2) the transfer of maternal antibodies through breast milk (UNICEF, 2011). Therefore, the potential impact of exclusive breastfeeding practices is especially important in developing country situation with a high burden of disease and low access to clean water and sanitation (WHO, 2000, 2003; UNICEF, 2011).

Figure 2. Relative Risk of Not Breastfeeding for Infections and Mortality Compared to Exclusive Breastfeeding from 0-5 months.



Source: Source: Black et al., (2008),The Lancet 2008, UNICEF, 2011

According to Lancet series on maternal and child Undernutrition (Horton, 2008), the relative risk for all cause mortality is 1.48 and 2.85 for predominant (breastfeeding plus water) and partial breastfeeding as compared to exclusive breastfeeding; the relative risk of diarrhea mortality is 2.28 and 4.62 and pneumonia mortality is 1.75 and 2.49 for predominant (breastfeeding plus water) and partial breastfeeding as compared to exclusive breastfeeding; and the relative risk for prevalence of diarrhea is 1.26 and 3.04, and for pneumonia is 1.79 and 2.49 for predominant (breastfeeding plus water) and partial breastfeeding as compared to exclusive breastfeeding (Horton, 2008).

Benefits of Breastfeeding for Infants and Young Children

Previous researches reported that breastfeeding is associated with reduced infant's risk of communicable and non-communicable diseases (APA, 2011; Jones, 2003; WHO, 2000, 2003, UNICEF, 2011; Victora, 2001, 2008, 2016; Mannel, Martens, and Walker, 2013). Breastfed infants have lower risk of respiratory tract infections, otitis media/ear infection, gastrointestinal tract infections, urinary tract infections, sepsis, atopic dermatitis, necrotizing enterocolitis, meningitis, sudden infant death syndrome (SIDS), allergic disease, inflammatory bowel diseases (Crohn's disease, ulcerative colitis, and celiac disease), obesity, diabetes type 1 and type 2, childhood leukemia and lymphoma, neurodevelopmental outcomes, and infant mortality (AAP, 2012, Victora et al, 2016, UNICEF, 2011).

Non-breastfed young children have 25% higher risk of being hospitalized for pneumonia and asthma (APA, 2011; UNICEF, 2011, Victora et al., 2016, Ip et al., 2007). Infants who are not breastfed are 36% more likely to die of SIDS, 22% more likely to be overweight or obese as

children, and at increased risk for developing leukemia, diabetes, and asthma (APA, 2011; Ip et al., 2007; Victora et al., 2016). A studies reported that non-breastfed children have a 60% higher risk of recurrent ear infections (UNICEF, 2011; APA 2011; Victora et al., 2016).

Breastfeeding not only lowers the risk of infectious and non-infectious disease in infant and young children, but also facilitates proper jaw and dental and speech development (Victora et al., 2016; UNICEF, 2011, APA, 2011). Studies reported that breastfed children have been shown to have less tooth decay (Victora et al., 2008, 2016; UNICEF, 2011, APA, 2011). In addition, studies found that breastfed infants may have different brain composition, higher IQ compared, higher mental development scores, and higher cognitive development observed from 6 months through 16 years of age compared to artificially-fed infants (Victora et al., 2008, 2016; UNICEF, 2011, APA, 2011). Furthermore, breastfeeding helps prevent growth faltering and stunting, particularly since it reduces the risk of illnesses among infants in the growth period (WHO, 2000, 2003; UNICEF, 2011; Kramer, 2002; Victora et al., 2008, 2016).

Children who are breastfed are healthier than non-breastfed children in all contexts, including in developed countries (WHO, 2003, UNICEF, 2011, Victora et al., 2016; APA, 2011). Numerous breastfeeding studies in the industrialized countries found that breastfed children have a 72% lowered risk for respiratory tract infections, 64% lower odds of gastrointestinal infections, 50% reduced chances for otitis media, 42% lower risk of asthma, 39% reduced risk of type II diabetes, 19% to 27% for type I diabetes, and 27 % less risk for obesity (Ip et al., 2007; Victora et al., 2016; APA, 2011). A study of post-neonatal mortality in the United States found a 21% lower risk of mortality among breastfed infants; breastfeeding saves infants life by preventing Sudden Infant Death Syndrome (SIDS) in the industrialized countries (APA, 2011; NHS, 2014; Victora et al., 2016). Not only that, breastfeeding decreases the chance of developing certain childhood

cancers, such as leukemia and lymphoma; with a 30% reduced risk if infants exclusively breastfed for six months (APA, 2011; UNICEF, 2011).

Furthermore, breastfeeding protects infants from the risk of getting illness from formula-feeding. The formula-feeding related illnesses can be acquired, not only from water and poor sanitation, but also from the powdered infant formula itself. Powdered infant formula is not a sterile product; infant formula is frequently recalled, it has been reported contaminated with *pathogen* and other microorganism (Mannel, Martens, Walker, 2013). In 2005, the Joint Food and Agriculture Organization/WHO expert meeting on *Enterobacter sakazakii* (now *Cronobacter sakazakii*) and other microorganism in powdered infant formula, concluded that intrinsic contamination of powdered infant formula with *E. sakazakii* (now *C.sakazakii*) and Salmonella had been a cause of infection and illnesses, including severe disease in infants, particularly preterm, low-birth-weight, or immune-compromised infants, and could lead to serious developmental sequel and death (Manner, Martens, and Walker, 2013). Apart of the risk of contamination, infant formula may be considered unsafe if the preparation and storage recommendation are not followed. According to FDA (Food Drug and Administrative), 77 % of formula feeding mothers do not receive instruction on formula preparation, and 73% do not receive storage instruction from a health professional. (WHO, 2011; Manner, Martens, and Walker, 2013).

Not only the risk of contamination, preparation, and storage, infant formula may increase the odds of getting illnesses and dying from diseases. Multiple studies reported that compared to breastfed infants, formula-fed infants have higher risk of allergy, asthma, diarrhea, gastrointestinal diseases, dental caries, respiratory disease, hypertension and high cholesterol levels, lung infections, ear infections, heart disease, obesity, diabetes type 1 and type 2, childhood cancers, inflammatory bowel disease, celiac disease, Sudden Infants-Death Syndrome (SIDS). Artificially-

fed infants has deficient response to childhood immunization. Non-breastfed infants reported have different brain composition, lower cognitive development observed from 6 months through 16 years of age and lower IQs and mental development scores (APA, 2012). Therefore, WHO recommends that parents are been told about the health risk of using infant formula to help them make a more informed decision regarding their infant feeding decision (Mannel, Martens, and Walker, 2013).

Benefits of Breastfeeding for the mothers

Breastfeeding also has a number of benefits for maternal health (Labbok, 2001; UNICEF, 2011, APA, 2011, Victoria et al. 2008, 2016). Breastfeeding mother enjoy a quicker recovery after delivery, especially due to the practice of initiation of breastfeeding immediately after delivery which helps to contract the uterus, expel the placenta, and reduce postpartum bleeding and depression (Labbok, 2001; UNICEF, 2011, APA, 2011, Victoria et al. 2008, 2016). Continued breastfeeding may also lead to a more rapid return to pre-pregnancy weight (Labbok, 2001; UNICEF, 2011, APA, 2011, Victoria et al. 2008, 2016). Exclusive breastfeeding may delay the return of fertility, thus reducing exposure to the risks associated with short birth intervals. In addition, continued breastfeeding leads to increased child spacing to lactational amenorrhea--the temporary postnatal infertility that occurs when a woman is not menstruating (Labbok, 2001; AAP, 2011).

In the longer term, mothers who breastfeed, especially for a longer duration, tend to be at lower risk of pre-menopausal breast cancer and ovarian cancer, the cumulative lactation experience correlated with these cancers; the increased risk of not breastfeeding is 39% for maternal breast cancer and 26% for ovarian cancer; the more months a woman has spent

breastfeeding, the greater the beneficial effect (Labbok, 2001; UNICEF, 2011, APA, 2011, Victoria et al. 2008, 2016). Not only that, longitudinal studies reported an inverted relationship between the cumulative lifetime duration of breastfeeding and the development of diabetes type 2, rheumatoid arthritis, adult cardiovascular disease, and other metabolic syndromes (Labbok, 2001; UNICEF, 2011, APA, 2011, Victoria et al. 2008, 2016). Breastfeeding also reduces osteoporosis, and help decrease insulin requirement in *diabetic mother*. Breastfeeding mother have a 14% lower risk of maternal type 2 diabetes (Labbok, 2001; UNICEF, 2011, APA, 2011, Victoria et al. 2008, 2016).

Moreover, women who breastfed seemingly have more productivity compare to non-breastfed women. Breastfeed mother will have fewer days of work or school lost due to baby's sickness (UNICEF, 2011). Woman who provides her breast milk to her babies are reported to be more confident, calm and less anxious than bottle-feeding mothers (Labbok, 2001; UNICEF, 2011, APA, 2011, Victoria et al. 2008, 2016). Importantly, breastfeeding contributes to feelings of attachment (*bonding*) between a mother and her child (Labbok, 2001; APA, 2012, UNICEF, 2011, Victoria et al., 2016).

Benefits of Breastfeeding for family and community

Apart from being the safest and healthiest infant feeding method, breastfeeding also has important economic benefits (WHO, 2003, UNICEF, 2011; Bartick, and Reynold, 2008). Breastfeeding is the least expensive infant feeding method (WHO, 2003). UNICEF (2011) reported an analyses of studies showing clearly the economic benefits of breastfeeding; it relates to the high cost of breast milk substitutes, feeding and sterilizing equipment, fuel, as well as workload for households (UNICEF, 2011).

Suboptimal breastfeeding practices may impact human capital development: future productivity and economic development. This practices lead to high health care cost for the household and the health service due to increased child morbidity, and the health care cost to deal with consequences of not breastfeeding; this includes the long term consequences related to obesity and chronic diseases (WHO, 2003; UNICEF, 2011). In addition, when infants get illness due to poor breastfeeding practices, it can cause the mother to miss work at the households and offices/formal work so that their productivity at work will be affected (UNICEF, 2011).

Although the economic costs of not breastfeeding generally are considered to be greatest for low-income households and low-income countries, the evidence suggests that the impact of breastfeeding in developed countries is also significant (UNICEF, 2011). A detailed pediatric cost analysis based on APA (2011) policy statement concluded that if 90% of US mothers would comply with the recommendation to breastfeed exclusively during the first six months of infant's life, there would be a savings of \$13 billion per year. The savings do not include those related to a reduction in parental absenteeism from work or adult deaths from diseases acquired in childhood (such as asthma, type-1 diabetes mellitus, or obesity-related conditions). Therefore, strategies to promote breastfeeding and increase number of exclusive breastfeeding mother would be a great economic benefit on a national level in developed and developing countries (APA, 2011).

2.2. Interventions to promote, protect, and support exclusive breastfeeding

Public health interventions to improve breastfeeding rate are essential for child survival (UNICEF, 2011). Promoting breastfeeding is an effective infant health intervention that does not need an extensive health system (Mannel, Martens, and Walker, 2013).

The Global Strategy for Infant and Young Child Feeding recognize that improving breastfeeding practices requires behavioral change; it is something that does not happen spontaneously. It needs encouragement and support at the family and community levels. Therefore, breastfeeding intervention includes community-based interventions as one of the new operational targets (WHO, 2000, 2003; UNICEF, 2011).

Factors for successful intervention include the large-scale implementation of comprehensive programs to promote, support, and protect breastfeeding with strong government leadership and broad partnership (UNICEF, 2011). The successful breastfeeding promotion programs involve action at national level, including national policies, strategies and plans to implement the main operational targets of the WHO/UNICEF Global Strategy for Infant and Young Child Feeding (2003), to adopt national legislation on the marketing of breast milk substitute and maternity protection for mothers who work outside the home, to ensure that maternity facilities are baby-friendly, to provide skilled support by health providers and community workers, and to facilitate mother support groups in the community. These actions also involves effective and targeted communication strategies to promote breastfeeding using multiple channels and messages which tailored to the local context and the specific barriers to breastfeeding (UNICEF, 2011).

Exclusive Breastfeeding in Intervention in Developing Countries

By conducting evidence-based practices of exclusive breastfeeding practices (EBF), several countries have been successful in increasing exclusive breastfeeding rates and decreasing trends of illnesses related to non-breastfeeding practice. Ghana has been successful in increasing the rates exclusive breastfeeding and declining trends in disease burden of non-breastfeeding from 5% to 52% from 1995-2012. This represents that a 10-fold increase of exclusive breastfeeding practices over 20 years in Ghana. During the same time period, rates of premature mortality, morbidity, and disability due to non-exclusive breastfeeding decreased to 80% (Fullman, 2014). Ghana adopted the Baby Friendly Hospital Initiatives (BFHI) in 1991, enacted the Breastfeeding Promotion Regulation in 2000, and invested in health communications programs to improve the knowledge of exclusive breastfeeding practices among health professionals and mothers (Fullman, 2014). Not only Ghana, other countries like Malawi (increased EBF from 5% to 50% from 1990-2010; declined infant mortality rates by 76% from 1990 to 2010), Sri Lanka (increased EBF from 21% to 61% from 1990-2010, and dropped infant mortality 83% from 1990-2010), and Cape Verde (increased EBF from 11% to 40% between 1990-2010, and decreased infant mortality rates 85% in that period) has attained similar notable achievements by conducting the evidence based interventions (Fullman, 2014).

Apart from baby-friendly hospital initiatives, some intervention may improve exclusive breastfeeding behavior in developing countries particularly with lower socioeconomic backgrounds. Peer counseling may support and encourage women to breastfeed (Mannel, Martens, and Walker, 2013) and normalize breastfeeding. Moreover, combined peer and professional support offered in hospital, at home and over the telephone, provides women with

the benefits of social support and the normalizing of breastfeeding while also addressing negative symptoms such as breast discomfort, fatigue, depression and anxiety ((Mannel, Martens, and Walker, 2013). Furthermore, other intervention may contribute to improve exclusive breastfeeding practice is prenatal and postnatal lactation instruction provided by a lactation consultant in the hospital. The lactation consultant educate women about the benefits of breastfeeding, teach them how to breastfeed correctly, and help them identify and overcome perceived barriers to breastfeeding (Mannel, Martens, and Walker, 2013).

2.3.Indonesia's Situation

2.3.1. Geography, Socio-economy, and Population of Indonesia

Indonesia is one of Republic countries in Southeast Asia and one of the founder of the Association of Southeast Asian Nations (ASEAN). The Republic of Indonesia is an archipelago consisting of approximately 17,000 islands which lies between Asia and Australia and bounded by the South China Sea in the north, the Pacific Ocean in the north and east, and the Indian Ocean in the south and west (Statistics Indonesia et al., 2013). Among the 17,000 islands, there are five major islands: Sumatera in the west, Java in the south, Kalimantan by the equator, Sulawesi and Papua in the east. Two remaining groups of island are Maluku and Nusa Tenggara, spreading between Sulawesi to Papua in the north and from Bali to Timor in the south (see figure 3). Indonesia is divided administratively into provinces; each province is subdivided into districts and municipalities; altogether, there are 33 provinces, 399 districts, and 98 municipalities in Indonesia (Statistics Indonesia et al., 2013).

Indonesia, inhabited by 237.6 million in 2010, is the fourth most populous country in the world after the People's Republic of China, India, and the United States of America (Statistics

Indonesia, 2013). However, Indonesia's population growth rate has declined in the last three decades (1980-2010), from 1.98 to 1.44 percent (Statistics Indonesia, 2013). Indonesia's fertility rate also has declined significantly since 1980s, the crude birth rate (CBR) dropped from 28 births per 1000 population in 1986-1989 to 23 per 1,000 population in 2010. The life expectancy at birth for both female and male has also increased. Male's life expectancy increased from 58 years in 1990 to 69 years in 2010, and female's life expectancy increased from 62 years in 1990 to 73 years in 2010 (Statistics Indonesia et al., 2013).

Indonesia's territory is 80% covered with water; the land area is approximately 1.9 million square kilometers. Having large numbers of islands and their dispersion over a spacious area has yielded a diverse culture and hundreds of ethnic groups, each having its own language; Indonesia has a national motto "Unity in Diversity" or in Indonesian well-known as *Bhinneka Tunggal Ika* (Statistics Indonesia et al., 2013).

Another critical characteristics of Indonesia is the uneven distribution of the population among islands and provinces. The population density varies not only across islands, but also among provinces of the same island (Statistics Indonesia, 2013). Population density at the national level was 109 persons per square kilometer in 2000 and increased to 124 persons per square kilometer in 2010. Half of Indonesia's population (118.3 million people, or 50 % of population) lived in urban areas, and the majority of Indonesian (87%) is Moslem in 2010 (Statistics Indonesia et al., 2013).

Indonesia has been noticed as one of Southeast Asia's highly performing economies in the latest decade (Statistics Indonesia, 2013). This decade, Indonesia's economy is recovering although Indonesia experienced a financial crisis in 1997 causing slow economic growth. The Indonesian government has apparently been successful in improving the general welfare of the

population by ensuring the availability of adequate food, clothing, and housing, as well as providing adequate education and health services (Statistics Indonesia et al., 2013).



Figure 3. Map of Indonesia and the neighboring countries
(source: Monash University, 2011 from <http://books.publishing.monash.edu/>)

Generally, Indonesia is divided into three time zone (Statistics Indonesia et al., 2013): Western Indonesian Time/WIT (observed in islands of Sumatra, Java, provinces of West Kalimantan and Central Kalimantan), Central Indonesian Time/CIT (observed in islands of Sulawesi, Bali, provinces of East Nusa Tenggara, West Nusa Tenggara, East Kalimantan and South Kalimantan), and Eastern Indonesian Time/EIT (observed in provinces of Maluku, North Maluku, Papua and West Papua).

The regions of Indonesia have some of their *indigenous* ethnic groups (Statistics Indonesia et al., 2013). Approximately, 300 ethnic groups are existed in Indonesia. The largest ethnic group is the Javanese making up 41% of the total population. Moreover, there are significant populations of ethnic groups reside in every region (Statistics Indonesia et al., 2013): Sumatra island (Malays, Batak, Minangkabau, Acehnese, Lampung, Kubu), Java island (Javanese, Sundanese, Bantenese, Betawi, Tengger, Osing, Badui), Sulawesi island (Makassarese, Buginese, Mandar, Minahasa, Buton, Gorontalo, Toraja, Bajau), Kalimantan island (Malays, Dayak, Banjar), Madura island (Madurese), Lesser Sunda Islands (Balinese, Sasak), The Moluccas (Nuaulu, Manusela, Wemale), and Papua island (Dani, Bauzi, Asmat) .

2.3.2. Infant and Under-five Mortality and Exclusive Breastfeeding Practices in Indonesia

Indonesia's Infant mortality rate is considered high, 35 deaths per 1000 live birth; however, its exclusive breastfeeding rates dropped over the past decade (Statistics Indonesia et al., 2013). According to the 2012 Indonesia Demographic Health Survey (IDHS), only one third of Indonesian mothers exclusively breastfeed their children for the first six months (Statistics Indonesia et al., 2013). Median for exclusive breastfeeding in Indonesia is 0.7 month (Statistics Indonesia et al., 2013). Among infants who were breastfed, Indonesian infants are generally breastfed until well into their second year or beyond, and the median duration of any breastfeeding is 21 months (Statistics Indonesia et al., 2013).

Factors related to exclusive breastfeeding in Indonesia can be associated with socioeconomic determinants and region (Mekuria, 2015; Onah, 2014; Titaley et al., 2014). The Indonesian Archipelago is characterized by uneven distribution of the population among the

island and provinces. The population density varies not only across islands, but also among provinces of the same island (Statistics Indonesia, 2013). Indonesia is divided into three time zone, and basically, western and central Indonesia are more developed than eastern Indonesia. It might be because the capital city is located in Java Island, and the development was centralized nearby the capital city. Furthermore, the regions of Indonesia have some of their *indigenous* ethnic groups; with approximately 300 ethnic groups existed in Indonesia. The largest ethnic group is the Javanese making up 41% of the total population. In this study, region is divided into three groups: Region 1 (western Indonesia), Region 2 (central Indonesia), and Region 3 (eastern Indonesia). One of big issues in Indonesia is providing equal access to health information and public health services (Statistics Indonesia, 2013). The uneven distribution in Indonesia may be associated with the disparities in development, and the regions inhabited by various ethnic groups. In addition, social support network from families, friends, and communities are linked with better health statues. Similarly, customs and traditions, as well as beliefs of the family and community influence health related behavior (WHO, 2016). Infant and young child feeding practice including breastfeeding may be influenced by the heterogeneity of ethnicities across region in Indonesia (Titaley, 2013).

2.4.Limitations to breastfeeding practices

Promoting exclusive breastfeeding in Indonesia is an important public health initiative to address the high infant mortality rate. In order to understand what factors impact whether a mother exclusively breastfeeds her infant until six months of age, we need to understand what factors contribute to or hinder her initiated and continue breast feeding. Previous studies have shown several material characteristics are associated with mothers applying the recommended infant feeding practices, including socioeconomic factors, regional factors, and initiation of breastfeeding (Ukegbu et al., 2013; Onah et al., 2014, Mekuria et al., 2015; Joshi et al., 2014, Egata, 2014; Gultie et al, 2016, Gayawan et al, 2014).

Determinants of health ranging from personal, social, economic, and environmental factors may influence health status (WHO, 2003). Social and physical determinants of health, also called as social determinants of health reflect the social factors and physical conditions of the environment where people are born, live, learn, play, work, and age. These determinants impact a wide range of health, functioning, and quality-of-life outcomes (WHO, 2000, 2003).

A number of socio-economic, environmental, and biological factors influence infant and child mortality (WHO, 2014; UNICEF, 2011). In a framework developed for the study of child mortality in developing countries, various proximate and socioeconomic determinants of infant mortality. Based on Mosley and Chen's framework, there is disparity in early childhood mortality by demographic characteristics of the child and the mother such as mother's age at birth, birth order, birth interval, and birth size (WHO, 2000, 2014). The differentials in childhood mortality by socio-economic characteristics including maternal age, mother's educational attainment, wealth index, and environmental factor, such as place of residence were reported in Indonesia (Statistics Indonesia et al., 2013). Furthermore, the relationship between mother's age

at birth and childhood mortality exhibits U-shaped pattern; children of the youngest and the oldest mothers experienced the highest mortality risks; the higher rates for younger and older women may be related to biological factors that lead to complications during pregnancy and delivery; however, it may be associated with other socioeconomic determinants such as level of education and household wealth index which affects mother access to health facilities (Statistics Indonesia et al., 2013). In addition, these socio-economic factors may interact each other to influence health-seeking behavior, and health-related behavior such as exclusive breastfeeding practice (Mikkonen, 2010). To illustrate, women who have higher education are more likely to have higher income level, have an employed status, live in urban area, and have a better access to health related information so that they are more likely to have a better health-related behavior, such as breastfed exclusively (Mikkonen, 2010).

Education is one of the most influential determinants of an individual's knowledge, attitudes, and behaviors, including health-related behavior, such as exclusive breastfeeding. Low education levels are associated with poor health, more stress and lower self-confidence (WHO, 2016). In Indonesia, mother's level of education is inversely related to her child's risk of dying. According to Statistics Indonesia et al., (2013), higher level of educational attainment are generally associated with lower mortality risks since education exposes mother to various information about pregnancy and child health care. It was reported by Statistics Indonesia et al., (2013) that infant mortality is 77 percent lower for children whose mothers have more than secondary education than those with no education (15 and 66 deaths per 1,000 live births, respectively). In the terms of association of education attainment with breastfeeding practice, a study found that mothers who have more education may have better understanding of the health

benefits of breastfeeding because mothers who have higher education level may be more likely to seek information about breastfeeding than low-educated mother (Heck, 2006).

Higher wealth index are associated with higher health status. The greater the gap between the richest and poorest people, the greater the differences in health status (WHO, 2014). According to socioeconomic model, lower wealth index, lower level of education, and occupational status are correlated with increased risk of morbidity and mortality (WHO 2014). According to Statistics Indonesia et al., (2013) all childhood mortality rates are lowest for children in the highest wealth index; the level of mortality of children in the highest wealth index is about one-third that of children in the lowest wealth index. It might be mother who have a higher wealth index have more resources that help them engaged in a health-related behavior (Mikkonen, 2010). However the association between exclusive breastfeeding practice and wealth index are seemingly reversible. A study examined exclusive breastfeeding practice in South-East Nigeria found that mother who had higher wealth index tend to not exclusively breastfeed compare to mother who had lower wealth index (Onah et al., 2014), it was confirmed from a study conducted in Indonesia (Titaley et al., 2014; Joshi, 2014). According to a study analyzing a national representative survey, infants from low household wealth-index, infants whose parents were unemployed, infants whose mothers did not have obstetric complication at childbirth, and infants who live in Eastern Indonesia had significantly increased odds of exclusive breastfeeding (Titaley et al., 2014). It was apparently due to the fact that mothers in eastern region of Indonesia have limited access to infant formula and complementary infant feeding than mothers in Java and Bali. It can affect exclusive breastfeeding behavior since the availability of infant formula and complementary food have been reported as hindering factor of exclusive breastfeeding practice (Titaley, 2013).

Furthermore, people in employment are healthier (WHO, 2016). An employed mother tend to have a higher level of education and a higher income, she may have a more positive attitude towards exclusive breastfeeding (Danso, 2014; Mekuria, 2015). In a study conducted by Li, Fein , and Grummer-Strawn (2008) which examine mothers' self-reported reasons for stopping breastfeeding during the first year, found that employment status of mother has been reported as a barrier to exclusive breastfeeding (Ip et al, 2007; U.S. Department of Health and Human Services, 2011).

Moreover, physical environment may contribute to health status and health related behavior. In terms of early childhood mortality, Statistics Indonesia et al., (2013) found that there is a large difference in infant and child mortality rate between urban and rural areas; generally, urban mortality is around two-thirds of the rural mortality at every age. As aforementioned, socioeconomic determinants may interconnected influencing heath status and health related behavior (WHO, 2014). In addition; a study reported that women who live in neighborhoods with lower income level, lower level of education (less than post-secondary education), and higher levels of unemployment, are less likely to exclusively breastfeed at discharge from hospital (WHO, 2014; Victora et al., 2008, 2016) and more likely to have lower rates of breastfeeding initiation and duration (UNICEF, 2011, Victora et al., 2008, 2016). The early breastfeeding initiation within one hour after birth was recommended by WHO (2003) and UNICEF (2011). Mother whose infant was initiated breastfeeding early are more likely to exclusively breastfeeding since the practice of early breastfeeding initiation was recommended by the health practitioner in a birth facility where mother tend to follow the recommendations (WHO, UNICEF, 2003). In addition, the early breastfeeding initiation facilitates infants and mother to have better breastfeeding experience, they tend to have less barrier to breastfeeding (Li et al. 2008).

However, this practice also correlates with socio-economic determinants and residence of mother. Titaley et al. (2013) found that wealth index and region are correlated with breastfeeding initiation in Indonesia.

The purpose of this current study was to expand upon research conducted in 2012 by Titaley et al. (2014). Specifically, we focused on maternal age, level of education, occupation status, wealth index, type of region, and breastfeeding initiation. It is hypothesized that mothers who aged more than 20 years old and less than 40 years old, had high education level, had low wealth index, unemployed, live in Eastern Indonesia; initiated breastfeeding early, are more likely to exclusively breastfeed their infants aged 0-5 months old.

Chapter III

Methods & Procedures

3.1 Data Source

The current study is a secondary analysis using data collected from the Indonesia Demographic and Health Survey (IDHS) 2012—the standard Demographic and Health Surveys (DHS) phase VI obtained from the United States Agency for International Development (USAID) website at <http://www.dhsprogram.com/data/available-datasets.cfm>. DHS are nationally representative household surveys designed to produce estimates at the national, urban-rural, and provincial levels. The 2012 IDHS is the seventh survey conducted in Indonesia under the auspices of the DHS program. The survey was carried out by Statistics Indonesia (*Badan Pusat Statistik-BPS*) in collaboration with the National Population and Family Planning Board (*Badan Kependudukan dan Keluarga Berencana Nasional-BKKBN*) and the Ministry of Health (MOH). Funding for the local costs of the survey was provided by the government of Indonesia; ICF International provided technical assistance through the U.S. Agency for International Development (USAID)-funded Demographic and Health Surveys (MEASURE DHS) program (Statistics Indonesia, 2012). The 2012 IDHS dataset is a nationally representative sample of 43,852 household (response rate of 99 percent), 45,607 women aged 15-49 years old (response rate 96 percent), and 9,306 married men aged 15-54 (response rate 92 percent). Generally, response rates in rural areas were higher than those in urban areas.

The primary objective of the 2012 IDHS was to provide policymakers and program managers with national- and provincial-level data on representative samples of all women age 15-49 and currently-married men age 15-54. This survey was specifically designed to provide data on fertility, family planning, maternal and child health, adult mortality (including maternal mortality),

and awareness of AIDS/STIs to program managers, policymakers, and researchers to help them evaluate and improve existing programs. (Statistics Indonesia, 2012). The 2012 DHS used four questionnaires: the household questionnaire, woman's questionnaire, the currently married man's questionnaire, and the never-married man questionnaire (Statistics Indonesia, 2012). Variables included in the current study were derived from the women's questionnaire.

3.2 Study Design and Participants

The 2012 IDHS used a cross-sectional study design and its sample is stratified by province and urban-rural areas. Data included for the current study involved only mothers who had an alive infant aged 0-5 months who lived with the mother, resulting total of 1,695 participants. This study used data from children dataset of Indonesia DHS 2012. The children data set contains information of under-five (children aged 0-5 years old) of interviewed woman. To determine exclusive breastfeeding status in this study, mothers who had an infant fulfilling three criteria were included: being alive, aged 0-5 months old, and lived with mother. Therefore, total subjects in this current study was 1,695 mothers, of whom, only one per three exclusively breast feed their infants (36.1%; see Table 4.1).

The characteristics of participants of this study (N=1,695) are displayed in Table 3.1. By the age group, half mothers in this study were 20-29 years old (52.7%), the average age is 27.6 years old (SD=6.29), mother's age ranged 15-49 years old. In terms of marital status, almost all mothers were currently married (99%). By the employment status, more than half mothers were unemployed (67.8%). Across the education level, more than half mothers had middle level of education (55.3%). In terms of wealth index, one of three mothers had poorest wealth index (30.3%). Moreover, in this study, according number of under five in the household, half mothers had one another under five in their household (53.51%). By mode of delivery, majority of infants

in this study were delivered by non-caesarean (85%). By breastfeeding initiation, half of those infants had delayed breastfeeding initiation (51.7%). Across the region, 40% mothers lived in region 1 (Sumatera and Kalimantan), and half of those lived in rural areas (54.9%).

Furthermore, the characteristics of infants in this study were illustrated in Table 3.2. Among infants aged 0-5 months, one of five infants aged 1 month old (20.18%), the average age of infants are 2.67 month old (SD=1.63). By the sex of infants, half of them are male (53.39%). In the term of size of infants (reported subjectively by the mothers), half of infants are on average size (55,1%). By the duration of breastfeeding, majority of infants are still breastfeeding (89.49%); however, more than half infants also drank from bottle with nipple on the preceding day of the survey (67.91%).

Table 3.1. Socio-demographic Characteristics of The Study Participants (Mothers), Indonesia DHS, 2012 (N=1,695)

Variables	Categories	N (%) N=1695
*Age (year)		*27.63 ± 6.29
Age-group	< 20	166 (9.79)
	20-29	894 (52.74)
	30-39	583 (34.4)
	>40	52 (3.07)
Occupation	Unemployed	1150 (67.85)
	Employed	545 (32.15)
Level of Education	Low	516 (30.44)
	Middle	937 (55.28)
	High	242 (14.28)
Marital Status	Never in union	1 (0.06)
	Currently Married	1678 (99)
	Formerly Married	16 (0.94)
Household Wealth Index	Poorest	514 (30.32)
	Poorer	353 (20.83)
	Middle	282 (16.64)
	Richer	311 (18.35)
	Richest	235 (13.86)
Number of Under five in the Household	0	51 (3.01)
	1	907 (53.51)
	2	570 (33.63)
	≥3	167 (9.85)
Type of Region	Reg. 1	688 (40.59)
	Reg. 2	423 (24.96)
	Reg. 3	584 (34.45)
Type of Place of Residence	Urban	763 (45.01)
	Rural	932 (54.99)

*Mean Age ± Standard Deviation

Table 3.2. Characteristics of The Study Participants (Infants), Indonesia DHS, 2012
(N=1,695)

Variables	Categories	N (%) N=1695
Infant's Age (month)	* 2.67 ± 1.63	
	0 month	165 (9.73)
	1 month	342 (20.18)
	2 month	293 (17.29)
	3 month	290 (17.11)
	4 month	294 (17.35)
	5 month	311 (18.35)
Sex of Child	Male	905 (53.39)
	Female	790 (46.61)
Baby Size	Large	505 (30.85)
	Average	902 (55.1)
	Small	230 (14.05)
Mode of Delivery	Non-caesarean	1438 (85.04)
	Caesarean	253 (14.96)
Breastfeeding Initiation	Delayed	782 (48.33)
	Early	836 (51.67)
Duration of Breastfeeding	Ever breastfeeding (currently not breastfeeding)	127 (7.50)
	Never breastfeeding	51 (3.01)
	Currently breastfeeding)	1515 (89.49)
Drank from bottle with nipple yesterday	Yes	1149 (67.91)
	No	542 (32.03)

*Mean Age ± Standard Deviation

3.3 Variables of Interest

The dependent variable in this study was exclusive breastfeeding practice. Infants were considered exclusive breastfeeding if they receive nothing other than breastmilk, not even water for the first six months of infant's life (WHO, 2008). For this outcome, only infants aged 0-5 months were included (WHO, 2008). In addition, the inclusion criteria for infants in this study are: infant was still alive and lived with mother. The construction of this variable was based on three questions in women's questionnaire of 2012 Indonesia DHS: 1). "*Are you still breastfeeding (the child)?*" 2). "*Did (the child) drink plain water/commercially produced infant formula/any other milk product/fruit juice/any other liquid such as sugar water, tea, coffee, carbonated drinks, or soup broth yesterday during the day or at night (last 24 hours)*" and 3). "*Did (the child) eat yesterday during the day or at night (last 24 hours)*"? (Statistics Indonesia, 2013). Exclusive breastfeeding was classified into two categories: exclusive and non-exclusive.

The independent variables for the current study included maternal age, level of education, maternal occupation, wealth index, breastfeeding initiation, and region of residence. Maternal age was derived from the current age of the female respondent in the children dataset, and classified into four categories: less than 20, 20-29, 30-39, and more than 40 years old. Maternal occupation was based on whether the mother were currently working or not at the time of interview conducted, and categorized into employed and unemployed. Mother's level of education was categorized as *low* education level if her last attended formal education is primary education or she had no formal education, *middle* education level if her last attended education is secondary education, and *high* education level if her last attended formal education is higher than secondary education. The mother's wealth index was a composite measure of a household's cumulative living standard. This variable was calculated using easy-to-collect data on a household's

ownership of selected assets, such as television, and bicycles; materials used for housing construction, and types of water access and sanitation facilities (Statistics Indonesia, 2013). This variable was categorized into poorest, poorer, middle, rich, and richer. Breastfeeding initiation was constructed from whether the child was put immediately/in minutes/an hour/hours to mother breast after birth. Infants were considered being initiated breastfeeding early if they were put to mother breast before one hour after delivery (WHO, 2008), and categorized into early and delayed breastfeeding initiation. Finally, region of residence was categorized into Region 1: Sumatera and Kalimantan, Region 2. Java and Bali, Region 3: Eastern Indonesia, based on mother's report of region.

3.4 Statistical Analysis

Preliminary and primary analyses of this study were performed using the Statistical Analysis System-SAS® (SAS Institute Inc., Cary, NC, USA) software program version 9.4. Preliminary analyses were performed by using chi-square tests to examine the frequency distribution of characteristics of dependent and independent variables. For all analyses p-value of less than or equal to 0.05 was used to determine statistical significance. Furthermore, primary analyses were performed by using logistic regression to assess associations between the categorical independent and dependent variables. The statistical modelling process was completed in two stages. The first stage was a *bivariate* logistic regression analysis which performed to assess association between each independent variable and dependent variable. This analysis resulted *crude* odd ratios (Crude OR) and its 95% confidence intervals (CIs). The second stage of the analyses was *multivariate* logistic regression model. The individual multivariate model was performed by entering all independent variables, including the confounder; this analyses yielded *adjusted* crude ratio

(adjusted OR) and its 95% confidence intervals (CIs). The measure of association between dependent and independent variable was determined by using the odd ratios and 95% Confidence Intervals.

In the DHS survey, complex sampling was used to provide representative data at the national and sub-national levels. However, in many countries including Indonesia, the population is not evenly distributed among different regions, Therefore, to consider and adjust for the disproportionate and non-response, DHS weights the data. Sample weights are mathematical adjustments applied to the data to correct for over-sampling, under-sampling, and different response rates to the survey in different regions (DHS program, 2016). Sample weights were included in any statistical analyses performed using DHS data to make sample data representative of the entire population (DHSprogram.com, 2016). For the analyses in this study, sampling weights were computed from variables of sample weight (an 8 digit variable with 6 implied decimal place) of individual data and applied to each analysis to adjust for differences in probability of sampling selection (DHS program.com, 2016).

CHAPTER 4 RESULTS

4.1 Preliminary Analysis

Chi-square tests were conducted to examine the frequency distribution of characteristics of dependent and independent variables (see Table 4.1). In terms of age group, half mothers who breastfeed exclusively were on age 20-29 years old (54.6%), however the difference was not statistically significant with non-exclusive mothers ($p = 0.22$). By the occupation status, most of mothers who practice exclusive breastfeeding were unemployed (76.3%), the difference was statistically significant with non-exclusive mothers ($p < 0.01$). In terms of level of education, half of exclusive breastfeeding mothers had middle level of education (56%), however the difference were not statistically significant with non-breastfeeding mothers. By the wealth index, one of four exclusive breastfeeding mothers had poorest wealth index (24.2%) and the association was statistically significant ($p < 0.01$). In terms of breastfeeding initiation, more than half mothers who practice exclusive breastfeeding initiated breastfeeding early (60.9%) and the association was statistically significant ($p < 0.01$). By the type of region, more than half exclusive breastfeeding mothers lived in region 2, Sumatera and Java (58.7%) and the association was statistically significant ($p < 0.01$).

Table 4.1. Proportion of Maternal characteristics, Breastfeeding Initiation, and Type of Region of Maternal Residence by Exclusive Breastfeeding of Infants aged 0-5 months, Indonesia DHS, 2012

Variable	Exclusive Breastfeeding Status		Total N = 1695	<i>p</i> -value
	Exclusive N%=611 (36.1%)	Non Exclusive N % = 1084 (63.9)		
	N %	N %	N %	
Maternal characteristics				
Age group				
< 20	52 (8.3)	110 (11.1)	161 (10.0)	0.22
20-29	338 (54.6)	536 (54.4)	874 (54.5)	
30-39	202 (32.7)	309 (31.3)	511 (31.8)	
>40	27 (4.3)	31 (3.2)	58 (3.6)	
Maternal Occupation				
Unemployed mother	473 (76.3)	664 (67.3)	1136 (70.8)	<0.01
Employed mother	147 (23.6)	321 (32.7)	468 (29.2)	
Level of Education				
Low	185 (29.9)	290 (30.0)	481 (30.0)	0.5
Middle	347 (56.0)	571 (57.8)	917 (57.2)	
High	87 (14.0)	119 (12.1)	206 (12.8)	
Wealth Index				
Poorest	150 (24.2)	208 (21.1)	358 (22.3)	<0.01
Poorer	120 (19.4)	196 (19.8)	315 (19.7)	
Middle	125 (20.2)	182 (18.5)	307 (19.1)	
Richer	98 (15.8)	263 (23.9)	334 (20.8)	
Richest	126 (20.4)	163 (16.5)	289 (18.0)	
Breastfeeding Initiation				
Delayed Initiation	242 (39.1)	472 (51.7)	713 (46.59)	<0.01
Early Initiation	377 (60.9)	441 (48.3)	818 (53.4)	
Type of Region				
Region 1	135 (21.8)	332 (33.7)	468 (29.2)	<0.01
Region 2	364 (58.7)	506 (51.3)	870 (54.2)	
Region 3	120 (19.3)	146 (14.8)	267 (16.6)	

4.2 Primary Analysis

To determine whether the association in the univariate model were not dependent of other covariates, multivariate logistic regression was performed by entering all independent variables in this study: age group, level of education, maternal occupation, wealth index, breastfeeding initiation, and type of region of maternal residence (see Table 4.2; Figure 4.1). Also, variable mode of delivery is included when conducting multivariate logistic regression to control its effect on breastfeeding initiation.

By maternal age group, after controlling other variables, the odds of mothers aged 30-39 years old to breastfeed exclusively are double than mothers less than 20 years old, which is statistically significant (OR=1.56, 95%CI: 1.04-2.35). In terms of maternal occupation, after controlling other variable, odds of unemployed mothers to exclusively breastfeed are twice than employed mothers, the association is statistically significant (OR= 1.65, 95% CI: 1.28-2.13). By the education level of mothers, after controlling other variables, the odds of mothers who have high level of education to exclusively breastfeed are twofold than the odd of mothers who have low level of education, the association is statistically significant (OR=1.89, 95% CI: 1.26-2.86). For the wealth index, after controlling other covariate, the odds of mothers who have richer wealth index to exclusively breastfeed are half time than the odd of mother who have poorest wealth index, it is statistically significant (OR= 0.49, 95%, CI: 0.38-0.77). For breastfeeding initiation, after controlling other variables, mothers who practiced early breastfeeding initiation are one and half times more likely to exclusively breastfeed than mother who did not initiate breastfeeding early, the association is statistically significant (OR=1.47, 95% CI: 1.19-1.83). Finally, by type of region of maternal residence, after controlling other predictors, the odds of mothers who live in

region 3/Eastern Indonesia to breastfeed exclusively are double than mother who live in region 1/Sumatera and Java, the association is statistically significant (OR= 1.82; 95%CI: 1.30-2.55).

Table 4.2 Multivariate analysis for factors associated with Exclusive Breastfeeding of Infants 0-5 months, Indonesia DHS, 2012

Variable	Crude OR (95% CI)	Adjusted OR (95% CI)
Maternal characteristics		
Age group		
< 20	Ref	Ref
20-29	1.34 (0.94-1.92)	1.41 (0.97-2.08)
30-39	1.39 (0.96-2.03)	1.56 (1.04-2.35)
>40	1.79 (0.97-3.32)	1.91 (0.99-3.64)
Maternal Occupation		
Employed mother	Ref	Ref
Unemployed mother	1.57 (1.25-1.97)	1.65 (1.28-2.13)
Level of Education		
Low	Ref	Ref
Middle	0.97 (0.78-1.22)	1.18 (0.91-1.53)
High	1.17 (0.84-1.63)	1.89 (1.26-2.86)
Wealth Index		
Poorest	Ref	Ref
Poorer	0.85 (0.62-1.16)	0.89 (0.64-1.24)
Middle	0.95 (0.69-1.29)	0.89 (0.63-1.26)
Richer	0.58 (0.42-0.79)	0.49 (0.34-0.72)
Richest	1.08 (0.79-1.47)	0.91 (0.61-1.36)
Breastfeeding Initiation		
Delayed Initiation	Ref	Ref
Early Initiation	1.69 (1.36-2.05)	1.47 (1.19-1.83)
Type of Region		
Region 1	Ref	Ref
Region 2	1.77 (1.39-2.25)	1.76 (1.35-2.30)
Region 3	2.01 (1.47-2.76)	1.82 (1.30-2.55)

Note: CI=Confidence Interval

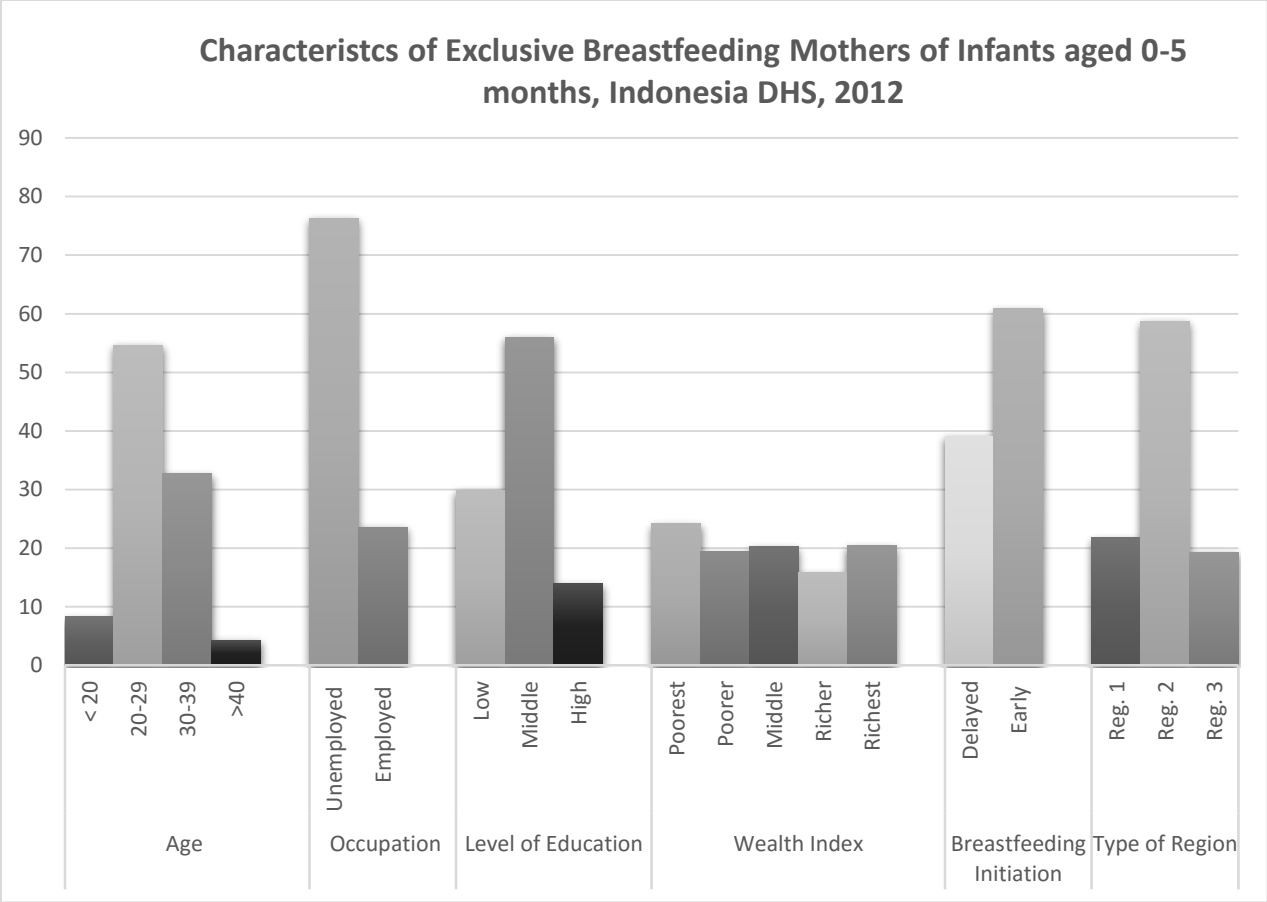


Figure 4.1. Characteristics of Exclusive Breastfeeding Mothers of Infants 0-5 months, Indonesia DHS, 2012

Chapter V

Discussion and Conclusion

5.1 Predictors of Exclusive Breastfeeding

This study aimed to examine the associations among maternal demographic factors: age, level of education, employment status, and wealth index; early breastfeeding initiation, and region with exclusive breastfeeding in Indonesia, 2012. We hypothesized that mothers who aged more than 20 years old and less than 40 years old, had high education level, had low wealth index, unemployed, live in Eastern Indonesia; and initiated breastfeeding early, are more likely to exclusively breastfeed their infants aged 0-5 months old.

This study found that exclusive breastfeeding rate of Indonesian infants aged 0-5 month in only 36%, compare to 40% of exclusive mother from IDHS 2011 report. The characteristics of mother who exclusively breast fed their infant were half among the age 20-29 years old group (54.6%), a majority were unemployed (%), had middle education level (56.0%), were from the poorest wealth index (24.2%), practiced early breastfeeding initiation (60.9%), and lived in Sumatera/Bali region.

Maternal Age

This study found that maternal age was significantly association with exclusive breastfeeding; mother aged 30-39 years old were more likely to breastfeed exclusively compare with mother aged less than 20 years old. This finding was line with previous study conducted by Jones (2011) that higher rates of exclusivity at six month were observed among children whose mothers were 30 years old or older (Jones, 2011). A study conducted in Ethiopia (Gultie, 2016) reported that younger age mothers tend to not exclusively breastfeed maybe because they are more likely to engage in activities that make them difficult to breastfeed such as being in

education and employment (Gultie, 2016). According to results of the Periodic Survey of Fellows conducted by the American Academy of Pediatrician (AAP) found that pediatricians in 2004 were 5 times as likely as pediatricians in 1995 to recommended that a mother of an infant not breastfeed if the mother was considered “too young or immature” (Jones, 2011). Moreover, barriers to exclusive breastfeeding such as decreased maternity leave and maternal employment were seemingly more pronounced among younger mothers who lack job control and paid maternity leave (Jones, 2011). However, a study conducted on Latina mother found that maternal age did not associate with exclusive breastfeeding (Holbrook et al. 2013; Egata, 2013). A study conducted in Ethiopia reported that their study participants apparently having similar socio-economic status, it might explained the fact that maternal age did not associate with exclusive breastfeeding (Egata, 2013).

Level of Education

This study found that exclusive breastfeeding is significantly associated with maternal level education. This finding is consistent with previous study conducted in Lebanon (Batal, 2006), Nigeria (Onah, 2014), United States (Jones, 2013). Ukegbu (2013) reported that mother with higher education could be older than those with less education because of the time spent to acquire higher education. It was explained that mother with higher education are more likely to understand the benefits of breastfeeding than mother with lower education (Ukegbu, 2013). By having higher education, mothers are more capable to deal with breastfeeding barriers so that they are more likely to exclusively breastfeed (Onah, 2014). Therefore, maternal education has been long recognized as one of the child survival strategies adopted by UNICEF (Onah, 2014).

In contrast, Egata (2013) reported that level of education has no association with exclusive breastfeeding; this might be since their study participants are basically homogenous in regards to their socioeconomic status (Egata, 2013).

Occupation Status

This study found that there is an association between employment status and exclusive breastfeeding. This finding agreed with previous studies conducted in Indonesia (Titaley, 2014), Ethiopia (Mekuria, 2015), and Southwest Nigeria (Danso, 2014). These studies reported that mother in workforce as one of the barriers to breastfeeding exclusivity (Danso, 2014).

Nowadays, enlarged urbanization and industrialization caused more women joined the workforce (Danso, 2014). A study reported that approximately half of women in the workforce are in reproductive age and they return to work within one year after delivery (Danso, 2014).

Wealth Index

This study found an inverse relationship between wealth index and exclusive breastfeeding. This finding is consistent with previous studies (Joshi, 2014; Titaley, 2014, Onah, 2014, Ukegbu, 2013). A study reported that mother who exclusively breastfeed do not want to spend money to purchase infant formula due to economic reason (Ukegbu, 2013). Ironically, other study found that some mothers tend to bottle-fed instead of breastfeed since they see bottle-feeding as a symbol status; therefore although those mother basically cannot afford formula they would try hard to emulate botte-feeding (Ukegbu, 2013). For this reason, an intervention should be targeted those kind of mothers. However, a study conducted in Ethiopia reported that wealth index has no association with exclusive breastfeeding; this might be due to the fact that their study participants are basically homogenous in regards to their socioeconomic status (Egata, 2013).

Type of Region

This study found a significant association between type of region (living in rural area: Eastern Indonesia) and exclusive breastfeeding. It is consistent with previous study (Batal, 2016, Titaley, 2014, Inayati, 2013). A study conducted in Lebanon (Batal et al, 2006) found that mothers who breast-fed exclusively for the first 6 months were predominantly born in a rural areas and currently lived in rural areas. In addition, a study conducted in Indonesia found that mothers live in Eastern Indonesia which is less developed than the other region in Indonesia are more likely to exclusively breastfeed due to limited access to infant formula and supplementary feeding (Titaley, 2014). Region characteristics can be associated with infant feeding culture; for instance in Nias Island, Indonesia, Colostrum, the first milk is believed dirty, cheesy, and harmful for infants and may cause stomachache, therefore it should be discarded. The practice of discarding colostrum has been strongly rooted in this island. This information derived from senior women in their family and has been carried out for generation (Inayati, 2012). In addition, mothers who live in rural areas are more likely to introduce prelacteal feeds for their infants immediately after delivery; this practice is clearly contrast with WHO and UNICEF recommendation (Ukegbu, 2013). On the other hand, a study from Ethiopia reported that region has no link with exclusive breastfeeding; this might because their study participants are predominantly homogenous in regards to their socioeconomic status (Egata, 2013).

Early Breastfeeding Initiation

This study found that early breastfeeding initiation is associated with exclusive breastfeeding. This finding is in line with previous study (Batal, 2006, Inayati, 2012). A study conducted in Lebanon (Batal et al., 2006) found that mothers who initiated breastfeeding early are more likely to breastfeed. A study in rural Nigeria reported that mothers who live in rural areas are more likely to not exclusively breastfeed since they did not initiate breastfeeding early. These mothers introduced prelacteal feeds soon after birth; this practice is against WHO and UNICEF recommendation. According to Ukegbu (2013), the reason for prelacteal feeding is a mother's perception of not being capable of breast feeding, and they perceived their breast milk did not flow yet. It is important to highlight that prelacteal feeding may delay the onset of milk flow and reduce the duration and frequency of breastfeeding. Pre-lacteal foods are often becoming a source of newborn infection and diarrhea; this practice creates a vicious cycle (Inayati, 2012), increases infant's odd of having infectious illnesses, and finally increase infant mortality (Ukegbu, 2013, Inayati, 2012).

5.2 Limitations and future directions

Even though this study used a nationally representative data available from the latest Indonesia Demographic Data (IDHS 2012), this study has some limitation. The first limitation relates to its sample design, design of this study is cross sectional so that it cannot measure causation among independent and dependent variables. Moreover, the cross sectional design may limit our study so that we can only observe infants aged 0-5 months one time and cannot assess duration of breastfeeding; or conduct the follow-up survey to examine whether infants who are breastfeed on age one month, are still exclusively breastfeed on age five month. The second

limitation for this study is that it may contain recall and interview bias, recall bias coming from subject of the study, since the infant feeding method which were being asked is the feeding from the last 24 hours before the survey conducted. Therefore, it may be the infant was not given anything other than breast milk 24 hours prior survey; however, it is possible if mother had fed her infant aged 2-5 months with baby with formula or baby food more than 24 hour before the survey, so that, this type of mother was included into exclusive breastfeeding while it should not. The third one, the bias may come in from the interview (interviewer bias), since this study using an integrated questionnaire (assessing socio-demographic characteristics of mother, communicable disease, infant feeding practice, mother and infant information, malaria, and HIV-related behavior) instead of using specific questionnaire regarding to infant feeding, especially exclusive breastfeeding, particular skills are needed to examine infant feeding behavior.

Future direction of this study can be related to region of maternal residence. Apart from socio economic factor, region of maternal residence seemingly plays an important role in exclusive breastfeeding behavior in respect to the heterogeneity of the ethnicities, belief, and customs in Indonesia. In addition, a study on the knowledge, attitude, practice and cultural beliefs on exclusive breastfeeding across the region in Indonesia may also be considered.

5.3 Implications & conclusion

The poor exclusive breastfeeding practice in Indonesia is a signal of critical need of evidence based intervention to promote, protect, and support exclusive breastfeeding practice. According to UNICEF (2011), successful exclusive breastfeeding interventions rely on behavior and social change implemented at scale, which can only be reached through political commitment, adequate resource allocation, capacity development and effective communication

(UNICEF, 2011). Hence, success on promoting breastfeeding program/intervention may be achieved by conducting five actions. First, the successful intervention can be achieved by implementing a complete package of interventions which are comprehensive, relevant, and evidence-based package, based on assessment of needs and situation. The second is by designing effective strategies and ensuring quality implementation: applying best practices using appropriate strategies and providing appropriate training and supervision. The third action is by working at all levels, national, health system, community, and communication. The next action is by achieving universal coverage: determine vision and planning for national scale, and ensure equity. The fifth action to achieve success on breastfeeding intervention is by ensuring continuity of the program: sustained, ongoing implementation, and fully institutionalized intervention (UNICEF, 2011). Studies across countries found that success in increasing exclusive breastfeeding is based on commitment for implementing comprehensive, evidence based, at scale programming tailored to the local context. These efforts have been successfully conducted in Ghana, Malawi, Sri Lanka, and Cape Verde (UNICEF, 2011, Fullman, 2014).

In conclusion, this study reported socio-demographic characteristics of Indonesian mothers who were more likely to practice exclusive breastfeeding. According to the current study, maternal-socio demographic determinants were associated with exclusive breastfeeding practice: mothers aged 30-39 years old, unemployed, had high education level, had low wealth index, and lived in Eastern Indonesia. In addition, mothers who initiated breastfeeding early are more likely to exclusively breastfeed following WHO recommendation.

According these findings, particular strategies and tailored intervention are needed to targeted particular population: 1). younger mothers (below 30 years old), 2) working mothers, 3).

mothers having low education level, 4). high wealth index mothers, 5). mothers who did not initiate exclusive breastfeeding, and 5). mothers living in Sumatera and Kalimantan region.

Finally, promotion of exclusive breastfeeding by establishing a breastfeeding-friendly working environment for working mothers is highly recommended. In addition, advocacy efforts targeting the extension of maternity leave up to the first six months after delivery should be exerted to improve infant's and mother's health outcomes.

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