DOES IN-HOSPITAL BREASTFEEDING SELF-EFFICACY PREDICT BREASTFEEDING DURATION?

by

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Abstract

**Background:** Health Canada recommends exclusive breastfeeding for at least 6 months with continued breastfeeding up to 2 years and beyond. While 88% of Canadian mothers initiate breastfeeding, only 70% of mothers continue to do so at 4 weeks postpartum and only 14% are exclusively breastfeeding at 6 months. Breastfeeding self-efficacy is a potentially modifiable variable that has been associated with mothers’ breastfeeding practices. The Breastfeeding Self-Efficacy Scale (Short-Form) is an instrument that could potentially identify women with low breastfeeding self-efficacy during the in hospital period.

**Purpose:** To describe the breastfeeding practices of new mothers in the Kingston, Frontenac and Lennox & Addington area and to assess the association between in-hospital scores on the Breastfeeding Self-Efficacy Scale (Short-Form) and duration of breastfeeding.

**Methods:** This study was a secondary analysis of a dataset from the 2008 Infant Feeding Survey, a prospective study of 463 mothers with 12-month longitudinal follow-up. Data were weighted according to the maternal age distribution of the general population of new mothers. Breastfeeding practices were described using Kaplan-Meier survival distributions. Four outcomes were described: ‘exclusive breastfeeding from birth’, ‘exclusive breastfeeding from discharge’, ‘high breastfeeding’, and ‘any breastfeeding’. Using logistic regression, scores from the Breastfeeding Self-Efficacy Scale (Short-Form) were assessed for association with duration of ‘exclusive breastfeeding from birth’ and duration of ‘any breastfeeding’ (dichotomized as ‘less than 6 weeks’ and ‘6 weeks or beyond’).
**Results:** The sample was highly educated (75% had post-secondary education) and reported high levels of household income (37% reported >$80,000/year). Six percent of mothers exclusively breastfed to 6 months. Close to one quarter (24%) of women sustained some extent of breastfeeding for 12 months. The relationship between scores on the Breastfeeding Self-Efficacy Scale (Short-Form) and duration of ‘exclusive breastfeeding from birth’ and the relationship between self-efficacy scores and duration of ‘any breastfeeding’ were identical (OR = 1.05) and non-significant (95% CI 1.0-1.1).

**Conclusion:** This study did not show a significant relationship between in-hospital scores on the Breastfeeding Self-Efficacy Scale (Short-Form) and duration of breastfeeding. Given the high socioeconomic status of women in this study, further studies are warranted to confirm these results.
Co-Authorship

This thesis is the work of Karen Poon in collaboration with Dr. Kathleen Steel O’Connor and Dr. Heather Stuart. The study was designed by Karen Poon, Dr. O’Connor, and Dr. Stuart. The statistical analyses were performed by Karen Poon with input and guidance by Drs. O’Connor and Stuart. All sections of this thesis were written by Karen Poon with editorial feedback from Drs. O’Connor and Stuart.
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Chapter 1

Introduction

1.1 Background

Research has shown that breastfeeding confers health benefits to infants that include an enhanced immune system and reduced incidence of atopic disease (Leon-Cava, Lutter, Ross, & 2002; Oddy, 2001). Studies have also suggested that breastfeeding may be associated with long-term benefits such as reduced likelihood of childhood leukemia and obesity (Horta, Bahl, Martines, & Victora, 2007; Kramer & Kakuma, 2004). Furthermore, there is evidence that breastfeeding provides significant health benefits for mothers, including reduced postpartum bleeding (Visness, Kennedy, & Ramos, 1997), reduced risk of type 2 diabetes, and reduced risk of breast and ovarian cancers (Ip, Chung, Raman, Trikalinos, & Lau, 2007).

Health Canada and the World Health Organization recommend that women exclusively breastfeed for 6 months with continued breastfeeding up to 2 years and beyond (Health Canada, 2004; World Health Organization, 2007). Public health has an important role in helping women achieve the recommended duration of breastfeeding. To do this, it is important to describe the local breastfeeding trends in order to assess the need for public health interventions.

According to the Canadian Maternity Experiences Survey, only 14% of Canadian mothers adhere to Health Canada recommendation (Public Health Agency of Canada, 2009). There is a large body of research exploring the reasons why women cease to exclusively breastfeed or stop breastfeeding altogether. These reasons are numerous and often multi-factorial, ranging from perceptions of insufficient milk supply (Ahluwalia et al., 2005; Li, Fein, Chen, & Gummer-Strawn, 2008; Murray, Ricketts, & Dellaport, 2007; Sheehan et al., 1999) to physical discomfort (Simard et al., 2005; Williams, Innis, Vogel, & Stephen, 1999) to the need to return to work (Dennis, 2002; Meedya, Fahy, & Kable, 2010). In order to provide effective interventions,
public health needs to address influential variables that are potentially modifiable. One such variable is a mother’s confidence in her ability to breastfeed, otherwise known as breastfeeding self-efficacy. According to the Social Cognitive Theory, self-efficacy is an important variable in determining the goals and subsequent behaviours of an individual (Bandura, 1977). The Breastfeeding Self-Efficacy Scale (Short-Form) is a validated instrument based on this theory that measures breastfeeding self-efficacy (Dennis, 2003). Being able to identify mothers who have low breastfeeding self-efficacy would help public health planners provide appropriate interventions.

1.2 Objectives

The objectives of this study were:

1. For the Kingston, Frontenac and Lennox & Addington area, to describe the breastfeeding practices of new mothers in terms exclusivity and duration, and

2. To assess the relationship between breastfeeding self-efficacy, measured in hospital with the Breastfeeding Self-Efficacy Scale (Short-Form), and

   i) ‘exclusive breastfeeding from birth’ to six weeks
   ii) ‘any breastfeeding’ to six weeks

1.3 Key Definitions

*Breastfeeding exclusivity:* the extent to which infants receive breast milk relative to formula, solids and other liquids, water, and vitamins and minerals with consideration of their medical needs. For the purposes of this study, breastfeeding exclusivity was categorized as ‘exclusive breastfeeding from birth’, ‘exclusive breastfeeding from discharge’, ‘high breastfeeding’, or ‘any breastfeeding’. These categories are defined in Chapter 3 (Methods).

*Breastfeeding duration:* the length of time that infants receive breast milk. This description needs to be characterized by the exclusivity of breast milk receipt. For example, the
duration that an infant receives only breast milk from birth would be very different from the
duration that an infant receives breast milk to any extent (which could include receiving breast
milk predominantly or receiving infrequent breast milk feeds).

*Breastfeeding self-efficacy:* mothers’ confidence in their perceived ability to breastfeed (Dennis, 1999)

1.4 Rationale

In previous research of breastfeeding confidence there has often been a lack of clear
definition and standardized method of measurement of this psychological construct. In contrast,
the Breastfeeding Self-Efficacy Scale (Short-Form) is a validated tool grounded in a well-
accepted theory of health behaviour (Dennis, 2003). The instrument has shown promise as a
useful instrument in identifying women at risk of early breastfeeding cessation. However, the
current literature on the relationship between breastfeeding self-efficacy scores and breastfeeding
in the early postpartum period is sparse. According to the Canadian Maternity Experiences
Survey, almost one quarter of women wean their infants in the first month postpartum (Public
Health Agency of Canada, 2009). As such, the relationship between breastfeeding self-efficacy
and breastfeeding behaviours may be unique during this period of time. Furthermore, given the
persistence and effort required of mothers to only feed breast milk with no feedings of formula or
solids or other liquids, the relationship between self-efficacy and ‘exclusive breastfeeding from
birth’ may be quite different from that of self-efficacy and ‘any breastfeeding’.

By examining the relationship between in-hospital breastfeeding self-efficacy and its
relationship with breastfeeding practices at 6 weeks this study focuses on the critical early
postpartum period. Six weeks is a particularly relevant time point as infants often experience a
growth spurt during this time. This short-term, rapid increase in growth results in increased
feeding frequency. In turn, this may contribute to concerns over fulfilling infants’ energy needs
and perceptions of insufficient milk supply, two of the most commonly cited reasons for
discontinuing breastfeeding. In addition, the apparent dose-response relationship between health benefits and breastfeeding suggests that infants who are weaned in the early postpartum period enjoy fewer health benefits than those who are weaned at a later date, further emphasizing the need to focus on the initial postpartum period.

The in-hospital period for assessment is also a particularly important aspect of attempting to improve breastfeeding duration and exclusivity. The immediate postpartum period is a critical time for breast milk production (Mohrbacher & Kendall-Tackett, 2010). At this time, mothers are also highly accessible to health care professionals and targeted interventions. If women with low breastfeeding self-efficacy could be identified in hospital, they could be assessed and referred to appropriate interventions in a timely manner so that breast milk production is not compromised.
Chapter 2

Literature Review

The literature review will begin by examining the advantages of breastfeeding for the child and the mother followed by an exploration of the societal benefits of breastfeeding. Current Health Canada and World Health Organization recommendations for breastfeeding will be presented with discussion of the recommended degree and duration of breastfeeding. Breastfeeding trends in Canada will then be described in the context of these recommendations. This will be followed by a discussion of the challenges to measuring breastfeeding behaviours. An exploration of the factors associated with breastfeeding will then be undertaken. Following, public health’s role in promoting and supporting breastfeeding will be examined. A review of studies assessing maternal confidence in breastfeeding and breastfeeding behaviours is then presented with the argument that breastfeeding self-efficacy is a focused conceptualization of breastfeeding confidence. This is followed by a review of studies assessing breastfeeding self-efficacy and breastfeeding behaviours. Research examining the potential to alter self-efficacy and the effect of increased self-efficacy on breastfeeding duration is then presented. Finally, the literature review ends with a summary of the reviewed literature.

2.1 Benefits of breastfeeding to the child

Breast milk provides species-specific nutrients and immunologic agents that optimize an infant’s growth. It is composed of dynamic proportions of protein, carbohydrates, fat, minerals, and vitamins that change to meet the needs of a developing infant (Goldman, Hopkinson, & Rassin, 2007). In addition to being an excellent source of nutrition, breast milk also provides a number of health benefits.
2.1.1 Immunological benefits

Passive immunity to environmental pathogens is delivered through immunoglobulin rich breast milk (Kanariou et al., 1995), protecting the infant against infectious disease such as gastrointestinal infection, otitis media and respiratory infection (Duijts, Ramadhani, & Moll, 2009). Growth factors for gastrointestinal bacteria further contribute to immunological development (Goldman et al., 2007). A systematic review of studies conducted in industrialized countries found 6 out of 8 studies to suggest a protective effect of breastfeeding against gastrointestinal infection. In general, the degree of protection depended on the duration and exclusivity of breastfeeding (Duijts et al., 2009). Studies have also found that infants who were breastfed for shorter periods of time have higher risks of infection or illness that require a doctor’s visit or hospital admission (Pardo-Crespo et al., 2004; Paricio Talayero et al., 2006).

There is evidence that the thymus gland of breastfed infants is larger than that of formula-fed infants (Hasselbach, Jeppesen, Engelmann, Michaelsen, & Nelsen, 1996), suggesting that breast milk enhances overall maturity of the immune system. Dorea (2009) found that breastfeeding primed the infant’s immune system for better response to vaccines, showing that antibody level responses to both peroral (poliovirus) and parenteral (diphtheria and tetanus toxoid) vaccines were significantly increased in breastfed compared to formula fed infants. Furthermore, compared to those on formula, breastfed infants immunized with Haemophilus influenza type b (Hib) vaccine had significantly higher antibodies at 12 months of age (Dorea, 2009).

2.1.2 Long-term health benefits

The long-term health effects of breastfeeding for the child are important to highlight. In a systematic review of studies from developed countries, Ip, Chung, Raman, Trikalinos, & Lau (2007) found that a history of breastfeeding was associated with a reduced risk of childhood leukemia and risk of being overweight, and possible reduced risk of type 1 and 2 diabetes.
mellitus. Ip et al. (2007) conducted a meta-analysis of three case-control studies that examined the relationship between breastfeeding and acute lymphocytic leukemia and found that breastfeeding for at least 6 months reduced the risk of acute lymphocytic leukemia (pooled OR adjusted for socioeconomic status = 0.8, 95% CI 0.7-0.9). In another meta-analysis, the authors found that breastfeeding reduced the risk of being overweight or obese later in life (infants who were ever breastfed to those who were never breastfed: pooled adjusted OR = 0.8, 95% CI 0.7-0.9). From this review, the relationship between breastfeeding and type 1 and type 2 diabetes was not entirely clear as there were methodological concerns regarding existing studies. For example, two meta-analyses comprised mostly of case-control studies reported statistically significant odds ratios of 1.2 and 1.4 for the risk of type 1 diabetes in infants having been breastfed less than 3 months compared with those having been breastfed for three months or more. However, these results have been questioned due to the susceptibility of case-control studies to recall bias as well conflicting results from a study that used existing infant records instead of long-term maternal recall to determine breastfeeding behaviours (Norris & Scott, 1996). In terms of type 2 diabetes, a pooled adjusted odds ratio of 0.6 (95% CI 0.4-0.9) for risk of developing type 2 diabetes was found for subjects who were ever breastfed compared with those who were never breastfed in a meta-analysis of seven studies. However, since only three of these studies accounted for important confounders such as birth weight, parental diabetes, socioeconomic status, and individual or maternal body size, the pooled estimate may not be an accurate assessment of the true relationship (Owen, Martin, Whincup, Smith, & Cook, 2006).

Breastfeeding has been associated with a reduction in the incidence of atopy in infants with a genetic disposition for allergies (Leung & Sauve, 2005). For these infants, sustained exclusive breastfeeding with introduction of solid foods at 6 months may postpone, or even prevent, the development of food allergies (Leung, 1998; Zeigler, 1990) It is hypothesized that breast milk provides the appropriate immunoglobulins to be secreted through mucosal surfaces in the gastrointestinal system, preventing the entrance of large foreign proteins and the ensuing
allergic response (Gdalvich, Mimouni, & Mimouni, 2001). A meta-analysis of 12 prospective studies also suggests that exclusive breastfeeding during the first months of life is associated with lower asthma rates during childhood (summary OR = 0.7, 95% CI 0.6-0.8). The effect estimate was greater (OR = 0.5, 95% CI 0.4-0.8) in studies of children with a genetic predisposition of atopy than in studies of children with and without a family history of atopy (OR = 0.7, 95% CI 0.6-0.9) (Gdalvich et al., 2001).

The cognitive benefits of breastfeeding are equivocal. In a meta-analysis of 11 studies, breastfed infants were associated with a significantly higher cognitive development score than formula fed infants after adjusting for socioeconomic status and maternal education (Anderson, Johnstone, & Remley, 1999). However, in Ip et al.’s systematic review (2007), the authors concluded that in full term infants there is little evidence of a relationship between breastfeeding and subsequent cognitive performance given the insufficient control of home environment factors.

2.1.3 Maternal benefits

Aside from direct health benefits to the infant, breastfeeding has a number of benefits for the mother. Breastfeeding is associated with decreased postpartum bleeding (Visness et al., 1997), reduced risk of type 2 diabetes, as well as decreased risk of breast and ovarian cancers (Ip et al., 2007). In a large, prospective study of American women from the Nurses’ Health Study II, each year of breastfeeding was associated with a hazards ratio of 0.9 (95% CI 0.8-0.9) for type 2 diabetes in later life (Ip et al., 2007). In a meta-analysis published by the Collaborative Group on Hormonal Factors of Breast Cancer, a 4.3% reduction (95% CI 2.9-5.8%) in breast cancer risk was found for each year of breastfeeding (adjusted for important potential confounders such as family history of breast cancer, age at menarche, and use of hormonal contraceptives) (Collaborative Group on Hormonal Factors in Breast Cancer, 2002). Ip et al. (2007) performed a
meta-analysis from nine case-control studies that controlled for potential confounders and found that breastfeeding reduced the risk of ovarian cancer (OR = 0.8, 95% CI 0.7-0.9).

### 2.1.4 Societal benefits

Improved infant health provides significant economic benefits. A recent American cost analysis estimated $13 billion USD in medical-care savings if 90% of US families were to comply with national recommendations to exclusively breastfeed for 6 months (Bartick & Reinhold, 2010). While no comparable analysis has been conducted in Canada, a framework developed by the Canadian Infant Feeding Action Coalition in 1998 suggests that the number of pediatric admissions to hospital due to childhood illnesses associated with not breastfeeding can be multiplied by the average stay of 6.61 days at a cost of $1609.97 per day (Breastfeeding Committee for Canada, n.d.). According to their estimations, every year more than 3000 infants under the age of one year are hospitalized across Canada due to acute respiratory disease and more than 2000 infants are hospitalized due to asthma. In 2000, Battlefords Health District in Saskatchewan reported that 3% of pediatric admissions were exclusively breastfed, 17% were breast and formula fed and 80% were formula fed at the time of admission (Breastfeeding Committee for Canada, n.d.). These figures indicate that there are substantial potential cost-savings to the health care system if the proportions of mothers breastfeeding and exclusively breastfeeding were increased. In addition, this figure is likely to be larger when calculating cost-savings in 2011 dollars. Reduced infant illness also may minimize maternal absenteeism from work, improving economic productivity (U.S. Department of Health and Human Service Office, Health Services and Services Administration: Maternal and Child Health Bureau, 2008).

### 2.2 Recommendations for breastfeeding

A systematic review conducted by the World Health Organization found exclusive breastfeeding for 6 months to confer greater protection from infectious disease morbidity than
exclusive breastfeeding for 3 to 4 months with continued mixed breastfeeding to at least 6 months (Kramer & Kakuma, 2004). Growth deficits were not demonstrated in studies of infants who were exclusively breastfed for 6 months in developing or developed countries. Based on this review, the World Health Organization recommends that new mothers exclusively breastfeed for the first 6 months postpartum with continued breastfeeding up to 2 years (World Health Organization, 2007). Upon critical review of this evidence, Health Canada aligned its recommendation with those of the World Health Organization (Health Canada, 2004).

2.3 Degree of breastfeeding

The degree of breastfeeding is an important aspect of the dose-response relationship between breastfeeding and infant health benefits (Kramer & Kakuma, 2004). Exclusive breastfeeding, as defined by the World Health Organization, requires that infants receive breast milk only and prohibits any supplementation with formula, tea, juice or water, not even once, unless medically indicated. Outside of this, the World Health Organization further categorizes breastfeeding into predominant breastfeeding, where infants receive breast milk with supplementation of non-milk liquids (such as sweetened and flavored water, tea, or juice) and complementary feeding, where infants receive breast milk and any food or liquid including formula.

2.4 Duration of breastfeeding

Duration is another important factor to consider when measuring the dose of breastfeeding. In 2001, Health Canada changed its recommendation from 4 months of exclusive breastfeeding to 6 months to align its recommendation to that of the World Health Organization. With increased duration, breastfeeding has consistently been associated with reductions in infection (Kramer & Kakuma, 2004; Rebhan et al., 2009) making the recommendation undeniably beneficial in developing countries that suffer from high rates of pediatric infection.
However, Fewtrell and Wilson (2011) have recently questioned whether developed countries should follow this recommendation with a focus on the potential nutritional inadequacy of breast milk in terms of energy and iron content. Authors also highlight new evidence exploring the relationship between timing of introduction of solids and atopic disease, calling for a review of the recommendation to delay introduction of solids to 6 months. A recent review found a small but increased risk of developing certain food allergies, eczema, and asthma with the introduction of particular allergens after 4 months (Prescott et al., 2008). Further, there has been evidence that infants exposed to cereal between ages 0 and 3 months, and 7 months or older are at an increased risk of developing glucose-related autoimmunity compared to those exposed between 3 and 7 months of age (Prescott et al., 2008). Further evidence, particularly in the form of randomized controlled trials, will be needed before the World Health Organization and Health Canada can review their recommendations.

### 2.5 Breastfeeding in Canada

The Canadian Maternity Experiences Survey, a national survey of mothers 15 years of age and older who had a singleton live birth in Canada during a three-month period preceding the 2006 Canadian Census of Population, found that 88% of mothers initiate breastfeeding (Public Health Agency of Canada, 2009). At 4 weeks, 70% of mothers report they are breastfeeding and only 54% report that they doing so at 6 months. With regards to exclusive breastfeeding, only 14% of new mothers report that they are breastfeeding exclusively at 6 months. Similar patterns of breastfeeding practices are seen for Ontario mothers (Sheehan, Krueger, Watt, Sword, & Bridle, 2001).

### 2.6 Challenges to measuring breastfeeding behaviours

There are a number of challenges to the accurate measurement of breastfeeding behaviours. For example, researchers have questioned the accuracy of using retrospective study
designs like those currently used in the national assessment of Canadian breastfeeding trends (Bland, Rollins, Solarsh, Van den Broeck, & Coovadia, 2003; Flaherman, Chien, McCulloh, & Dudley, 2011). Flaherman, Chien, McCulloh, and Dudley (2011) challenged the use of a retrospective study design, stating that the literature has shown that maternal recall of early formula feeds is unreliable for mothers of children 6 months or older. In addition, Bland et al. (2003) found that mothers of infants 6-9 months old who indicated their infant was breastfed exclusively through 2 weeks were correct only 52% of the time. Further, Quandt (1987) found that only 58% of mothers recalled correctly within 1 month of the first formula feed when interviewed at 6 months. This literature suggests that a prospective design is important in accurately describing breastfeeding behaviours.

In addition to the appropriate use of study design, the accuracy of commonly used infant feeding indicators is an issue of contention. In many studies, researchers use ‘current feeding status’ to indicate the infant feeding method. In this approach, researchers ask mothers what they fed their infant in the previous 24 hours and use their responses to determine their infant feeding status (Public Health Agency of Canada, 2009). Such an indicator may produce misleading information regarding breastfeeding exclusivity and duration. Given the strictness of the Health Canada definition of exclusive breastfeeding, whereby even one feeding of formula, solids or water excludes mothers from this group, the use of this indicator may result in an overestimation of the prevalence of exclusive breastfeeding.

In contrast, inquiries about mothers’ infant feeding since birth may produce more accurate estimations of the prevalence of exclusive breastfeeding. For example, in a prospective study of 506 mothers, wide discrepancies were found between exclusive breastfeeding prevalence defined by ‘current status’ versus ‘exclusive breastfeeding from birth’. At 2 and 4 months of age, there was a difference of over 40% in exclusive breastfeeding prevalence between the two definitions (92% versus 51% at 2 months and 73% versus 30% at 4 months, respectively). At 6 months there was a 9% difference between the two definitions (11% versus 2%) (Aarts et al.,
The authors recommend that researchers include more detailed questions about feeding practices since birth in infant feeding questionnaires.

2.7 Factors associated with breastfeeding

To address low adherence to breastfeeding recommendations, it is of public health importance to understand the factors associated with breastfeeding. To begin, the factors associated with breastfeeding initiation, duration, and exclusivity are numerous and complex. Breastfeeding practices have been associated with biological, social and psychological characteristics of the mother as well as intra-partum experiences, policies of the hospital and community health services, and postpartum support (Dennis, 2002; Meedya et al., 2010; Thulier & Mercer, 2009).

2.7.1 Biological predictors of breastfeeding

In a recent systematic review, Thulier and Mercer (2009) reported that maternal age, maternal obesity, physical challenges encountered during breastfeeding (such as discomfort caused by sore nipples, engorgement, mastitis and plugged ducts), and infant health problems (such as those encountered due to low birthweight or pre-term birth) are negatively associated with breastfeeding duration. In addition to these factors Whalen and Cramton (2010) found that duration and exclusivity are significantly reduced for mothers who are primiparous and/or have no previous breastfeeding experience.

2.7.2 Sociodemographic predictors of breastfeeding

It has been consistently shown that marital status, maternal smoking, education, and income level are associated with breastfeeding initiation, duration, and exclusivity (Dennis, 2002; Meedya et al., 2010; Whalen & Cramton, 2010). Specifically, married women with higher education and income levels have a higher initiation rate, breastfeed longer, and do so more
exclusively than single women with lower education and income levels. In addition, non-smokers have more positive breastfeeding behaviours than those who smoke.

Intention to return to paid employment has been found to be negatively associated with breastfeeding duration but not with breastfeeding initiation (Dennis, 2002; Fein & Roe, 1998). Among women who have initiated breastfeeding, returning to paid employment within 12 months of delivery is associated with earlier breastfeeding cessation. Further, work intensity, using daily work hours as a measure of intensity, has been found to be negatively associated with breastfeeding at 3 and 6 months postpartum (Fein & Roe, 1998). In particular, expecting to return to full-time work significantly decreased the probability of breastfeeding compared to not expecting to work full-time (Fein & Roe, 1998).

Canadian research on the relationship between ethnicity and breastfeeding is scarce. A recent study in Ontario found mothers who were born in Canada were at a greater risk for early breastfeeding cessation than mothers who were born outside of Canada (Sheehan, Watt, Krueger, & Sword, 2006). There is some evidence that there is a negative association between acculturation of immigrants and breastfeeding (Dennis, 2002). In a number of American studies, smaller proportions of African American and Hispanic women than Caucasian women reported breastfeeding after controlling for confounding variables such as maternal age and level of education (Colley, Johnson, Morrow, Gaffield, & Ahluwalia, 1999; Ryan, Rush, Krieger, & Lewandowski, 1991). However, among low-income ethnic groups, some researchers found no difference in proportions of women breastfeeding, suggesting that socioeconomic status may be a more important factor in breastfeeding outcomes (MacGowan et al., 1991; Piper & Parks, 1996).

2.7.3 Psychological predictors of breastfeeding

Maternal intention to breastfeed and confidence in breastfeeding have been positively associated with breastfeeding duration (Dennis, 2002; Meedya et al., 2010). For example, in a longitudinal study of 300 Australian mothers, Blyth et al. (2002) reported that significantly more
mothers who intended to breastfeed for at least 12 months were doing so at 4 months (87.5%) compared to mothers who intended to breastfeed for less than 6 months (35.7%, \( \chi^2 = 33.67, p<0.001 \)). A review of the literature on the relationship between breastfeeding confidence and breastfeeding behaviours will be undertaken in section 2.10 of this chapter.

Negative attitudes towards breastfeeding, such as perceptions of lifestyle restrictions and physical discomfort, have been associated with earlier cessation of breastfeeding (Avery, Duckett, Dodgson, Savik, & Henly, 1998). Also, deciding to breastfeed late in the pregnancy and postpartum depression have been negatively associated with breastfeeding duration (Dennis, 2002). In a systematic review of studies examining the relationship between postpartum depressive symptomatology and infant feeding outcomes, Dennis and McQueen (2009) found a consistent association between postpartum depressive symptoms and breastfeeding duration.

### 2.7.4 Intra-partum experiences

A woman’s experiences during the birthing process may affect her breastfeeding behaviours. Specifically, method of delivery (vaginal versus caesarean section) has been examined for its association with breastfeeding initiation and duration. There is some evidence of a negative association between caesarean delivery and breastfeeding initiation (Ever-Hadani, Seidman, Manor, & Harlap, 1994; Scott, Lander, Hughes, & Binns, 2001). Delayed initiation may affect milk supply and subsequent breastfeeding behaviours, although the relationship between type of delivery and breastfeeding duration is unclear. Some researchers found no association between type of delivery and breastfeeding duration (Kearney, Cronenwett, & Reinhardt, 1990; Victora, Huifly, Barros, & Vaughan, 1990), while new evidence has shown that caesarean delivery is associated with a decreased duration of exclusive breastfeeding (Zanardo et al., 2010).

The effect of analgesia during labor and delivery on breastfeeding outcomes appears to be dependent on the type of analgesia used. In general, opioids are associated with delayed initiation of infant suckling (Leighton & Halpern, 2002) which could potentially affect new
mother breastfeeding behaviours later in the postpartum period. In a review conducted by the World Health Organization, poor suckling behaviour (in frequency and correctness) was seen significantly more often in infants of mothers who received pethidine, a commonly used opioid, than of those who did not report receipt of pethidine (World Health Organization, 1998). Epidural analgesia does not appear to be associated with breastfeeding initiation or maintenance (Leighton & Halpern, 2002). A recent narrative review of the literature concluded that there is a lack of prospective, randomized evidence to demonstrate that epidural analgesia reduces breastfeeding success (Devroe, De Coster, & Van de Velde, 2009).

2.7.5 Policies of hospitals and community health services

The postpartum experience is influenced by the policies of hospital and community health services, which may impact breastfeeding practices. The World Health Organization and United Nations Children’s Fund promote the Baby-Friendly Hospital Initiative as a key breastfeeding framework for hospitals (UNICEF, n.d.). In order to be designated ‘Baby-Friendly’, a hospital must implement 10 specific policies entitled *The 10 Steps to Successful Breastfeeding* (also known as *The Ten Steps*) and decline free or low-cost breast milk substitutes, feeding bottles or teats in accordance with the World Health Organization International Code of Marketing of Breast-Milk Substitutes. The Breastfeeding Committee for Canada recently interpreted these ten steps for Canadian practice (see Figure 1, Breastfeeding Committee for Canada, 2011).
Figure 1 Interpretation of The 10 Steps to Successful Breastfeeding for Canadian Practice by the Breastfeeding Committee for Canada

| Step 1: | Have a written breastfeeding policy that is routinely communicated to all health care providers and volunteers. |
| Step 2: | Ensure all health care providers have the knowledge and skills necessary to implement the breastfeeding policy. |
| Step 3: | Inform pregnant women and their families about the importance and process of breastfeeding. |
| Step 4: | Place babies in skin-to-skin contact with their mothers immediately following birth for at least an hour or until completion of the first feeding or as long as the mother wishes; encourage mothers to recognize when their babies are ready to feed, offering help as needed. |
| Step 5: | Assist mothers to breastfeed and maintain lactation should they face challenges including separation from their infants. |
| Step 6: | Infants are not offered food or drink other than human milk for the first 6 months, unless medically indicated. |
| Step 7: | Facilitate 24-hour rooming-in for all mothers: mothers and infants remain together. |
| Step 8: | Encourage baby-led or cue-based breastfeeding. Encourage sustained breastfeeding beyond six months with appropriate introduction of solids. |
| Step 9: | Support mothers to feed and care for their breastfeeding babies without the use of artificial teats or pacifiers (dummies or soothers). |
| Step 10: | Provide a seamless transition between the services provided by the hospital, community health services and peer support programs. |

The Baby-Friendly Initiative is a Canadian framework for hospitals and community health services to provide a continuum of care for breastfeeding mothers. This framework is based on the Canadian interpretation of The Ten Steps. It describes the minimum standard of care for healthy term infants with regards to breastfeeding support for mothers in hospital and in the community (Breastfeeding Committee for Canada, 2011).

While the impact of the Canadian framework has not been explored, extensive research has examined the effectiveness of the Baby-Friendly Hospital Initiative in improving breastfeeding outcomes. There is evidence that implementation of the policy is associated with increased proportions of mothers breastfeeding initiation, exclusive breastfeeding at discharge, duration of exclusive breastfeeding, and duration of breastfeeding in general (Kramer & Kakuma, 2004; Toronto Public Health, 2010). However, proportions of women breastfeeding and duration
of exclusive breastfeeding remain low in these studies, suggesting that the Baby-Friendly Hospital Initiative alone may not be adequate to ensure mothers continue breastfeeding. Research on the impact of the Baby-Friendly Initiative, including the effect of Baby-Friendly community health services on breastfeeding behaviours, is required.

2.7.6 Postpartum support

Professional and partner support during the postpartum period have been associated with positive breastfeeding behaviours. In a review of 34 trials from 14 countries, Britton, Britton, and Gronwaldt (1999) found that support from health professionals prolonged any breastfeeding, with the effects on exclusive breastfeeding being less clear. Johnston and Esposito (2007) found that effective support included encouragement, recommendations, and role modeling.

Interestingly, Dennis (2002) found that informal support from friends and family was a more reliable predictor of breastfeeding initiation than support from health professionals, including doctors and nurses. In particular, a woman’s partner has been consistently shown to be a primary source of support in the initiation of breastfeeding (Bar-Yam & Darby, 1997; Freed, Clark, Harris, & Lowdermilk, 1996). In a study of 200 mothers in which maternal age, education level, ethnicity, and marital status were controlled, women whose partners preferred breastfeeding were significantly more likely to initiate breastfeeding than those whose partners were ambivalent or preferred formula-feeding (Giugliani et al., 1994). Johnston and Esposito (2007) found support from a significant other, friends and family members to be especially important for working mothers to sustain breastfeeding.

2.8 Reasons for discontinuing breastfeeding or introducing solids/liquids

Factors associated with discontinuing breastfeeding can be categorized as those that deter mothers from breastfeeding and those that encourage mothers to introduce formula or solids. The commonly cited factors for discontinuing to breastfeed include physical discomforts of
breastfeeding (cracked or sore nipples, tenderness, and engorgement of breasts) (Simard et al., 2005) and infant feeding problems (Ahluwalia et al., 2005; Murray et al., 2007; Sheehan et al., 1999) such as problems with latching (Ahluwalia et al., 2005; Hall et al., 2002). In particular, perceived insufficient milk supply (Ahluwalia et al., 2005; Li et al., 2008) and concerns over fulfilling the infant’s energy needs (Murray et al., 2007) are two of the most commonly cited reasons for discontinuing to breastfeed during infant growth spurts. These rapid increases in growth often occur at 2-3 weeks and 6 weeks (Goodwin, Montoro, Muderspach, Paulson, & Roy, 2011), which could help explain the significant proportion of mothers who discontinue breastfeeding in the early postpartum period.

Factors that encourage mothers to introduce formula or solids include return to work in combination with lack of support in the work environment, the partner wanting to help in feeding, maternal perceptions that the infant requires solids for growth, and the child showing an interest in solids (Dennis, 2002; BORN Ontario, 2008).

2.9 Public health’s role in promoting and supporting breastfeeding

Public health has an important role in promoting and supporting breastfeeding. As with other healthy behaviours, an important element of public health promotion is to promote a positive change in social and cultural perspectives toward breastfeeding. While the scientific literature has consistently outlined the benefits of breast milk, breastfeeding, particularly in public, has yet to become accepted by the general public (Hannan, Li, Benton-Davis, & Grummer-Strawn, 2005). In order to normalize the act of breastfeeding, a multi-factorial approach is required at different levels of society. The Ottawa Charter for Health Promotion can be used as a guideline for this discussion (World Health Organization, 1986). Developed at the first international conference on health promotion in 1986, this charter outlines means of action to promote health at the population, community and individual level (see Figure 2).
**Figure 2 Ottawa Charter for Health Promotion: Key Health Promotion Action Means**

<table>
<thead>
<tr>
<th><strong>Build Healthy Public Policy</strong></th>
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<tbody>
<tr>
<td>“Health promotion policy combines diverse but complementary approaches including legislation, fiscal measures, taxation and organizational change… It is coordinated action that leads to health, income and social policies that foster greater equity.”</td>
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<tr>
<th><strong>Create Supportive Environments</strong></th>
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<tr>
<td>“Changing patterns of life, work and leisure have a significant impact on health… The way society organizes work should help create a healthy society.”</td>
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<th><strong>Strengthen Community Actions</strong></th>
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<tr>
<td>“Community development draws on existing human and material resources in the community to enhance self-help and social support, and to develop flexible systems for strengthening public participation in and direction of health matters.”</td>
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<th><strong>Develop Personal Skills</strong></th>
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<tr>
<td>“Health promotion supports personal and social development through providing information, education for health, and enhancing life skills.”</td>
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<th><strong>Reorient Health Services</strong></th>
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<tr>
<td>“Health services need to embrace an expanded mandate which is sensitive and respects cultural needs. This mandate should support the needs of individuals and communities for a healthier life, and open channels between the health sector and broader social, political, economic and physical environmental components.”</td>
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Healthy public policy is required to empower women in their decision to breastfeed. Currently, Ontario and British Columbia are the only provinces that clearly outline the legal rights of breastfeeding mothers. In Ontario, women have legal protection from discrimination and harassment that result from their sex, including pregnancy and breastfeeding. In addition, the Ontario Human Rights Commission developed a document entitled ‘Policy on Discrimination because of Pregnancy and Breastfeeding’ with further details on the protection of mothers in the workplace and in public (Ontario Human Rights Commission, 2008). The British Columbia Human Rights Code offers similar legal protection for women who are pregnant or breastfeeding (British Columbia Ministry of Attorney General, 2008). Such legislation is important in empowering mothers to breastfeed their children.

Public health can also play a role in helping businesses develop breastfeeding policies for employees and customers. In doing so, it is important to ensure that clean and safe facilities exist...
for mothers to breastfeed their children or to express breast milk as a part of creating a supportive physical environment for breastfeeding mothers.

At the community level, public health can engage the public in discussions of breastfeeding and increase awareness with community wide promotional campaigns. By promoting breastfeeding at the population and community levels, public health can strive to increase public acceptance of breastfeeding.

At the individual level, public health can promote breastfeeding by improving mothers’ personal skills. Public health units often provide such targeted health promotion in the form of prenatal of breastfeeding classes. Since research has shown that mothers often feel vulnerable when breastfeeding in public (Sheeshka et al., 2001), techniques to cope with self-conscious thoughts may be an important part of prenatal education.

Health services can also be reoriented to further support breastfeeding mothers. One common complaint by mothers is frustration due to conflicting breastfeeding advice from health care professionals (Graffy & Taylor, 2005). The Baby-Friendly Initiative recommends that health care professionals who provide direct care for pregnant women and mothers receive at least 20 hours of breastfeeding education (Breastfeeding Committee for Canada, 2011). If more hospitals and community health services were to become certified Baby-Friendly, health care professionals would likely provide more consistent breastfeeding advice for new mothers.

**2.10 Maternal confidence and breastfeeding outcomes**

A number of studies have assessed maternal confidence and breastfeeding outcomes. In a secondary analysis of a cross-sectional study of 526 mothers in Ontario, Dunn et al. (2006) found that women who scored the lowest on a survey question asking about breastfeeding confidence were 34 times more likely to cease breastfeeding (OR = 34.6, p<.001) than women who scored higher. After controlling for age and education, low confidence and postpartum depression were found to be negatively associated with breastfeeding at 6 weeks (Dunn et al., 2006). In a cohort
study of 1,163 American mother-and-infant pairs, women who lacked confidence in the early postpartum period were more likely to have ceased breastfeeding at 2 weeks (OR = 2.8, 95% CI 1.0-7.6) than women who were confident in their ability to breastfeed (Taveras et al., 2003). In a sample of mothers eligible for the Woman, Infants and Children Program, an American social welfare program, women who reported that they were not confident that they would be breastfeeding at 2 months postpartum were more likely to stop breastfeeding within the first 2 weeks postpartum (RR=2.4, 95% CI 1.8-6.2) (Ertem, Votto, & Leventhal, 2001). Furthermore, these mothers were over 10 times more likely to discontinue breastfeeding within the first 2 months (RR=11.8, 95% CI 1.8-76.5). Despite the low precision of this estimate, the direction of association between low breastfeeding confidence and early cessation of breastfeeding was maintained.

This research suggests there is a consistent association between maternal confidence and breastfeeding duration. However, confidence is a complex psychological trait. In previous research it has often not been explicitly defined or consistently measured, making comparisons difficult. For example, the terminology in the studies presented here ranged from general (‘maternal confidence’, Dun et al., 2006, or ‘confidence in ability to breastfeed’, Taveras et al., 2003) to specific (‘confidence that the mother would be breastfeeding at 2 months postpartum’, Ertem et al., 2001). In addition, measurement of confidence varied from qualitative, binary responses (‘very confident’ versus ‘not at all confident’, Taveras et al., 2003) to a range of responses (from ‘not at all confident’ to ‘very confident’, Dunn et al., 2006). The lack of a theoretical basis for the description and measurement of maternal confidence limits the generalizability of these findings. More importantly, these results provide no information on what modifiable variables contribute to breastfeeding confidence, or how interventions can improve breastfeeding outcomes (McQueen, Dennis, Stremler, & Norman, 2011).

To address these issues, Dennis and Faux applied Bandura’s Social Cognitive Theory to the concept of breastfeeding confidence and developed an assessment tool, the Breastfeeding
Self-Efficacy Scale, based on this health behaviour theory (Dennis & Faux, 1999). The reduced form of this scale, the Breastfeeding Self-Efficacy Scale (Short-Form), is the focus of this study.

2.11 Self-efficacy and health behaviours: Social Cognitive Theory

Self-efficacy, commonly described in existing literature as confidence, is a key component of Social Cognitive Theory (SCT), a model that asserts that there is a dynamic interplay between personal factors (in the form of cognition, personality, and biological tendencies), behaviour, and environmental influences. This model evolved from the Social Learning Theory, a psychological framework based on the concept that people learn from the experiences of others as well as their own.

Bandura defined self-efficacy as an individual’s confidence in his or her perceived ability to perform a specific task or maintain a specific behaviour. Self-efficacy is influenced by four primary sources of information: 1) performance accomplishments (experience with the specific behaviour or task), 2) vicarious experience (previous observation of the performance of the specific behaviour or task) 3) verbal persuasion (encouragement by influential individuals), and 4) physiological responses (somatic responses in relation to autonomic arousal during anticipation or experience of a specific behaviour or task) (Bandura, 1977). In turn, self-efficacy influences the goals that are set by the individual. These goals influence the behaviours in which individuals engage, how much effort they expend in the tasks, how long they persist when faced with obstacles, and whether they undertake self-debilitating or self-encouraging cognitions. Self-efficacy can also directly affect these outputs. Other key concepts of Social Cognitive Theory include outcome expectancies and sociostrucutral factors. Figure 3 is a visual representation of this conceptual framework.
Goals can be categorized into proximal (short-term) goals and distal (short-term) goals. Intentions, as defined in the Theory of Planned Behavior (Ajzen, 1991), are similar to proximal goals.

Bandura recommended a behavior-specific approach to studying self-efficacy. As such, to assess the role of self-efficacy in determining breastfeeding behaviours, Dennis developed a breastfeeding self-efficacy framework based on Bandura’s Social Cognitive Theory (Dennis, 1999; Bandura, 1977). Based on the four sources of information that influence self-efficacy, Dennis and Faux (1999) developed the 33-item Breastfeeding Self-Efficacy Scale to measure breastfeeding self-efficacy. This instrument was later reduced to the 14-item Breastfeeding Self-Efficacy Scale (Short-Form). Details regarding the psychometric properties of these instruments are included in Chapter 3, Methods.
2.12 Self-efficacy and breastfeeding behaviours

This section summarizes recent studies on the relationship between self-efficacy and breastfeeding behaviours and highlights gaps in the literature. These studies have been organized by the instrument used to measure self-efficacy: those that used the Breastfeeding Self-Efficacy Scale (Short-Form), Breastfeeding Self-Efficacy Scale (Original) and those that used other instruments.

2.12.1 Studies using the Breastfeeding Self-Efficacy Scale (Short-Form)

McCarter-Spaulding and Gore (2009) assessed the influence of self-efficacy on duration and exclusivity of breastfeeding in a sample of 125 women of African descent. Self-efficacy was measured in the first week postpartum using the Breastfeeding Self-Efficacy Scale (Short-Form). Women were telephoned at 1 month postpartum to assess pattern of infant feeding and duration of breastfeeding. They were followed up each month until 6 months postpartum or until the respondents reported complete weaning, whichever came first. In a Cox regression analysis, self-efficacy scores measured in the first postpartum week were negatively associated with risk of being weaned at one month postpartum (HR = 0.97, 95% CI and p-value not reported, stated to be statistically significant in text). Self-efficacy was the only significant predictor of breastfeeding behaviours at 1-month postpartum. Breastfeeding Self-Efficacy Scale (Short-Form) scores were also predictive of breastfeeding until 6-months postpartum (HR = 0.96, 95% CI and p-value not reported, stated to be statistically significant in text), while controlling for timing of return to work. Using ordered logistic regression, breastfeeding self-efficacy measured in the first week postpartum was significantly associated with more exclusive breastfeeding at 1-month postpartum (OR = 1.05, 95% CI and p-value not reported, stated to be statistically significant in text) while controlling for planned pattern of breastfeeding (McCarter-Spaulding & Gore, 2009).

Mossman, Heaman, Dennis, and Morris (2008) examined the relationship between breastfeeding confidence and breastfeeding initiation and duration in adolescents. In a sample of
100 pregnant teenage mothers (<19 years of age), self-efficacy was measured prenatally and at 1-week postpartum with the Breastfeeding Self-Efficacy Scale (Short-Form). Mothers who were breastfeeding at 1-week postpartum were followed up at 4 weeks. Using Cox multivariate regression, low postnatal breastfeeding confidence was significantly associated with cessation of breastfeeding within 28 days postpartum (HR = 3.63, 95% CI=1.85-7.13) while controlling for smoking and planned duration of breastfeeding. Prenatal self-efficacy scores were not significantly associated with breastfeeding duration (Mossman et al., 2008).

Otsuka, Dennis, Tasuoka, and Jimba (2008) looked at the relationship between breastfeeding self-efficacy and formula supplementation at 4-weeks postpartum as a secondary objective of a study that examined the relationship between maternal perceptions of insufficient milk and breastfeeding self-efficacy. In a sample of 262 in-hospital breastfeeding mothers in Japan, self-efficacy was measured prior to discharge with a translated and validated Japanese version of the Breastfeeding Self-Efficacy Scale (Short-Form). Mothers were followed up at 4-weeks postpartum to measure perception of insufficient milk and infant feeding method. In a single-variable logistic regression analysis, mothers who scored below the sample mean on the Breastfeeding Self-Efficacy Scale (Short-Form) had an increased likelihood of supplementing with formula at 4-weeks postpartum compared to mothers who scored higher than the sample mean (unadjusted OR = 3.5, 95% CI 1.8-6.6, p<.01). It was not clear to which group mothers belonged if they scored the sample mean on the Breastfeeding Self-Efficacy Scale (Short-Form) as the study reported non-overlapping categories (Otsuka et al., 2008).

Pollard and Guill (2009) examined the relationship between in-hospital breastfeeding self-efficacy and breastfeeding duration. In a sample of 62 women recruited from a regional hospital in southeastern North Carolina, breastfeeding confidence was assessed in hospital and infant feeding was determined through a telephone interview at 6 months. A weak positive correlation was found between in-hospital scores on the Breastfeeding Self-Efficacy Scale (Short-Form) and breastfeeding duration (r=0.26, p=.05) (Pollard & Guill, 2009).
2.12.2 Studies using the Breastfeeding Self-Efficacy Scale (Original)

In a prospective survey of 300 Australian women who intended to breastfeed, breastfeeding self-efficacy was assessed in an antenatal questionnaire using the Breastfeeding Self-Efficacy Scale. Women were telephoned at 1 week and 4 months postpartum to determine infant feeding practices and postpartum self-efficacy. Significant differences in antenatal scores were found between women who were breastfeeding ($M = 128.1, SD = 22.7$) and women who were bottle-feeding ($M = 109.6, SD = 27.2$) at 1-week postpartum ($t (253) = 4.91, p<.001$). Similarly, a significant difference was found in 1-week self-efficacy scores between women who were breastfeeding ($M = 147.0, SD = 15.6$) and women who were bottle-feeding ($M = 126.5, SD = 25.8$) at 4 months postpartum ($t (252) = 7.17, p<.001$). In a multiple regression analysis, postnatal self-efficacy scores accounted for more variation in breastfeeding duration at 4 months postpartum ($R^2 = 17\%, \beta = 0.4, t = 7.17, p<.001$) than antenatal breastfeeding self-efficacy ($R^2 = 9\%, \beta = 0.3, t = 4.91, p<0.001$), suggesting that postnatal assessments may be more predictive of breastfeeding behaviours than prenatal measures of breastfeeding self-efficacy (Blyth et al., 2002).

Wilhelm, Rodehorst, Stepans, Hertzog, and Berens (2008) examined the influence of breastfeeding intention and self-efficacy on duration in a sample of 53 rural mothers from the mid-west United States of America. Self-efficacy was measured in hospital and at the 2-week visit using the Breastfeeding Self-Efficacy Scale. Follow up of participants occurred between 2 and 4 days postpartum, at 2 and 6 weeks and during monthly phone calls thereafter until 6 months postpartum. Breastfeeding self-efficacy scores measured in hospital were high and demonstrated low variability. Self-efficacy scores were not significantly different for those who stopped breastfeeding 6 months ($M = 120.8, SD = 22.2$) and those who were breastfeeding at 6 months ($M = 130.5, SD = 18.8, t (52) = 1.65, p=.104$). In logistic regression analyses, in hospital self-efficacy scores did not significantly predict breastfeeding at 6 months ($p>.05$). In contrast, higher levels of
self-efficacy at 2 weeks postpartum were significantly associated with an increased likelihood of breastfeeding for 6 months (OR = 1.04, p<.05) (Wilhelm et al., 2008).

2.12.3 Studies using other measures of self-efficacy

A cohort of 471 Danish mothers was followed for 4 months to determine infant feeding behaviours. A self-report questionnaire concerning maternal, baby and family characteristics was given to mothers 3 weeks postpartum by a local health visitor; this is a health professional who provides postpartum support to mothers in Denmark. Psychosocial items on the questionnaire reflected factors of Ajzen’s Theory of Planned Behaviour and Bandura’s Social Cognitive Theory. The health visitor followed up on breastfeeding status until 17 weeks postpartum. Self-efficacy was dichotomized into high or medium-to-low. In Cox proportional hazard analyses, women with medium-to-low self-efficacy were more likely than women with high self-efficacy to stop exclusive breastfeeding (HR = 1.9, 95% CI 1.3-2.7) (Kronborg & Vaeth, 2004).

In a cohort of 27,753 Norwegian mothers, general self-efficacy (as opposed to breastfeeding self-efficacy) and negative affectivity were assessed for their relationship with breastfeeding practices at 6 months. Self-efficacy was assessed at 30-weeks gestation using the General Self-Efficacy Scale. At 6 months, mothers reported breastfeeding status and any introduction of solids in the preceding months. Women were categorized into 3 feeding groups: predominant breastfeeding, mixed feeding, and bottle-feeding. After controlling for maternal age, smoking, education, mode of birth, preterm birth, parity, and external daycare, general self-efficacy was associated with decreased odds of bottle-feeding (OR = 0.90, 95% CI 0.84-0.97) but not with mixed feeding (OR = 0.98, 95% CI 0.92-1.04) compared with predominant breastfeeding (Ystrom, Niegel, Klepp, & Vollrath, 2008).

While the relationship between self-efficacy and breastfeeding outcomes has been well studied, the existing research lacks focus on the early postpartum period, with many studies assessing the effect of self-efficacy on breastfeeding duration in general (Kronborg & Vaeth,
2004; Pollard & Guill, 2009; Wilhelm et al., 2008; Ystrom et al., 2008). The existing literature on breastfeeding self-efficacy and breastfeeding in the early postpartum period are not generalizable to adult, Canadian mothers. In particular, two studies that assessed the relationship between scores on the Breastfeeding Self-Efficacy Scale (Short-Form) and breastfeeding in the early postpartum period were done so in specific ethnic groups (women of African descent and Japanese mothers) (McCarter-Spaulding & Gore, 2009; Otsuka et al., 2008). The research with adolescents is not generalizable to adult mothers (Mossman et al., 2008). Finally, Pollard and Guill’s (2009) study with American mothers did not control for potential confounders. Given the significant decline in breastfeeding during the initial postpartum phase, this time period warrants further research in breastfeeding self-efficacy, a potentially modifiable factor associated with mothers’ breastfeeding practices.

2.13 Altering self-efficacy

Research on the potential to alter breastfeeding self-efficacy and the effect of increased self-efficacy to subsequently improve breastfeeding duration has been inconclusive. In a randomized controlled trial of 110 primiparous mothers, a 2.5-hour prenatal breastfeeding workshop was administered to the intervention group (Noel-Weiss, Rupp, Cragg, Bassett, & Woodend, 2006). This workshop was based on Bandura’s theory of self-efficacy and adult learning principles. The four sources of self-efficacy were addressed by using life-like dolls, videos and discussion in a comfortable environment. Self-efficacy was measured with the Breastfeeding Self-Efficacy Scale (Short-Form) at 4 and 8 weeks postpartum. At 4 weeks, mean self-efficacy scores were significantly lower in the control group than in the intervention group (intention to treat analysis: \( t (78) = -2.320, p = .023 \), actual workshop attendance analysis: \( t (78) = -3.002, p=.004 \). At 8 weeks, mean self-efficacy scores were lower in the control group, however loss to follow up reduced power to detect a statistically significant difference. Under the intention to treat assumption, the mean duration of breastfeeding (in days) calculated at 8 weeks was not
statistically different between the intervention (49.9) and control group (50.4, t (90) = -.066, p=.95). However, when actual workshop attendance was analyzed, the mean duration of breastfeeding (in days) was statistically different between those who attended the workshop (54.0) and those who did not (47.1, t (90) = -2.36, p=.02) (Noel-Weiss et al., 2006).

Recently, a randomized control trial of an individualized efficacy-enhancing nursing protocol was delivered in a standardized manner to a sample of new mothers in Northwestern Ontario to evaluate the feasibility, compliance, and acceptability of the intervention, as well as the alterability of self-efficacy and its subsequent effect on breastfeeding exclusivity and duration (McQueen et al., 2011). The sample was comprised of 150 in-hospital, primiparous mothers with singleton infants of at least 37 weeks gestational age, and who initiated breastfeeding. Mothers were randomized in hospital and the intervention group received 3 individualized self-efficacy interventions (2 in-hospital and 1 by telephone) in addition to standard care. These interventions followed a standardized format including i) assessment of breastfeeding self-efficacy using the Breastfeeding Self-Efficacy Scale (Short-Form), ii) application of strategies to increase breastfeeding self-efficacy based on the assessment, and iii) evaluation of short-term changes in breastfeeding self-efficacy from efficacy-enhancing strategies. The control group was assessed for breastfeeding self-efficacy using the same instrument and received standard hospital and community care. Self-efficacy was measured in both groups in hospital and at 4 and 8 weeks. At 4 weeks postpartum, the intervention group had a mean self-efficacy score of 58.4 points (SD = 11.4) compared to 55.0 points (SD = 13.7) in the control group (p > .05). At 8 weeks postpartum the intervention group had a mean score of 59.0 points (SD = 13.7) compared to 54.9 points (SD = 15.8) in the control group (p > .05). Similarly, non-significant differences in proportions of women exclusively breastfeeding were found between the intervention group and the control group at 4 weeks (60.9% and 55.1% respectively) and 8 weeks postpartum (50.8% and 45.2% respectively). While these results are discouraging, the authors note that these analyses were secondary to the study’s primary objectives to assess feasibility, compliance, and acceptability.
As such, the study had insufficient power to detect a difference between the two groups. As a result, it is not surprising that a statistically significant difference was not found with regards to self-efficacy scores and breastfeeding exclusivity (McQueen et al., 2011).

In a randomized controlled study of 90 mothers, an interactive workbook on breastfeeding was administered to women in their third trimester of pregnancy assigned to the intervention group at antenatal clinics. This workbook was created to reflect Dennis’ breastfeeding self-efficacy framework based on the four sources of self-efficacy outlined by Bandura (Dennis, 1999). Women in the control group received an interactive workbook on parenting issues, with no reference to breastfeeding. Breastfeeding self-efficacy was assessed with the original, 33-item Breastfeeding Self-Efficacy Scale at prior to completing the workbook and at 4 weeks postpartum. After controlling for pre-intervention scores, the intervention group scored significantly higher on the Breastfeeding Self-Efficacy Scale than the control group ($F (1, 87) = 5.35, p=.03$). There was a borderline significant difference between mothers in the intervention group and the control group with respect to number of days breastfeeding ($F (1, 87) = 3.87, p=.05$) (Nichols, Brown, Dennis, & Price, 2009).

In 2007, Kingston, Dennis, and Sword conducted a study to assess the influence of efficacy-enhancing experiences on breastfeeding self-efficacy. Using the Breastfeeding Self-Efficacy Scale (Short-Form) as a measure of breastfeeding confidence, the study assessed the influence of enactive mastery and various forms of experiences (vicarious, verbal persuasory, and physiological) as outlined by Bandura’s Social Cognitive Theory. A convenience sample of women was approached in hospital to participate in the study. An in-hospital questionnaire comprised of questions about sociodemographics, infant feeding status and the influence of particular experiences on breastfeeding self-efficacy was administered within 48-hours postpartum. Women were telephoned at 4-weeks postpartum to re-assess breastfeeding confidence and infant feeding status. Mothers who reported viewing audiovisual tapes of women breastfeeding during the prenatal or immediate postpartum period (a form of vicarious
experience) had significantly higher self-efficacy scores ($M = 40.87, SD = 11.73$) 48-hours postpartum than woman who did not ($M = 21.24, SD = 9.96, t(62) = 2.69, p<.01$). In addition, there were significant differences in mean self-efficacy scores of mothers experiencing varying degrees of pain from breastfeeding (a form of physiological response) (moderate: $M = 41.70, SD = 12.63$, little: $M = 51.03, SD = 10.68$, none: $M = 54.78, SD = 8.63$, $F(2) = 4.16, p=.02$). Of the other sources of self-efficacy, verbal persuasion in the form of praise for breastfeeding efforts demonstrated a non-significant association with self-efficacy scores at 48-hours postpartum (having received praise: $M = 50.91, SD = 9.80$, not having received praise: $M = 44.00, SD = 14.17, p=.07$). However, post-hoc analysis revealed that women who received praise from parents (p=.02) or their partners (p=.01) had significantly higher self-efficacy scores at 48-hours postpartum than mothers who received praise from friends. Mean scores for these analyses were not reported. Enactive mastery experiences were found to be most predictive of self-efficacy scores at 4-weeks postpartum. In particular, women who received help with breastfeeding difficulties had lower scores at 4 weeks postpartum than those who received no help ($t(53) = -2.37, p=.02$, mean scores not reported). This may be due to women’s perceptions that professional assistance significantly contributed to breastfeeding accomplishments resulting in doubts in being able to repeat these successes. At the same time, mothers who received professional assistance may be particularly self-conscious of their breastfeeding difficulties, lowering their confidence in their breastfeeding ability. Both potential explanations represent an alterable situation that may be responsive to efficacy-enhancing interventions (Kingston et al., 2007).

### 2.14 Summary of literature review

Sustained exclusive breastfeeding has important health benefits for children that translate into significant reductions in infant illness, including gastrointestinal and respiratory infections.
As such, the Health Canada and the World Health Organization recommend exclusive breastfeeding for 6 months with continued breastfeeding up to 2 years.

While the majority of Canadian women initiate breastfeeding (88%), only 54% of women sustain breastfeeding to 6 months. In addition, despite the national recommendation, only 14% of women report they are exclusively breastfeeding at 6 months, with close to a quarter of women weaning their infant within the first month postpartum (Public Health Agency of Canada, 2009).

A number of maternal characteristics (such as biological, sociodemographic, and psychological variables) and factors in the intrapartum and postpartum experience have been associated with breastfeeding duration (Dennis, 2002). The relationship between breastfeeding self-efficacy and breastfeeding duration is of particular interest to this study.

To measure breastfeeding self-efficacy, Dennis and Faux (1999) developed the Breastfeeding Self-Efficacy Scale using Bandura’s Social Cognitive Theory. The most recent version has a reduced number of items and was renamed the Breastfeeding Self-Efficacy Scale (Short-Form). Studies have shown self-efficacy scores from this instrument to be associated with breastfeeding behaviours. Existing studies that have examined breastfeeding self-efficacy and breastfeeding behaviours in the early postpartum have been conducted in mothers of African descent, Japanese mothers, and adolescent mothers. These results are not generalizable to Canadian, adult mothers, indicating a need for further research on the potential for Breastfeeding Self-Efficacy Scale (Short-Form) to be used as an instrument to identify mothers with low breastfeeding self-efficacy.

While preliminary research has shown small and, at times, non-significant, associations between self-efficacy enhancing interventions and increased breastfeeding self-efficacy, and between increased breastfeeding self-efficacy and subsequent breastfeeding behaviours, the studies in question also had methodological issues that could explain the lackluster results such as insufficient power and failure to account for confounding. Further research is required to clarify the ability of public health interventions to improve breastfeeding self-efficacy.
Chapter 3

Methods

3.1 Design

This is a secondary analysis of a dataset from the 2008 Infant Feeding Survey, a survey of new mothers in Kingston, Frontenac and Lennox & Addington area with longitudinal follow-up for 12 months.

3.2 Infant Feeding Survey

3.2.1 Objectives:

Kingston, Frontenac and Lennox & Addington Public Health developed the Infant Feeding Survey to describe local infant feeding practices. The survey objectives related to this thesis were:

1. To determine the duration of all types of breastfeeding
2. To identify factors that influence the initiation and duration of all types of breastfeeding and that influence the early introduction of solid foods.

3.2.2 Study Population

The study population consisted of a convenience sample of women who were residents of the Kingston, Frontenac and Lennox & Addington area and who delivered a live infant of at least 36 weeks gestation and weighing 1500 grams or more between January 1st, 2008 and July 31st, 2008 at Kingston General Hospital.

3.2.3 Methods of data collection

Women fitting the eligibility criteria were recruited from Kingston General Hospital by one of five research assistants during the study period (see Appendix A for data collection procedure). Research assistants explained the purpose of the study, provided mothers with an
introduction letter (see Appendix B), and obtained consent from mothers (see Appendix C). Women who provided consent were given a hardcover children’s book as a token of appreciation. Follow-up telephone interviews at 2, 4, 6 and 12 months were conducted by trained interviewers from CCI Research, a third-party survey company formerly known as Compustat Consultants. CCI Research is the full name of the survey company. Interviewers followed a script with detailed prompts and probes. Reminder letters were sent by Kingston, Frontenac and Lennox & Addington Public Health several days before each survey period (see Appendix D).

3.2.4 Instruments and tools

3.2.4.1 Surveys

The Infant Feeding Survey was developed collaboratively through discussion with managers from the Family Health and Research and Education Divisions of Kingston, Frontenac and Lennox & Addington Public Health with reference to existing literature on breastfeeding and breastfeeding instruments. The survey was comprised of an initial questionnaire given in hospital and telephone interviews that were conducted at 2, 4, 6 and 12 months postpartum. The in-hospital survey included 229 questions regarding socio-demographic characteristics of the mother, maternal attitudes towards breastfeeding including breastfeeding self-efficacy, early feeding practices, breastfeeding challenges and supports, and characteristics of the infant (see Appendix E for survey questions). In the telephone interviews mothers were asked about their infant feeding experiences, current-feeding practices, and future plans for infant feeding. See Appendix F for survey questions posed by interviewers at 2 months. Subsequent interviews were identical in format.

3.2.4.2 Breastfeeding Self-Efficacy Scale (Short-Form)

The Breastfeeding Self-Efficacy Scale (Short-Form) was used in hospital to measure postnatal breastfeeding confidence. All questions were presented positively with response options on a 5-point scale where 1 indicated “not at all confident” and 5 indicated “very confident”. The
sum of item responses ranged from 14-70, with higher scores indicating higher breastfeeding self-efficacy.

This instrument originated in 1999, when Dennis and Faux developed a 33-item Breastfeeding Self-Efficacy Scale based on Bandura’s social cognitive theory (Dennis & Faux, 1999). Following a pilot test, the instrument was assessed with 130 in-hospital breastfeeding mothers for reliability and validity. Support for predictive ability was shown with positive correlations between self-efficacy scores and infant feeding practices at 6 weeks postpartum \( (F(118) = 9.89, p<.001) \). The Cronbach’s alpha coefficient was 0.96, demonstrating high internal consistency. To further test the psychometric properties of the scale, assessments of reliability and validity were replicated in a sample of 300 Australian mothers. The Breastfeeding Self-Efficacy Scale was administered antenatally, at 1 week and at 16 weeks postpartum (Creedy et al., 2003). In terms of predictive validity, significant differences in antenatal breastfeeding self-efficacy scores were found between mothers who were breastfeeding \( (M=128.10, SD = 22.74) \) and mothers who were bottle-feeding \( (M = 109.57, SD = 27.18, t(274) = 3.68, p<.001) \) at 1 week postpartum. Similarly, mothers who were breastfeeding at 16 weeks postpartum had significantly different scores than mothers who were bottle-feeding \( (t(253) = 4.91, p<.001) \). Using the 1-week breastfeeding self-efficacy scores, mothers who were breastfeeding \( (M = 146.97, SD = 15.56) \) at 16-weeks postpartum had significantly higher scores than those who were bottle-feeding \( (M = 126.48, SD = 25.82, t(252) = 7.17, p<.001) \). The antenatal breastfeeding self-efficacy scores were also associated with breastfeeding level at 1-week postpartum and 16-weeks postpartum. Specifically, in a one-way analysis of variance, mothers who were predominantly breastfeeding (including exclusive, almost exclusive and high breastfeeding) at 1-week postpartum had higher antenatal self-efficacy scores \( (M = 129.50, SD = 21.71) \) than mothers who were partially breastfeeding \( (M = 120.62, SD = 27.47) \) or bottle feeding \( (M = 109.08, SD = 26.11, F(2) = 10.22, p<.001) \). Similar differences in antenatal self-efficacy were found between mothers who were predominantly breastfeeding, partially breastfeeding or bottle-feeding \( (F(2) = 9.22, p<.001) \) at 16
weeks. Based on these encouraging results, the instrument was translated and validated in a sample of Chinese mothers (Dai & Dennis, 2003) and a sample of Puerto Rican mothers (Torres, Torres, Rodriguez, & Dennis, 2003).

In 2003, Dennis conducted an exploratory factor analysis to reduce this scale to 14 items, resulting in the Breastfeeding Self-Efficacy Scale (Short-Form) (Dennis, 2003). Dennis conducted a psychometric assessment of this scale to establish validity and reliability in a sample of 491 Canadian women. Mothers were mailed a questionnaire to determine breastfeeding self-efficacy and infant feeding method at 1, 4 and 8 weeks postpartum. To evaluate construct validity, known group comparisons and correlations with theoretically related concepts were assessed. For the first, it was hypothesized that women with previous breastfeeding experience would have higher scores than those who did not. This was confirmed with significant differences in 1-week breastfeeding self-efficacy scores between primiparous mothers ($M = 53.48, SD = 10.33$) and multiparous mothers with prior breastfeeding experience ($M = 58.21, SD = 10.87$), $t(481) = 4.82, p<.001$. Similar results were found at 4 weeks ($t(449) = 2.31, p = .02$), and at 8 weeks ($t(387) = 2.01, p = .05$, magnitudes of difference not reported). For the second, relationships between breastfeeding self-efficacy and a number of theoretically related concepts were assessed. Self-esteem, measured by the Rosenberg Self-Esteem Scale at 1 and 8 weeks postpartum, was expected to be positively associated with Breastfeeding Self-Efficacy Scale (Short-Form) scores. In addition, maternal mood, measured with the Edinburgh Postnatal Depression Scale at 1, 4 and 8 weeks, was expected to negatively correlate with self-efficacy scores. Similarly, perceived stress, measured with the Perceived Stress Scale at 1 and 8 weeks postpartum, was expected to be negatively associated with self-efficacy scores. These relationships were confirmed at a statistical significance of $p<.001$ and are summarized in the following table:
Table 1 Breastfeeding Self-Efficacy Scale (Short-Form): Correlations between breastfeeding self-efficacy and theoretically related concepts

<table>
<thead>
<tr>
<th></th>
<th>Breastfeeding Self-Efficacy Scale - Short-Form</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time 1 week</td>
</tr>
<tr>
<td>Self-Esteem (RSES)</td>
<td></td>
</tr>
<tr>
<td>1 week</td>
<td>0.22</td>
</tr>
<tr>
<td>8 weeks</td>
<td>0.28</td>
</tr>
<tr>
<td>Postpartum Depression (EPDS)</td>
<td></td>
</tr>
<tr>
<td>1 week</td>
<td>-0.38</td>
</tr>
<tr>
<td>4 weeks</td>
<td>-0.35</td>
</tr>
<tr>
<td>8 weeks</td>
<td>-0.25</td>
</tr>
<tr>
<td>Perceived Stress (PSS)</td>
<td></td>
</tr>
<tr>
<td>1 week</td>
<td>-0.25</td>
</tr>
<tr>
<td>8 weeks</td>
<td>-0.28</td>
</tr>
</tbody>
</table>

RSES = Rosenberg Self-Esteem Scale; EPDS = Edinburgh Postnatal Depression Scale; PSS = Perceived Stress Scale
Adapted from Dennis, 2003
Note: all results have p<.001

In terms of predictive validity, a significant difference in 1 week postpartum scores was found between women who were breastfeeding ($M = 56.4, SD = 10.5$) and those bottle feeding ($M = 42.6, SD = 13.4$) at 4 weeks postpartum ($t (481) = 5.56, p<.001$) and at 8 weeks postpartum ($M = 57.7, SD = 9.9$ and $M = 46.1, SD = 11.4$ respectively, $t (449) = 8.16, p<.001$). A significant difference in 4 week postpartum scores was found between women who were breastfeeding ($M = 57.9, SD = 9.1$) and bottle feeding ($M = 32.4, SD = 13.2$, $t (387) = 17.56, p<.001$) at 8 weeks.

Cronbach’s alpha for the scale was 0.94 in the sample assessed by Dennis in 2003. The scores correlated highly and significantly with the original Breastfeeding Self-Efficacy Scale scores at 1, 4 and 8 weeks respectively ($r=0.99$ for all time points, p-value not reported). Given these encouraging results, the Breastfeeding Self-Efficacy Scale (Short-Form) has been piloted and psychometrically assessed in populations from Canada, Poland, the United Kingdom, Brazil and Turkey (Baghurst et al., 2007; Wutke & Dennis, 2007; Gregory, Dennis, Morrison, Penrose, & MacArthur, 2008; Oriá, Ximenes, de Almeida, Glick, & Dennis, 2009; Tokat, Okumus, & Dennis, 2010). Table 2 summarizes the findings of these studies.
### Table 2 Psychometric assessments of the Breastfeeding Self-Efficacy Scale (Short-Form)

<table>
<thead>
<tr>
<th>Authors (Year)</th>
<th>Sample</th>
<th>Cronbach’s alpha</th>
<th>Predictive Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dennis (2003)</td>
<td>491 Canadian breastfeeding mothers at 1-week postpartum</td>
<td>0.94</td>
<td>Scores at 1 week were significantly related to infant feeding method at 4 weeks ((F (2) = 55.6, p&lt;.001)) and 8 weeks ((F (2) = 47.5, p&lt;.001))</td>
</tr>
<tr>
<td>Kingston et al. (2007)</td>
<td>63 Canadian breastfeeding mothers in hospital</td>
<td>0.94</td>
<td>At 4-weeks postpartum, a significant difference in scores was found between mothers who were breastfeeding ((M = 51.4, SD = 8.6)) and mothers who formula fed ((M = 39.6, SD = 17.4, t (60) = 3.1, p&lt;.001)).</td>
</tr>
<tr>
<td>Wutke &amp; Dennis (2007)</td>
<td>105 Polish breastfeeding mothers in hospital</td>
<td>0.89</td>
<td>At 8-weeks postpartum, a significant difference in scores was found between mothers who were breastfeeding ((M = 56.7, SD = 8.1)) and mothers who formula fed ((M = 50.7, SD = 7.9, t (103) = 3.07, p&lt;.001)). At 16-weeks postpartum, a significant difference in scores was found between mothers who were breastfeeding ((M = 57.9, SD = 7.3)) and mothers who formula fed ((M = 50.6, SD = 8.5, t (103) = 3.07, p&lt;.001)).</td>
</tr>
<tr>
<td>Gregory et al. (2008)</td>
<td>165 ethnically diverse breastfeeding mothers in hospital from the United Kingdom</td>
<td>0.90</td>
<td>Scores were significantly associated with infant feeding method at 4 weeks postpartum ((F (2) = 1.6, p&lt;.001)). Mothers who were breastfeeding had significantly higher scores ((M = 49.4, SD = 12.9)) than mothers who were partially breastfeeding ((M = 44.7, SD = 9.5)) or formula feeding ((M = 42.4, SD = 11.7))</td>
</tr>
<tr>
<td>Tokat et al. (2008)</td>
<td>144 pregnant mothers and 150 postnatal breastfeeding mothers from Turkey</td>
<td>0.87 antenatal 0.86 postnatal</td>
<td>A significant difference in anenatal scores was found between mothers who breastfed ((M = 57.2 SD = 6.8)) and mothers who formula fed ((M = 54.7, SD = 6.7, t = 2.07^{\dagger}, p=.04)) at 12-weeks postpartum. A significant difference in postnatal scores was found between mothers who breastfed ((M = 58.64 SD = 7.05)) and mothers who formula fed ((M = 53.46, SD = 7.22, t = 3.89^{\dagger}, p&lt;.001)) at 12-weeks postpartum.</td>
</tr>
<tr>
<td>Oriá et al. (2009)</td>
<td>117 pregnant Brazilian mothers</td>
<td>0.88</td>
<td>Not evaluated</td>
</tr>
</tbody>
</table>

\(*^{\dagger}\): Degrees of freedom not reported
3.2.5 Preparation of data

Research assistants from Kingston, Frontenac and Lennox & Addington Public Health entered data from the initial questionnaire. Data from the follow-up interviews were entered into a dataset by CCI Research interviewers. A customized internal program called ‘Data Check’ was used to identify logic errors. In addition, files were routinely checked for duplicate identification numbers, missing fields and other irregularities. A project specific report of the question responses was generated at least once a week that allowed the interviewers to identify data entry problems. These data were then securely transferred and merged with the data of the initial questionnaire. The final dataset was anonymized and contained no identifying variables. It is kept at Kingston, Frontenac and Lennox & Addington Public Health under a secure electronic pass code, accessible only to the primary investigators for purposes of data analysis.

3.2.6 Variables available for analysis

The Infant Feeding Survey collected information on a number of variables relevant to breastfeeding practices in addition to breastfeeding self-efficacy (see Appendix E for exact survey questions). Sociodemographic variables available for analysis included age, education, income and smoking status. Variables relating to the intrapartum experience included type of delivery. Characteristics of the infant included parity, gestational age, infant birth weight and whether or not the infant was a singleton. Variables related to the mother and breastfeeding included previous breastfeeding experience, partner support (in her decision to breastfeed), prenatal breastfeeding education, difficulties or concerns with breastfeeding in hospital, and intention to breastfeed at home.
3.3 Current research study

This study used data from the Infant Feeding Survey to describe breastfeeding trends and to assess the relationship between breastfeeding self-efficacy, measured in hospital with the Breastfeeding Self-Efficacy Scale (Short-Form), and breastfeeding duration.

3.3.1 Objectives

The objectives of this study were:

1. For the Kingston, Frontenac and Lennox & Addington area, to describe the breastfeeding practices of new mothers in terms exclusivity and duration, and
2. To assess the relationship between breastfeeding self-efficacy, measured in hospital with the Breastfeeding Self-Efficacy Scale (Short-Form), and
   i) exclusive breastfeeding from birth’ to six weeks
   ii) ‘any breastfeeding’ to six weeks

3.3.2 Classification of outcomes

3.3.2.1 Extent of breastfeeding

An epidemiologist at Kingston, Frontenac and Lennox & Addington Public Health created four hierarchal categories to indicate degrees of breastfeeding exclusivity (described below). Table 3 summarizes the types of food allowed within each category. See Appendix G for questions used to determine categories of breastfeeding exclusivity.

i) Exclusive breastfeeding from birth

This group consisted of women who gave their infant only breast milk from birth with the exception of mothers whose infants were given formula in hospital because it was medically indicated. With regards to solids and other liquids, the survey was worded in such a way that it was not possible to distinguish between infants who did not receive solids or other liquids, and infants who received a single serving. Specifically, mothers were asked: ‘Other than breast milk
or formula, has your baby had any other food, such as infant cereal or fruit juice, *more than once?* (Research and Education Division of Kingston, Frontenac and Lennox & Addington Public Health, 2011). This prevented the application of the Health Canada and World Health Organization definition of ‘exclusive breastfeeding’ whereby any feeds of solids or other liquids preclude women from the exclusive breastfeeding group.

ii) *Exclusive breastfeeding from discharge*

This category consisted of women who gave their infant only breast milk *from discharge onwards*. The same possibility regarding a single serving of a solid and other liquid applied to this category.

iii) *High breastfeeding from discharge*

This group consisted of mothers who gave their infant breast milk and minimal formula feeds after discharge. Minimal formula feeds were defined as 1 or 2 formula feeds in total or ‘occasional’ feeds (less than 1 feeding a week). Women who gave plain water were not excluded from this group. This group excluded women who gave their infant solids or other fluids more than once after discharge.

iv) *Any breastfeeding*

This group consisted of mothers who gave their infant any breast milk. Women who gave their infant water, formula, and solids and other fluids were included as long as they also gave breast milk.
Table 3 Categories of breastfeeding exclusivity

<table>
<thead>
<tr>
<th>Breastfeeding Category</th>
<th>Type of Food</th>
<th>Breast milk</th>
<th>Formula</th>
<th>Water</th>
<th>Solids or other liquids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusive breastfeeding from birth</td>
<td>Yes</td>
<td>No, unless medically indicated by physician</td>
<td>No</td>
<td>One feeding is possible</td>
<td></td>
</tr>
<tr>
<td>Exclusive breastfeeding from discharge</td>
<td>Yes</td>
<td>No, unless medically indicated by physician</td>
<td>No</td>
<td>One feeding is possible</td>
<td></td>
</tr>
<tr>
<td>High breastfeeding</td>
<td>Yes</td>
<td>One or two formula feedings in total, or less than one per week</td>
<td>Permitted</td>
<td>One feeding is possible</td>
<td></td>
</tr>
<tr>
<td>Any breastfeeding</td>
<td>Yes</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td></td>
</tr>
</tbody>
</table>

Adapted from Research and Education Division of Kingston, Frontenac and Lenno & Addington Public Health, 2011

3.3.2.2 Duration of breastfeeding

To describe breastfeeding trends, length of breastfeeding was determined for each of the four breastfeeding categories. For each category, the duration of breastfeeding was the length of time a mother adhered to that category’s inclusion criteria (see Appendix G for questions used to determine breastfeeding category; see Appendix H for questions used to determine the timing of introduction of formula). Using Kaplan-Meier survival distributions, the cumulative proportions of women breastfeeding were described for specific time points according to four levels of exclusivity. In assessing the relationship between self-efficacy and breastfeeding duration, 6 weeks was selected as the duration of interest in this study. Review of the literature has shown that mothers are likely to cease breastfeeding during the early postpartum period (Public Health Agency of Canada, 2009). In particular, infants often experience growth spurts at 6 weeks (Goodwin et al., 2011) resulting in greater energy demands. This can lead to perceptions of insufficient milk supply (one of the most commonly cited reasons for breastfeeding cessation) (Ahluwalia et al., 2005). Therefore ‘duration’ was dichotomized to ‘less than 6 weeks’ and ‘6
weeks or beyond’ for women who initiated breastfeeding and had follow-up at 2 months. In these analyses, the breastfeeding categories ‘exclusive breastfeeding from discharge’ and ‘high breastfeeding’ were excluded. Since the World Health Organization does not use these categories, the results of such analyses would be less meaningful than those for ‘exclusive breastfeeding from birth’ and ‘any breastfeeding’.

Mothers who gave breast milk only for 6 weeks or longer were coded as ‘exclusive breastfeeding for 6 weeks or beyond’. Mothers who gave formula on any occasion or solids or other liquids more than once before 6 weeks were coded as ‘exclusive breastfeeding for less than 6 weeks’.

Mothers who gave any breast milk for 6 weeks or longer were coded as ‘breastfeeding for 6 weeks or beyond’. Mothers who stopped giving breast milk altogether before 6 weeks were coded as ‘breastfeeding for less than 6 weeks’.

### 3.3.3 Preparation of independent variables

#### 3.3.3.1 Breastfeeding self-efficacy score

Responses to the 14 items on the Breastfeeding Self-Efficacy Scale (Short-Form) were summed to produce a score. For women with 1 or 2 incomplete questions (7% or 14% of the total questionnaire) missing responses were given imputed values equal to the average score of non-missing items in the questionnaire. Known as the person mean substitution approach to managing missing values, when the number of missing items is less than 20% this method has been found to produce good estimates of the true values (Downie & King, 1998). Valid and imputed responses were summed to produce a score. Women who were missing more than 2 items were excluded from the regression analyses (n = 80).
3.3.3.2 Demographic characteristics

Age and household income were treated as ordinal variables. Due to low cell counts, age categories ‘15-19 years’ and ‘20-24 years’ were collapsed into a ‘<25 years’ category. Age categories ‘25-29 years’ and ‘30-34 years’ were retained due to sufficient cell counts. Age categories ‘35-39 years’ and ‘40+ years’ were collapsed into a ‘35+ years of age’ category. Due to low cell counts, adjacent income categories for households were collapsed to produce three groupings (<$39,999, $40,000-$79,999 and $80,000+) from the 6 original income categories (see Appendix E). For the same reason, education was treated as ‘high school or less’ or ‘post-secondary education’. Smoking status was treated categorically as ‘current smoker’, ‘former smoker’ and ‘non-smoker’. “I don’t know” responses for any of these variables were coded as missing.

3.3.3.3 Factors potentially associated with duration

Type of delivery was treated dichotomously as ‘caesarean’ or ‘vaginal’. Parity was assessed as an ordinal variable with categories ‘one’, ‘two’, and ‘three or more’. Previous experience with breastfeeding was assessed dichotomously (‘yes’ or ‘no’). First-time mothers with missing responses were coded as having ‘no previous experience with breastfeeding’. Partner support in a mother’s decision to breastfeed was treated as a binary variable (‘yes’ or ‘no’). Women who reported that their partner was ‘neutral’ or those who did not find this question relevant were coded as having ‘no partner support’. Prenatal breastfeeding education (attendance at a prenatal class, breastfeeding class or both), in-hospital formula feeds, and difficulties or concerns with breastfeeding (occurring in hospital) were treated as dichotomous variables (‘yes’ or ‘no’). “I don’t know” responses for any of these variables were coded as missing.

Intention to breastfeed was not included as a potential confounder in the multivariate analyses as researchers have argued that this variable lies on the causal pathway to breastfeeding.
behaviours (Peat, Allen, Nguyen, Hayen, & Oddy, 2004). According to the Theory of Planned Behaviour, intention is the psychological state that directly precedes a health behavior (Noar, 2005). An important criterion of a confounder is that it does not lie on the causal pathway for the outcome. Controlling for pathway variables would reduce or obscure effects between the exposure and outcome (Peat et al., 2004). Figure 4 presents a conceptual framework for the assessment of potential confounders (demographic variables and factors potentially associated with breastfeeding duration) in exploring the relationship between in-hospital breastfeeding self-efficacy and breastfeeding duration.

**Figure 4 Conceptual framework for assessing potential confounders**

<table>
<thead>
<tr>
<th>In-Hospital Breastfeeding Self-Efficacy</th>
<th>Breastfeeding Practices at 6-Weeks Postpartum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Potential Confounders</td>
</tr>
<tr>
<td></td>
<td>• Age</td>
</tr>
<tr>
<td></td>
<td>• Education</td>
</tr>
<tr>
<td></td>
<td>• Income</td>
</tr>
<tr>
<td></td>
<td>• Smoking status</td>
</tr>
<tr>
<td></td>
<td>• Type of delivery</td>
</tr>
<tr>
<td></td>
<td>• Purity</td>
</tr>
<tr>
<td></td>
<td>• Previous BF experience</td>
</tr>
<tr>
<td></td>
<td>• Partner support</td>
</tr>
<tr>
<td></td>
<td>• Prenatal BF education</td>
</tr>
<tr>
<td></td>
<td>• Difficulties BF in hospital</td>
</tr>
</tbody>
</table>

### 3.3.4 Statistical analyses

The following statistical analyses were completed using SAS Version 9.2.

#### 3.3.4.1 Univariate analyses

The characteristics of the study sample were described using univariate statistics. Percentages were used to describe categorical, ordinal, and binary variables. The mean and standard deviation were used to describe the breastfeeding self-efficacy score, which were normally distributed. Item responses were presented in percentages. The types of breastfeeding
difficulties or concerns experienced in hospital were described as proportions of the total sample who reported each type of difficulty or concern. Percentages do not add up to 100 as mothers could select more than one type of difficulty or concern.

3.3.4.2 Two-sample comparisons

To assess representativeness, the study sample was compared with the Kingston, Frontenac and Lennox & Addington population of women who delivered infants who were at least 36 weeks gestation and weighing 1500 grams, at Kingston General Hospital during the study period. Relevant variables for this population were taken from the Niday Perinatal Database. This database captures record level perinatal information on 95% of births in Ontario (BORN Ontario, 2010). Information collected includes characteristics of the mothers and newborns and use of health services in the prenatal and intrapartum period. Variables used in this study included age of the mother, smoking during pregnancy, parity, multiple gestation, type of delivery, intention to breastfeed at home, and whether the infant was fed formula in hospital. Gestational age and birth weights of the infants were not compared as selection criteria restricted the sampling of these characteristics. Since the study sample was a substantial proportion of the total number of births in Kingston, Frontenac and Lennox & Addington mothers, comparisons were made between the unsampled group and the study sample. Characteristics of the unsampled group were determined by subtracting those of the study sample from those of the general population. Chi-square tests were used to compare the distribution of characteristics in the two groups.

3.3.4.3 Calculation of weights

Significant differences in age, smoking during pregnancy, type of delivery, and formula feeding in hospital were found between the sample and the general population of new mothers (see Appendix I). Preliminary descriptive analyses showed that the sample was highly educated (74.9% of mothers had a college diploma or university degree) and reported high levels of annual household income (37.0% of mothers reported an annual household income of $80,000 or more)
(see Appendix J). Since these characteristics have been demonstrated in the literature to be positively associated with breastfeeding exclusivity and duration (Dennis, 2002), the breastfeeding behaviours described by this study would likely overestimate breastfeeding exclusivity and duration in the general population. In an attempt to improve external validity, population weights were calculated from the maternal age distribution for the general population of new mothers in Kingston, Frontenac and Lennox & Addington as the inverse of sampling fractions for each age category. These weights were used in all subsequent analyses. Nine women did not provide their age and were excluded from weighted analyses.

3.3.4.4 Survival analyses

Kaplan-Meier survival distributions were constructed to describe cumulative proportions of women breastfeeding according to four levels of exclusivity; ‘exclusive breastfeeding from birth’, ‘exclusive breastfeeding from discharge’, ‘high breastfeeding’, and ‘any breastfeeding’. For each definition, women ‘failed’ when they no longer fulfilled the respective criteria. Women were censored if and when they were lost to follow up.

3.3.4.5 Comparison of early cessation and sustained groups

The early cessation (less than 6 weeks) and sustained breastfeeding (to 6 weeks or beyond) groups were compared on demographic traits and potential confounders; this comparison was done for two levels of breastfeeding, ‘exclusive breastfeeding from birth’ and ‘any breastfeeding’.

Chi-square tests were used to compare categorical, ordinal and binary variables. When missing values accounted for more than 5% of either group, a ‘missing’ category was created for comparisons; otherwise missing values were excluded. Fisher’s exact test was used in cases where expected values for more than 25% of the cells were less than 5 (Rosner, 2006). As the breastfeeding self-efficacy scores demonstrated normality, t-tests were used to compare the self-efficacy scores. A significance level of $p = .05$ was used in all analyses.
3.3.4.6 Bivariate analyses

Single predictor regression analyses were conducted to assess the potential confounding effects of demographic characteristics and factors potentially associated with breastfeeding duration on the relationship between breastfeeding self-efficacy and breastfeeding duration. Linear regression analyses were conducted between potential confounders and breastfeeding self-efficacy scores. Logistic regression analyses were conducted between potential confounders and duration of ‘exclusive breastfeeding from birth’ (with duration classified as less than 6 weeks or to 6 weeks or beyond). These analyses were repeated for the duration of ‘any breastfeeding’ (less than 6 weeks or to 6 weeks or beyond). Since the influence of these variables may be altered when placed in a multivariate regression model, potential confounders were not eliminated from further analyses based on the results of the bivariate analyses. The sample size of 339 individuals satisfied the requirement for a minimum of 20 observations per assessed covariate (Tabachnick & Fidell, 1989).

3.3.4.7 Multicollinearity

To assess multicollinearity between covariates, variance inflation factors of the potential confounders were evaluated (see Appendix K). If variance inflation factors were greater than 10, this indicated a problem with multicollinearity and redundant variables were excluded (Chaterjee, Hadi, & Price, 2000).

3.3.4.8 Interaction

To create a comprehensive but parsimonious regression model, reasonably plausible first-order interactions were assessed for association with duration of ‘exclusive breastfeeding’ and duration of ‘any breastfeeding’ (see Appendix L). Interaction terms associated with the outcome at p<.25 were included in the multivariate regression analyses (Bursac, Gauss, Williams, & Hosmer, 2008).
3.3.4.9 Multivariate analyses

Multivariate logistic regression was used to assess the relationship between the scores on the Breastfeeding Self-Efficacy Scale (Short-Form) and breastfeeding duration (dichotomized to less than 6 weeks and to 6 weeks or beyond) while controlling for covariates. Separate models were created for assessing the relationships between breastfeeding self-efficacy and duration of ‘exclusive breastfeeding from birth’ and duration of ‘any breastfeeding’. As the predictor of interest, Breastfeeding Self-Efficacy Scale (Short-Form) was forced into the models. Given the strong relationship between age and education, and breastfeeding duration (Dennis, 2002), these covariates were also forced into the models. Other covariates were eliminated using a backwards stepwise procedure combined with a change-in-estimate approach. Variables were retained in the final models if they were significant predictors of the outcome (p<.05) or if they changed the parameter estimate for Breastfeeding Self-Efficacy Scale (Short-Form) by greater than 10% (Greenland, 1989). Women with missing values for predictor variables in the final model were excluded; the sample available for each analysis was reported in the results.

3.3.4.10 Power calculations

A power calculation was done to determine whether the analyses would have sufficient power to detect a difference between mothers who exclusively breastfed to 6 weeks and those who stopped before 6 weeks. An estimated difference of 8.3 points was used based on previous research conducted in similar populations (Gregory et al., 2008; Kingston et al., 2007; Wutke & Dennis, 2007). Using an alpha value of 5% and a beta value of 20%, the regression analysis had greater than 99% power to detect a difference of 8.3 points in breastfeeding self-efficacy scores between the two groups (see Appendix M).

A similar power calculation was done to assess the power of the regression analyses to detect a difference between mothers who breastfed to 6 weeks and those who stopped breastfeeding altogether before 6 weeks. An estimated difference of 8.3 points was used (Gregory
et al., 2008; Kingston et al., 2007; Wutke & Dennis, 2007). Using an alpha value of 5% and a beta value of 20%, the regression analysis had greater than 99% power to detect a difference of 8.3 points in breastfeeding self-efficacy scores between the two groups (see Appendix M).

3.4 Ethics

The Infant Feeding Survey received ethics approval from the Queen’s University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board. This study received expedited ethics approval from the same ethics board on March 21st, 2011 (see Appendix N).
Chapter 4

Results

4.1 Descriptive analyses

4.1.1 Percentage of follow-up and attrition

Four hundred and sixty three women initially participated in the Infant Feeding Survey. Although there was no information available regarding the number of women approached for the survey, 1057 women who fit the eligibility criteria of the study gave birth at Kingston General Hospital during the recruitment period. Therefore, the study sample represents 43.8% of this eligible population.

At 2, 4, 6 and 12 months 82%, 75%, 71% and 65% of the study sample were followed up respectively. Attrition of participants was the greatest between the in-hospital point of contact and the telephone interview at 2 months (18%). Figure 5 shows the flow of participants throughout the study period.
Women who met the eligibility criteria and gave birth between January 1st and July 31st, 2008 at Kingston General Hospital (captured by the NIDAY database) 

n=1057

In-Hospital Survey 
n=463 
43.8% of 1057

Lost to Follow Up 
n=84 
18.1% of 463

2-Month Survey 
n=379 
81.9% of 463

Lost to Follow Up 
n=31 
8.2% of 379

4-Month Survey 
n=348 
75.2% of 463

Lost to Follow Up 
n=18 
5.2% of 348

6-Month Survey 
n=330 
71.3% of 463

Lost to Follow Up 
n=28 
8.5% of 330

12-Month Survey 
n=302 
65.2% of 463

Figure 5 Flow diagram of participants in the Infant Feeding Survey
4.1.1 Descriptive comparison of the study sample and Kingston, Frontenac and Lennox & Addington population

Table 4 compares the study sample to the unsampled group of Kingston, Frontenac and Lennox & Addington mothers who met the eligibility criteria. The study sample significantly differed from the unsampled group with respect to age and smoking during pregnancy. The two groups were not significantly different in terms of parity, with most mothers being primiparous in both groups.

Infants from the two groups were of similar gestational age. Singleton births comprised the overwhelming majority of the study sample and the unsampled population. The two groups had similar distributions in infant birth weight. While the majority of women in both populations gave birth vaginally, a significantly higher proportion of women did so in the unsampled group (80% compared to 72% in the sample population, p=.003).

Similar proportions of women in the study sample and the unsampled group intended to breastfeed when they returned home with their infant. However, the two groups differed in terms of formula feeding in hospital (28% in the sample compared to 45% in the unsampled group, p<.0001).
### Table 4 Comparison of the study sample to the unsampled Kingston, Frontenac and Lennox & Addington population with regards to demographic characteristics and factors potentially associated with breastfeeding duration

<table>
<thead>
<tr>
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<th>Study Sample</th>
<th>Unsampled KFL&amp;A Population</th>
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<td>n</td>
<td>%</td>
<td>n</td>
</tr>
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<td>109</td>
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<td>13</td>
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<td>Two</td>
<td>164</td>
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<td>Three or more</td>
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<td>98.2</td>
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<td>Vaginal</td>
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<td>71.8</td>
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<td>No</td>
<td>46</td>
<td>10.3</td>
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<td>Yes</td>
<td>109</td>
<td>23.5</td>
</tr>
<tr>
<td>No</td>
<td>354</td>
<td>76.5</td>
</tr>
</tbody>
</table>

KFL&A = Kingston, Frontenac and Lennox & Addington

#### 4.1.2 Descriptive comparison of the study sample and Kingston, Frontenac and Lennox & Addington population with respect to demographic characteristics and factors potentially associated with breastfeeding duration: weighted analysis

Given the significant differences between the study sample and the unsampled group on a number of important variables as well as the sample’s high socioeconomic status (see Appendix I and J), the sample was weighted to the age distribution of Kingston, Frontenac and Lennox & Addington’s population of new mothers in an attempt to increase generalizability. Weighting the
study sample by maternal age reduced differences in multiple gestation, type of delivery, and intention to breastfeed at home (see Table 5).

Table 5 Comparing the study sample and Kingston, Frontenac and Lennox & Addington population with respect to demographic characteristics and factors potentially associated with breastfeeding duration: weighted analysis

<table>
<thead>
<tr>
<th>Age</th>
<th>Weighted Sample %</th>
<th>Unsampled KFL&amp;A Population %</th>
<th>Chi-Square Value*, DF</th>
<th>P-Value after weighting</th>
<th>P-Value before weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20</td>
<td>6.2</td>
<td>6.2</td>
<td>0.006, 5</td>
<td>1.00</td>
<td>0.04</td>
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<td>20-24</td>
<td>18.1</td>
<td>18.1</td>
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</tr>
<tr>
<td>25-29</td>
<td>31.3</td>
<td>31.3</td>
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</tr>
<tr>
<td>30-34</td>
<td>31.8</td>
<td>31.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35-39</td>
<td>10.4</td>
<td>10.4</td>
<td></td>
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<td>40+</td>
<td>2.2</td>
<td>2.2</td>
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</table>

Smoking during pregnancy

<table>
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<tr>
<th>Smoking during pregnancy</th>
<th>Weighted Sample %</th>
<th>Unsampled KFL&amp;A Population %</th>
<th>Chi-Square Value*, DF</th>
<th>P-Value after weighting</th>
<th>P-Value before weighting</th>
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<tbody>
<tr>
<td>Yes</td>
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<td>22.68, 1</td>
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Parity

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<th>P-Value before weighting</th>
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<tr>
<td>One</td>
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<td>10.70, 2</td>
<td>0.005</td>
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<td>34.5</td>
<td>40.6</td>
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<td></td>
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<td>Three or more</td>
<td>14.4</td>
<td>18.4</td>
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Multiple Gestation

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<th>P-Value after weighting</th>
<th>P-Value before weighting</th>
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Type of Delivery

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<th>Type of Delivery</th>
<th>Weighted Sample %</th>
<th>Unsampled KFL&amp;A Population %</th>
<th>Chi-Square Value*, DF</th>
<th>P-Value after weighting</th>
<th>P-Value before weighting</th>
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</thead>
<tbody>
<tr>
<td>Caesarean</td>
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<td>0.003</td>
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<td>Vaginal</td>
<td>73.9</td>
<td>79.7</td>
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</table>

Intention to Breastfeed at Home

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<tr>
<th>Intention to Breastfeed at Home</th>
<th>Weighted Sample %</th>
<th>Unsampled KFL&amp;A Population %</th>
<th>Chi-Square Value*, DF</th>
<th>P-Value after weighting</th>
<th>P-Value before weighting</th>
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<td>2.06, 1</td>
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<td>No</td>
<td>11.3</td>
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</table>

Formula Feed In Hospital

<table>
<thead>
<tr>
<th>Formula Feed In Hospital</th>
<th>Weighted Sample %</th>
<th>Unsampled KFL&amp;A Population %</th>
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<th>P-Value after weighting</th>
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<td>76.2</td>
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</tr>
</tbody>
</table>

KFL&A = Kingston, Frontenac and Lennox & Addington, DF = Degrees of freedom

*Statistics after weighting

4.1.3 Demographic characteristics of the study sample

Table 6 summarizes the demographic characteristics of the study sample. The majority of women (64%) were between 25 and 34 years of age. The majority of women (72%) had a post-secondary diploma or degree. Eighteen percent of women had a high school diploma or less. The
largest proportion of women (30%) reported an annual household income between $60,000 and $99,999. Almost one quarter of women (22%) reported a household income of $100,000 or greater. It should be noted that the question regarding income generated a large proportion of non-responses (11%). The majority of women surveyed were non-smokers (75%).

Table 6 Demographic characteristics of the study sample: weighted sample

<table>
<thead>
<tr>
<th></th>
<th>%</th>
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<tbody>
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<td>20-24</td>
<td>16.2</td>
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<tr>
<td>25-29</td>
<td>30.9</td>
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<td>30-34</td>
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</tr>
<tr>
<td>35-39</td>
<td>12.3</td>
</tr>
<tr>
<td>40+</td>
<td>2.2</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Did not graduate from high school</td>
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</tr>
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<td>High school certificate</td>
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</tr>
<tr>
<td>Some education after high school</td>
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<tr>
<td>College/university diploma or degree</td>
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</tr>
<tr>
<td>Household Income</td>
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<td>Less than $20,000</td>
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</tr>
<tr>
<td>$40,000 to $59,999</td>
<td>11.8</td>
</tr>
<tr>
<td>$60,000 to $79,999</td>
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</table>
4.1.4 Breastfeeding self-efficacy scores

Of the women who initiated breastfeeding, 92% had valid self-efficacy scores and 8% were missing scores. The mean score was 53 points ($SD = 8$). Out of a possible range of 14 to 70 points, the scores were centrally located in the upper tercile of the scale. Higher scores represent greater self-efficacy indicating that the sample possessed a high level of self-efficacy overall.

Figure 6 displays the distribution of self-efficacy scores. Normality tests produced p-values larger than 0.05 for the Anderson-Darling and Cramer-von Mises statistic for normality ($p=.13$ and $p=.20$ respectively). As such, the null hypotheses that the observed values do not differ from a Gaussian distribution cannot be rejected and the scores can be considered normally distributed.
Figure 6: Distribution of scores from the Breastfeeding Self-Efficacy Scale (Short-Form): Weighted analysis.

BSES-SF = Breastfeeding Self-Efficacy Scale (Short-Form)
Table 7 presents the distribution of item responses on the Breastfeeding Self-Efficacy Scale (Short-Form). As previously observed, this sample possessed high self-efficacy overall. The proportion of mothers who reported being ‘confident’ or ‘very confident’ for any item ranged from 34% (‘I can always determine that my baby is getting enough milk’) to 82% (‘I can always deal with the fact that breastfeeding can be time-consuming’). The average proportion of mothers who responded ‘confident’ or ‘very confident’ for an item was 65%.

**Table 7 Distribution of item responses on the Breastfeeding Self-Efficacy Scale (Short-Form): weighted analysis**

<table>
<thead>
<tr>
<th>Items on the Breastfeeding Self-Efficacy Scale (Short-Form)</th>
<th>Not at all Confident</th>
<th>Not Confident</th>
<th>Somewhat Confident</th>
<th>Confident</th>
<th>Very Confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine that my baby is getting enough milk</td>
<td>4</td>
<td>16</td>
<td>46</td>
<td>26</td>
<td>8</td>
</tr>
<tr>
<td>Successfully cope with breastfeeding like I have with other challenging tasks</td>
<td>0</td>
<td>5</td>
<td>30</td>
<td>47</td>
<td>19</td>
</tr>
<tr>
<td>Breastfeed my baby without using formula as a supplement</td>
<td>2</td>
<td>9</td>
<td>31</td>
<td>33</td>
<td>25</td>
</tr>
<tr>
<td>Ensure that my baby is properly latched on for the whole feeding</td>
<td>1</td>
<td>7</td>
<td>33</td>
<td>42</td>
<td>17</td>
</tr>
<tr>
<td>Manage the breastfeeding situation to my satisfaction</td>
<td>1</td>
<td>4</td>
<td>32</td>
<td>49</td>
<td>14</td>
</tr>
<tr>
<td>Manage to breastfeed even if my baby is crying</td>
<td>1</td>
<td>8</td>
<td>39</td>
<td>41</td>
<td>11</td>
</tr>
<tr>
<td>Keep wanting to breastfeed</td>
<td>0</td>
<td>2</td>
<td>18</td>
<td>47</td>
<td>33</td>
</tr>
<tr>
<td>Comfortably breastfeed with my family members present</td>
<td>2</td>
<td>11</td>
<td>24</td>
<td>38</td>
<td>25</td>
</tr>
<tr>
<td>Be satisfied with my breastfeeding experience</td>
<td>0</td>
<td>4</td>
<td>26</td>
<td>48</td>
<td>21</td>
</tr>
<tr>
<td>Deal with the fact that breastfeeding can be time-consuming</td>
<td>0</td>
<td>2</td>
<td>15</td>
<td>56</td>
<td>26</td>
</tr>
<tr>
<td>Finish feeding my baby on one breast before switching to the other breast</td>
<td>1</td>
<td>3</td>
<td>25</td>
<td>51</td>
<td>21</td>
</tr>
<tr>
<td>Continue to breastfeed my baby for every feeding</td>
<td>0</td>
<td>4</td>
<td>19</td>
<td>46</td>
<td>30</td>
</tr>
<tr>
<td>Manage to keep up with my baby's breastfeeding demands</td>
<td>0</td>
<td>2</td>
<td>21</td>
<td>51</td>
<td>25</td>
</tr>
<tr>
<td>Tell when my baby is finished breastfeeding</td>
<td>0</td>
<td>9</td>
<td>32</td>
<td>40</td>
<td>18</td>
</tr>
</tbody>
</table>

**4.1.5 Factors potentially associated with breastfeeding duration**

Table 8 describes the factors potentially associated with breastfeeding duration in the study sample. Most women had a vaginal delivery (73%) rather than a caesarean section (27%). The overwhelming majority of women had singleton births (98%). One half of the sample was
primiparous (50%). The majority of women in the study sample had no previous experience breastfeeding (54%). However, this variable was missing for 8% of the sample. A large proportion of the study sample reported that they had partner support in their decision to breastfeed (79%). This variable was missing for 13% of the sample. Almost half the women in the study sample received prenatal breastfeeding education (attended a prenatal or breastfeeding class) (49%). Of the women who initiated breastfeeding, 57% reported problems with breastfeeding in hospital. This variable was missing for 14% of the sample. The majority of women reported that their baby did not receive formula in hospital (75%).

Table 8 Factors potentially associated with breastfeeding duration in the study sample: weighted analysis

<table>
<thead>
<tr>
<th>Factor</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Delivery</td>
<td></td>
</tr>
<tr>
<td>Caesarean</td>
<td>27.1</td>
</tr>
<tr>
<td>Vaginal</td>
<td>72.9</td>
</tr>
<tr>
<td>Multiple Gestation</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2.1</td>
</tr>
<tr>
<td>No</td>
<td>97.9</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>49.8</td>
</tr>
<tr>
<td>Two</td>
<td>35.5</td>
</tr>
<tr>
<td>Three or more</td>
<td>14.8</td>
</tr>
<tr>
<td>Previous Breastfeeding Experience</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>38.2</td>
</tr>
<tr>
<td>No</td>
<td>54.2</td>
</tr>
<tr>
<td>Missing</td>
<td>7.7</td>
</tr>
<tr>
<td>Partner Support</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>79.2</td>
</tr>
<tr>
<td>No</td>
<td>8.1</td>
</tr>
<tr>
<td>Missing</td>
<td>12.7</td>
</tr>
<tr>
<td>Prenatal Breastfeeding Education</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>48.5</td>
</tr>
<tr>
<td>No</td>
<td>51.5</td>
</tr>
<tr>
<td>Difficulties or Concerns with Breastfeeding In Hospital</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>57.0</td>
</tr>
<tr>
<td>No</td>
<td>29.2</td>
</tr>
<tr>
<td>Missing</td>
<td>13.9</td>
</tr>
<tr>
<td>Formula Feed In Hospital (Any)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>25.0</td>
</tr>
<tr>
<td>No</td>
<td>75.0</td>
</tr>
</tbody>
</table>
4.1.6 Breastfeeding difficulties and concerns reported by mothers in hospital

The most common breastfeeding difficulty reported by mothers in hospital was that their ‘baby was too sleepy’ (64%, see Figure 7). The second most common difficulty was that their ‘baby could not latch’ (32%). Perceptions of insufficient milk supply were reported by 16% of mothers.

Figure 7 Proportions of the sample that reported each type of in-hospital breastfeeding difficulty or concern: weighted analysis

*Percentages do not add up to 100 as mothers were allowed to choose more than one response
4.1.7 Loss to follow-up at 2 months

Women who were lost to follow-up at 2 months did not have significantly different breastfeeding self-efficacy scores from women who stayed in the study ($M = 53.5$, $SD = 7.3$, and $M = 52.9$, $SD = 8.2$ respectively, $t(367) = -0.52, p=.60$).

Table 9 compares those who completed the survey at 2 months and those who were lost to follow-up with regards to demographic characteristics and factors potentially associated with duration. At 2 months, 18% of the study sample was lost to follow up. Women who did not complete the 2-month survey were younger, less educated, reported lower income, and were more likely to be current or former smokers.

The two groups did not differ in terms of parity, multiple gestation, type of delivery, or previous breastfeeding experience. Fewer women in the lost to follow-up group indicated that their partner was supportive in their decision to breastfeed than in the group that completed the 2-month survey. More women lost to follow up group indicated that their infants were given formula in-hospital than in the group that remained in the study. The two groups were equally likely to have experienced difficulties or concerns with breastfeeding in hospital and equally likely to have received prenatal breastfeeding education.
| Table 9 Comparison of women who completed the survey at 2-months and those lost to follow-up: weighted analysis |
|---------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|
|                                                               | Completed 2-Month Survey (%) | Lost to Follow-Up (%) | Chi-Square Value, DF | P-Value |
| Age                                                           |                               |                               |                  |         |
| 15-19                                                         | 3.4                           | 11.3                          | 13.85, 4         | 0.008   |
| 20-24                                                         | 15.2                          | 20.4                          |                  |         |
| 25-29                                                         | 30.7                          | 31.7                          |                  |         |
| 30-34                                                         | 35.1                          | 27.0                          |                  |         |
| 35+                                                           | 15.7                          | 9.6                           |                  |         |
| Education                                                     |                               |                               |                  |         |
| Did not graduate from high school                             | 3.0                           | 9.7                           | 32.68, 3         | <0.0001 |
| High school certificate                                       | 10.2                          | 29.5                          |                  |         |
| Some education after high school                              | 9.6                           | 9.2                           |                  |         |
| College/university diploma or degree                          | 77.2                          | 51.6                          |                  |         |
| Household Income                                              |                               |                               |                  |         |
| Less than $20,000                                             | 8.0                           | 15.6                          | 24.20, 6         | 0.0005  |
| $20,000 to $39,999                                            | 13.5                          | 19.3                          |                  |         |
| $40,000 to $59,999                                            | 11.9                          | 10.1                          |                  |         |
| $60,000 to $79,999                                            | 17.9                          | 14.5                          |                  |         |
| $80,000 to $99,999                                            | 14.4                          | 5.4                           |                  |         |
| $100,000 and greater                                          | 24.1                          | 12.3                          |                  |         |
| Missing *                                                     | 10.3                          | 22.9                          |                  |         |
| Smoking Status                                                |                               |                               |                  |         |
| Current Smoker                                                | 11.8                          | 16.8                          | 12.22, 2         | 0.002   |
| Former Smoker                                                 | 9.8                           | 33.6                          |                  |         |
| Non-Smoker                                                    | 78.4                          | 86.1                          |                  |         |
| Parity                                                        | N/A                           |                               |                  |         |
| One                                                           | 98.3                          | 97.7                          |                  | 0.49†   |
| Two                                                           | 2.2                           | 1.1                           |                  |         |
| Three or more                                                 | 0.3                           | 1.1                           |                  |         |
| Multiple Gestation                                            | N/A                           |                               |                  |         |
| Yes                                                           | 2.2                           | 2.4                           |                  |         |
| No                                                            | 97.8                          | 97.6                          |                  |         |
| Type of Delivery                                              |                               |                               | 0.45, 1          | 0.50    |
| Caesarean                                                     | 26.3                          | 30.2                          |                  |         |
| Vaginal                                                       | 73.7                          | 69.8                          |                  |         |
| Previous Breastfeeding Experience                             |                               |                               |                  |         |
| Yes                                                           | 38.2                          | 38.0                          | 0.11, 2          | 0.95    |
| No                                                            | 53.9                          | 55.2                          |                  |         |
| Missing*                                                      | 7.9                           | 6.7                           |                  |         |
| Partner Support                                               |                               |                               |                  |         |
| Yes                                                           | 82.0                          | 67.5                          | 12.82, 2         | 0.002   |
| No                                                            | 5.7                           | 4.7                           |                  |         |
| Missing*                                                      | 12.4                          | 27.8                          |                  |         |

Continued
**Table 9 Continued**

<table>
<thead>
<tr>
<th></th>
<th>Completed 2-Month Survey (%)</th>
<th>Lost to Follow-Up (%)</th>
<th>Chi-Square Value, DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prenatal Breastfeeding Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>50.6</td>
<td>39.6</td>
<td>3.38, 1</td>
<td>0.09</td>
</tr>
<tr>
<td>No</td>
<td>49.5</td>
<td>60.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Difficulties or Concerns Breastfeeding (In-Hospital)</strong></td>
<td></td>
<td></td>
<td>5.50, 2</td>
<td>0.06</td>
</tr>
<tr>
<td>Yes</td>
<td>58.0</td>
<td>52.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>30.0</td>
<td>25.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing*</td>
<td>12.0</td>
<td>21.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Formula Feed In Hospital (Any)</strong></td>
<td></td>
<td></td>
<td>10.43, 1</td>
<td>0.001</td>
</tr>
<tr>
<td>Yes</td>
<td>74.1</td>
<td>56.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>25.9</td>
<td>43.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DF = degrees of freedom
*Missing values were included in this comparison as they accounted for >5% of the sample
† Fisher’s exact test was used since expected values for >25% of cells were less than 5

4.1.8 Proportions of women breastfeeding over the first year after birth, according to level of breastfeeding

Figure 8 shows the proportion of women breastfeeding for each of the four breastfeeding levels. The median duration of ‘exclusive breastfeeding from birth’ and ‘exclusive breastfeeding from discharge’ was 4 weeks. The median duration of ‘high breastfeeding from discharge’ and ‘any breastfeeding’ were 5 weeks and 22 weeks respectively.

The proportions of mothers ‘exclusively breastfeeding from birth’ and ‘exclusively breastfeeding from discharge’ were very similar over time. At 1 month, close to half the women in the sample were no longer practicing exclusive breastfeeding (51% continued to do so from birth and 55% continued to do so from discharge). Between the first and second month, there was a steep decline in proportion of women exclusively breastfeeding, with percentages falling to 28% for the ‘from birth’ definition and 29% for the ‘from discharge’ definition. These proportions remain relatively the same to 4 months with 22% of mothers exclusively breastfeeding ‘from birth’ and 23% exclusively breastfeeding ‘from discharge’. At 6 months, only 6% of mothers were exclusively breastfeeding ‘from birth’ and 7% were doing so ‘from discharge’.

65
The overall decline in ‘high breastfeeding’ was much slower than for exclusive breastfeeding. Between 1 and 3 months postpartum, the proportion of women practicing ‘high breastfeeding’ dropped from 55% to 41%. At 5 months, this proportion dropped to 29%. By 6 months, only 12% of mothers were breastfeeding at a ‘high’ level.

Overall, 24% of mothers breastfed to some degree to 12 months. The greatest decline occurred between 1 and 3 months postpartum, with proportions dropping from 75% in the first month to 60% in the third month. Close to half of women breastfed to some extent to 6 months (49%) and almost one quarter of women continued to do so to 12 months (24%).
Figure 8: Cumulative proportions of women breastfeeding in the first 12 months postpartum according to four levels of exclusivity.

Weighted analysis using Kaplan-Meier survival distributions.

BF = breastfeeding, EBF = exclusive breastfeeding
Blank cells indicate <1% cumulative proportion.
4.2 Association between scores from the Breastfeeding Self-Efficacy Scale (Short-Form) and ‘exclusive breastfeeding from birth’ to six weeks postpartum

The following analyses examine the relationship between self-efficacy scores measured with the Breastfeeding Self-Efficacy Scale (Short-Form) and ‘exclusive breastfeeding from birth’ to 6 weeks postpartum.

4.2.1 Univariate analyses

4.2.1.1 Descriptive comparison of women breastfeeding less than 6 weeks (early cessation group) and breastfeeding to 6 weeks or beyond (sustained breastfeeding group)

Mothers who stopped exclusive breastfeeding before 6 weeks scored significantly lower on the Breastfeeding Self-Efficacy Scale (Short-Form) ($M = 51.2, SD = 7.9$) than mothers who continued to 6 weeks or beyond ($M = 55.6, SD = 8.1, t (318) = -4.65, p=<.0001$). The percentage of women who were missing self-efficacy scores was not significantly different between the two groups (7% for the early cessation group and 2% for the sustained breastfeeding group, $\chi^2 (1, N=339) = 3.45, p=.06$).

Table 10 summarizes the demographic characteristics and factors potentially associated with duration by the duration of ‘exclusive breastfeeding from birth’. Of the women who initiated breastfeeding and had follow-up at 2 months, 212 mothers exclusively breastfed for less than 6 weeks and 126 women did so for 6 weeks or beyond. The early cessation group was similar to the sustained breastfeeding group with respect to age, level of education, and household income. Women who exclusively breastfed for 6 weeks or beyond were more likely to be non-smokers than women in the early cessation group.

Women in the early cessation group were equally likely to have had a caesarean birth as the sustained breastfeeding group. The two groups were similar with regards to partner support and prenatal breastfeeding education. More women in the early cessation group were
primiparous, lacked previous breastfeeding experience and reported having difficulties or concerns while breastfeeding in-hospital than in the sustained breastfeeding group.

Table 10 Comparison of early cessation group and sustained breastfeeding group with regards to demographic characteristics and factors potentially associated with duration of ‘exclusive breastfeeding from birth’: weighted analysis

<table>
<thead>
<tr>
<th></th>
<th>BF for Less than 6 Weeks</th>
<th>BF to 6 Weeks or Beyond</th>
<th>Chi-Square Statistic</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;24</td>
<td>18.9</td>
<td>12.7</td>
<td>3.64, 3</td>
<td>0.3</td>
</tr>
<tr>
<td>25-29</td>
<td>28.8</td>
<td>34.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-34</td>
<td>37.3</td>
<td>34.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35+</td>
<td>14.6</td>
<td>18.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school education or less</td>
<td>12.8</td>
<td>10.3</td>
<td>0.43, 2</td>
<td>0.81</td>
</tr>
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<td>Some education after high school</td>
<td>9.0</td>
<td>7.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College/university diploma or degree:</td>
<td>78.3</td>
<td>81.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household Income</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Less than $20,000</td>
<td>8.5</td>
<td>4.8</td>
<td>6.36, 6</td>
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<td>$20,000 to $39,999</td>
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<td>13.5</td>
<td></td>
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<td>$40,000 to $59,999</td>
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<td>9.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$60,000 to $79,999</td>
<td>17.9</td>
<td>16.7</td>
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<td>$80,000 to $99,999</td>
<td>15.1</td>
<td>15.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$100,000 and greater</td>
<td>21.2</td>
<td>31.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing*</td>
<td>10.8</td>
<td>8.7</td>
<td></td>
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</tr>
<tr>
<td>Smoking Status</td>
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<td></td>
</tr>
<tr>
<td>Current Smoker</td>
<td>12.3</td>
<td>7.1</td>
<td>10.95, 2</td>
<td>0.004</td>
</tr>
<tr>
<td>Former Smoker</td>
<td>13.2</td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Smoker</td>
<td>74.5</td>
<td>88.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of Delivery</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Caesarean</td>
<td>30.2</td>
<td>21.4</td>
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<td>Vaginal</td>
<td>66.5</td>
<td>76.2</td>
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<td>3.3</td>
<td>2.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>54.2</td>
<td>40.5</td>
<td>7.37, 2</td>
<td>0.03</td>
</tr>
<tr>
<td>Two</td>
<td>30.2</td>
<td>40.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three or more</td>
<td>12.3</td>
<td>18.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>3.3</td>
<td>0.8</td>
<td></td>
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</tr>
<tr>
<td>Previous Breastfeeding Experience</td>
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<td></td>
</tr>
<tr>
<td>Yes</td>
<td>34.0</td>
<td>51.6</td>
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<td>58.5</td>
<td>42.9</td>
<td></td>
<td></td>
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<tr>
<td>Missing*</td>
<td>7.5</td>
<td>5.6</td>
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</tbody>
</table>

Continued
Table 10 Continued

<table>
<thead>
<tr>
<th></th>
<th>BF for Less than 6 Weeks</th>
<th>BF to 6 Weeks or Beyond</th>
<th>Chi-Square Statistic</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>( \chi^2 ), DF</td>
<td></td>
</tr>
<tr>
<td>Partner Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>85.4</td>
<td>94.4</td>
<td>3.08, 1</td>
<td>0.08</td>
</tr>
<tr>
<td>No</td>
<td>10.8</td>
<td>5.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>3.8</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prenatal Breastfeeding Education</td>
<td></td>
<td></td>
<td>2.07, 1</td>
<td>0.15</td>
</tr>
<tr>
<td>Yes</td>
<td>49.1</td>
<td>57.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>50.9</td>
<td>42.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulties or Concerns with Breastfeeding (In-Hospital)</td>
<td></td>
<td></td>
<td>11.43, 2</td>
<td>0.003</td>
</tr>
<tr>
<td>Yes</td>
<td>68.9</td>
<td>53.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>25.9</td>
<td>43.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing*</td>
<td>5.2</td>
<td>3.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BF = breastfeeding, DF = degrees of freedom

*Missing values were included in this comparison as they accounted for >5% of the sample

4.2.2 Bivariate analyses

Table 11 describes the relationships between demographic characteristics and factors potentially associated with duration, and the Breastfeeding Self-Efficacy Scale (Short-Form).

Table 12 describes the relationship between these independent variables and the duration of ‘exclusive breastfeeding from birth’ to 6 weeks.

4.2.2.1 Relationship between demographic characteristics and factors potentially associated with duration, and the Breastfeeding Self-Efficacy Scale (Short-Form): weighted analysis

Using linear regression analyses, age, education, income, smoking status, type of delivery and prenatal breastfeeding education were not found to be significantly associated with the Breastfeeding Self-Efficacy Scale (Short-Form) score (\( p > .05 \) for all variables, Table 11).

A number of variables were associated with the Breastfeeding Self-Efficacy Scale (Short-Form) score. Compared to women who had two other children in addition to their newborn, primiparous mothers scored an average of 7 points less on the Breastfeeding Self-Efficacy Scale (Short-Form). This can be understood as a 13% reduction in the scale score (7 points out of 56 points). Women with no previous experience breastfeeding scored 3 points less, on average, than
experienced mothers. This can be translated to a 5% drop in the scale score (3 points out of 56 points). Women who had no partner support scored 6 points less, on average, than those who reported that they did have partner support in their decision to breastfeed. This can be understood as a 11% reduction in the scale score (6 points out of 56 points). Mothers who reported difficulties or concerns with breastfeeding in hospital scored 5 points less, on average, than women who did not. This can be represented as a 9% decrease in the scale score (5 points out of 56 points). Women whose infants received formula supplementation in-hospital scored 4 points less, on average, than women who were exclusively breastfeeding. This can be translated into a 7% drop in the scale score (4 points out of 56 points).
Table 11 Bivariate analyses of demographic characteristics and factors potentially associated with duration, and the Breastfeeding Self-Efficacy Scale (Short-Form): weighted analysis

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Breastfeeding Self-Efficacy Scale (Short-Form)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 25</td>
<td>0.18</td>
<td>0.88</td>
</tr>
<tr>
<td>25-29</td>
<td>-0.32</td>
<td>0.76</td>
</tr>
<tr>
<td>30-34</td>
<td>-.5</td>
<td>0.23</td>
</tr>
<tr>
<td>35 +</td>
<td>1.51</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School or Less</td>
<td>0.79</td>
<td>0.42</td>
</tr>
<tr>
<td>Post-Secondary</td>
<td>-.5</td>
<td></td>
</tr>
<tr>
<td>Household Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $40,000</td>
<td>0.18</td>
<td>0.88</td>
</tr>
<tr>
<td>$40,000 to $79,999</td>
<td>-.5</td>
<td></td>
</tr>
<tr>
<td>$80,000 and greater</td>
<td>-0.47</td>
<td>0.65</td>
</tr>
<tr>
<td>Smoking Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Smoker</td>
<td>-1.61</td>
<td>0.25</td>
</tr>
<tr>
<td>Former Smoker</td>
<td>-0.56</td>
<td>0.67</td>
</tr>
<tr>
<td>Non-Smoker</td>
<td>-.5</td>
<td></td>
</tr>
<tr>
<td>Type of Delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caesarean</td>
<td>-0.01</td>
<td>0.99</td>
</tr>
<tr>
<td>Vaginal</td>
<td>-.5</td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>-7.11</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Two</td>
<td>-4.42</td>
<td>0.001</td>
</tr>
<tr>
<td>Three or more</td>
<td>-.5</td>
<td></td>
</tr>
<tr>
<td>Previous Breastfeeding Experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>-.5</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>No</td>
<td>-3.36</td>
<td></td>
</tr>
<tr>
<td>Partner Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>-.5</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>-5.83</td>
<td>0.0003</td>
</tr>
<tr>
<td>Prenatal Breastfeeding Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>-.5</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0.07</td>
<td>0.94</td>
</tr>
<tr>
<td>Difficulties or Concerns with Breastfeeding (In Hospital)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>-5.33</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>No</td>
<td>-.5</td>
<td></td>
</tr>
<tr>
<td>Formula Feed In-Hospital (Any)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>-3.78</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No</td>
<td>-.5</td>
<td></td>
</tr>
</tbody>
</table>

*Reference group
4.2.2.2 Relationship between Breastfeeding Self-Efficacy Scale (Short-Form), demographic characteristics and factors potentially associated with breastfeeding duration, and duration of ‘exclusive breastfeeding from birth’: weighted analysis

Table 12 presents the results of single variable logistic regression analyses used to assess the relationship between demographic characteristics and factors potentially associated with breastfeeding duration, and duration of ‘exclusive breastfeeding from birth’ (a weighted analysis). A 7% increase in estimated odds for breastfeeding exclusively to 6 weeks or beyond was associated with each unit increase on the Breastfeeding Self-Efficacy Scale (Short-Form) (OR = 1.07, 95% CI 1.0-1.1). This relationship was not statistically significant.

A number of other variables were significantly associated with sustained breastfeeding. Compared to non-smokers, women who were former smokers had reduced estimated odds of breastfeeding to 6 weeks (OR = 0.3, 95% CI 0.1-0.7). Women who did not have previous experience breastfeeding had a lower estimated odds of sustaining breastfeeding compared to their experienced counterparts (OR = 0.5, 95% CI 0.3-0.8). Women who reported difficulties or concerns with breastfeeding in hospital had lowered estimated odds of breastfeeding to 6 weeks or beyond compared those who did not report problems with breastfeeding (OR = 0.5, 95% CI 0.3-0.7). A relationship of borderline significance between parity and breastfeeding duration was found in which first-time mothers had reduced estimated odds of sustaining breastfeeding compared to mothers with parity of three or more (OR = 0.5, 95% CI 0.3-1.0).
Table 12 Bivariate assessment of the Breastfeeding Self-Efficacy Scale (Short-Form), demographic characteristics and factors potentially associated with duration with exclusive breastfeeding to 6 weeks or beyond: weighted analysis

<table>
<thead>
<tr>
<th></th>
<th>Exclusive BF from Birth to 6 Weeks or Beyond</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>CI</td>
</tr>
<tr>
<td>Breastfeeding Self-Efficacy Scale</td>
<td>1.07</td>
<td>1.04-1.10</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 25</td>
<td>0.72</td>
<td>0.36-1.44</td>
</tr>
<tr>
<td>25-29</td>
<td>1.31</td>
<td>0.77-2.24</td>
</tr>
<tr>
<td>30-34</td>
<td>1.00*</td>
<td>0.70-2.60</td>
</tr>
<tr>
<td>35 +</td>
<td>1.35</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School or Less</td>
<td>0.84</td>
<td>0.49-1.47</td>
</tr>
<tr>
<td>Post-Secondary</td>
<td>1.00*</td>
<td></td>
</tr>
<tr>
<td>Household Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $40,000</td>
<td>1.02</td>
<td>0.53-1.95</td>
</tr>
<tr>
<td>$40,000 to $79,999</td>
<td>1.00*</td>
<td></td>
</tr>
<tr>
<td>$80,000 and greater</td>
<td>1.52</td>
<td>0.89-2.61</td>
</tr>
<tr>
<td>Smoking Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Smoker</td>
<td>0.50</td>
<td>0.23-1.10</td>
</tr>
<tr>
<td>Former Smoker</td>
<td>0.25</td>
<td>0.09-0.66</td>
</tr>
<tr>
<td>Non-Smoker</td>
<td>1.00*</td>
<td></td>
</tr>
<tr>
<td>Type of Delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caesarean</td>
<td>0.62</td>
<td>0.37-1.04</td>
</tr>
<tr>
<td>Vaginal</td>
<td>1.00*</td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>0.49</td>
<td>0.26-0.95</td>
</tr>
<tr>
<td>Two</td>
<td>0.88</td>
<td>0.45-1.73</td>
</tr>
<tr>
<td>Three or more</td>
<td>1.00*</td>
<td></td>
</tr>
<tr>
<td>Previous Breastfeeding Experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.00*</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0.48</td>
<td>0.30-0.77</td>
</tr>
<tr>
<td>Partner Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.00*</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0.44</td>
<td>0.18-1.07</td>
</tr>
<tr>
<td>Prenatal Breastfeeding Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.00*</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0.72</td>
<td>0.46-1.12</td>
</tr>
<tr>
<td>Difficulties or Concerns with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breastfeeding (In Hospital)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0.45</td>
<td>0.28-0.73</td>
</tr>
<tr>
<td>No</td>
<td>1.00*</td>
<td></td>
</tr>
</tbody>
</table>

BF = breastfeeding, OR = odds ratio, CI = confidence interval

* Reference group
4.2.2.3 Relationship between ‘a priori’ interaction terms and duration of exclusive breastfeeding from birth

A number of interaction terms were associated with exclusive breastfeeding to 6 weeks or beyond at a significance level of p<.25 (see Appendix L for estimate statistics). These included the multiplicative effect of the breastfeeding self-efficacy score and age, income, parity, previous breastfeeding experience, prenatal breastfeeding education and reported difficulties and concerns with breastfeeding in hospital. The relationship between breastfeeding self-efficacy scores and duration of exclusive breastfeeding was altered according to the levels of these variables. These interaction terms were included in the multivariate analyses to assess for effect modification.

4.2.3 Multivariate analyses

4.2.3.1 Relationship between predictor variables: Assessment of multicollinearity

All covariates listed in Table 10 were assessed for multicollinearity (see Appendix K). Relatively large variance inflation factors were shown for previous breastfeeding experience (7.7) and primiparity (9.8). Since these statistics were close to the cut-off of 10 (Chaterjee, Hadi, & Price, 2000), multivariate regression models that included these variables were especially scrutinized for inflated standard errors.

4.2.3.2 Relationship between Breastfeeding Self-Efficacy Scale (Short-Form) and duration of ‘exclusive breastfeeding from birth’, adjusted for age, education and confounders

Table 13 lists the unadjusted and adjusted odds ratios of the Breastfeeding Self-Efficacy Scale (Short-Form) and confounders of exclusive breastfeeding from birth. The removal of the variables ‘difficulties or concerns with breastfeeding (in hospital)’ and ‘partner support’ was associated with a >10% change in parameter estimate for the Breastfeeding Self-Efficacy Scale (Short-Form). These variables were retained in the final model as confounders. When adjusted for age, education, experiencing difficulties or concerns with breastfeeding (in hospital) and partner support, the estimated odds of breastfeeding to 6 weeks increased by 5% for every unit increase
of the Breastfeeding Self-Efficacy Scale (Short-Form) (OR = 1.05, 95% CI 1.0-1.1). This relationship was not significant.

The Hosmer-Lemeshow test indicated a good fit of the model to the data. Testing the null hypothesis that there is no difference between the observed values and those predicted by the model, a non-significant p-value was produced ($\chi^2 (8, N=310) = 2.28, p=.97$). Given that the p-value is larger than 0.05, the null hypothesis could not be rejected and the model can be considered well calibrated. The Nagelkerke adjusted $R^2$ statistic was 0.1174, indicating that this model explained 11.7% of the variation in duration of ‘exclusive breastfeeding from birth’.

**Table 13 Unadjusted odds ratios and adjusted odds ratios for significant predictors and confounders of duration of ‘exclusive breastfeeding from birth’, n=310: weighted analysis**

<table>
<thead>
<tr>
<th>Significant Predictors</th>
<th>Unadjusted ORs</th>
<th>Adjusted ORs*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Breastfeeding Self-Efficacy Scale (Short-Form)</td>
<td>1.07</td>
<td>1.04-1.10</td>
</tr>
</tbody>
</table>

**Confounders†**

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted ORs</th>
<th>Adjusted ORs*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Partner Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.00a</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0.44</td>
<td>0.18-1.07</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Difficulties or Concerns with Breastfeeding (In Hospital)</th>
<th>Unadjusted ORs</th>
<th>Adjusted ORs*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Yes</td>
<td>0.45</td>
<td>0.28-0.73</td>
</tr>
<tr>
<td>No</td>
<td>1.00a</td>
<td></td>
</tr>
</tbody>
</table>

Note: Hosmer-Lemeshow test for goodness of fit: $\chi^2 (8, N=310)=2.28, p=.97$; Nagelkerke adjusted $R^2 = 0.1174$

OR = odds ratio, CI = confidence interval

a Reference group

*Adjusted for age and education

†Variables that changed the parameter estimate for Breastfeeding Self-Efficacy Scale (Short-Form) by >10%
4.3 Association between scores from the Breastfeeding Self-Efficacy Scale (Short-Form) and ‘any breastfeeding’ to six weeks postpartum

The following analyses examine the relationship between self-efficacy scores measured with the Breastfeeding Self-Efficacy Scale (Short-Form) and ‘any breastfeeding’ to 6 weeks or beyond.

4.3.1 Univariate analyses

4.3.1.1 Descriptive comparison of women breastfeeding less than 6 weeks (early cessation group) and breastfeeding to 6 weeks or beyond (sustained breastfeeding group)

Mothers who stopped breastfeeding altogether before 6 weeks scored significantly lower on the Breastfeeding Self-Efficacy Scale (Short-Form) \((M = 49.8, SD = 8.0)\) than mothers who continued to 6 weeks or beyond \((M = 53.7, SD = 8.1, t(318) = -3.52, p<.001)\). It should be noted that there were significantly more women with missing self-efficacy scores in the early cessation group than in the sustained breastfeeding group (19% versus 2% respectively, \(p<.0001\), Fisher’s exact test). Women who were missing scores were not significantly different than women who had valid scores with respect to age and education (see Appendix O). However, these two groups were significantly different with respect to income.

Table 14 compares the early cessation group with the sustained breastfeeding group with regards to demographic characteristics and factors potentially associated with duration. Women in the early cessation group were younger, had lower income, and were more likely to be current or former smokers than women in the sustained breastfeeding group. The two groups were similar in terms of education.

The two groups did not differ significantly in terms of type of delivery, parity, previous breastfeeding experience, or experiencing difficulties or concerns with breastfeeding in hospital.

Mothers who breastfed for less than 6 weeks were less likely to have partner support or prenatal breastfeeding education and more likely to have given a formula feed in hospital.
Table 14 Comparison of early cessation group and sustained breastfeeding group with regards to demographic characteristics and factors potentially associated with duration ‘any breastfeeding’: weighted analysis

<table>
<thead>
<tr>
<th></th>
<th>BF for Less than 6 Weeks</th>
<th>BF to 6 Weeks or Beyond</th>
<th>Chi-Square Statistic</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-19</td>
<td>5.0</td>
<td>2.3</td>
<td>12.25, 4</td>
<td>0.02</td>
</tr>
<tr>
<td>20-24</td>
<td>18.8</td>
<td>12.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-29</td>
<td>30.0</td>
<td>31.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-34</td>
<td>41.3</td>
<td>34.5</td>
<td></td>
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</tr>
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<td>35+</td>
<td>5.0</td>
<td>19.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not graduate from high school</td>
<td>6.3</td>
<td>1.9</td>
<td>5.12, 3</td>
<td>0.16</td>
</tr>
<tr>
<td>High school certificate</td>
<td>11.3</td>
<td>7.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some education after high school</td>
<td>7.5</td>
<td>8.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College/university diploma or degree</td>
<td>75.0</td>
<td>81.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Household Income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $20,000</td>
<td>13.8</td>
<td>5.1</td>
<td>16.35, 6</td>
<td>0.01</td>
</tr>
<tr>
<td>$20,000 to $39,999</td>
<td>7.5</td>
<td>15.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$40,000 to $59,999</td>
<td>13.8</td>
<td>11.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$60,000 to $79,999</td>
<td>25.0</td>
<td>15.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$80,000 to $99,999</td>
<td>11.3</td>
<td>16.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$100,000 and greater</td>
<td>17.5</td>
<td>27.2</td>
<td></td>
<td></td>
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<tr>
<td>Missing*</td>
<td>11.3</td>
<td>9.7</td>
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<td></td>
</tr>
<tr>
<td><strong>Smoking Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Smoker</td>
<td>18.8</td>
<td>7.8</td>
<td>11.15, 2</td>
<td>0.004</td>
</tr>
<tr>
<td>Former Smoker</td>
<td>13.8</td>
<td>8.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Smoker</td>
<td>67.5</td>
<td>84.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type of Delivery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caesarean</td>
<td>26.3</td>
<td>27.2</td>
<td>2.19, 2</td>
<td>0.33</td>
</tr>
<tr>
<td>Vaginal</td>
<td>68.8</td>
<td>70.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>5.0</td>
<td>1.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>47.5</td>
<td>49.6</td>
<td>3.16, 2</td>
<td>0.37</td>
</tr>
<tr>
<td>Two</td>
<td>33.8</td>
<td>34.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three or more</td>
<td>13.8</td>
<td>14.7</td>
<td></td>
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<tr>
<td>Missing</td>
<td>5.0</td>
<td>1.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Previous Breastfeeding Experience</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>33.8</td>
<td>42.8</td>
<td>2.07, 2</td>
<td>0.35</td>
</tr>
<tr>
<td>No</td>
<td>58.7</td>
<td>50.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing*</td>
<td>7.5</td>
<td>6.6</td>
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<td></td>
</tr>
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</table>

Continued
Table 14 Continued

<table>
<thead>
<tr>
<th></th>
<th>BF for Less than 6 Weeks</th>
<th>BF to 6 Weeks or Beyond</th>
<th>Chi-Square Statistic</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>$\chi^2$, DF</td>
<td></td>
</tr>
<tr>
<td>Partner Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>72.5</td>
<td>93.8</td>
<td>27.76, 1</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>No</td>
<td>27.5</td>
<td>6.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prenatal Breastfeeding Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>35.0</td>
<td>57.2</td>
<td>12.28, 1</td>
<td>0.0005</td>
</tr>
<tr>
<td>No</td>
<td>65.0</td>
<td>42.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulties or Concerns with Breastfeeding (In-Hospital)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>65.0</td>
<td>62.6</td>
<td>5.61, 2</td>
<td>0.06</td>
</tr>
<tr>
<td>No</td>
<td>26.3</td>
<td>34.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing*</td>
<td>8.8</td>
<td>3.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formula Feed In Hospital (Any)</td>
<td></td>
<td></td>
<td>74.72, 1</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Yes</td>
<td>67.5</td>
<td>15.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>32.5</td>
<td>78.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing*</td>
<td>1.3</td>
<td>5.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BF = breastfeeding, DF = degrees of freedom
*Missing values were included in this comparison as they accounted for >5% of the sample.

4.3.2 Bivariate analyses

Table 15 describes the relationships between demographic characteristics and factors potentially associated with duration, and the duration of ‘any breastfeeding’ to 6 weeks.

Using logistic regression analyses, a 6% increase in estimated odds for any breastfeeding to 6 weeks or beyond was associated with one unit increase in Breastfeeding Self-Efficacy Scale (Short-Form) (OR = 1.06, 95% CI 1.0-1.1). This relationship was not statistically significant.

A number of other variables were significantly associated with sustained breastfeeding. Compared to women 30-34 years of age, mothers aged 35+ years had higher estimated odds of breastfeeding to 6 weeks or beyond. Women who reported an annual income of $80,000 and greater had an increased estimated odds of sustained breastfeeding compared to women reporting $40,000 to $79,999. Compared to non-smokers, women who were current smokers had reduced estimated odds of breastfeeding to 6 weeks. Women who lacked partner support in their decision to breastfeed had decreased estimated odds of breastfeeding to 6 weeks or beyond compared to
those who said they had partner support. Women who did not receive prenatal breastfeeding education had decreased estimated odds of sustained breastfeeding compared to those who reported attendance at a prenatal or breastfeeding class. Women who reported in-hospital formula supplementation had lower estimated odds of breastfeeding to 6 weeks or beyond than those who fed their infant breast milk only while in hospital.
Table 15 Bivariate assessments of the Breastfeeding Self-Efficacy Scale (Short-Form), demographic characteristics and factors potentially associated with duration, and with ‘any breastfeeding’ to 6 weeks or beyond: weighted analysis

<table>
<thead>
<tr>
<th>Demographic Characteristics or Factors</th>
<th>Any BF to 6 Weeks or Beyond</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breastfeeding Self-Efficacy Scale (Short-Form)</td>
<td>1.06</td>
<td>1.03-1.10</td>
</tr>
<tr>
<td>Age&lt;br&gt;&lt; 25</td>
<td>0.68</td>
<td>0.35-1.35</td>
</tr>
<tr>
<td>25-29</td>
<td>1.28</td>
<td>0.70-2.36</td>
</tr>
<tr>
<td>30-34</td>
<td>1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>35+</td>
<td>4.40</td>
<td>1.5-12.94</td>
</tr>
<tr>
<td>Education&lt;br&gt;High School or Less</td>
<td>0.68</td>
<td>0.38-1.22</td>
</tr>
<tr>
<td>Post-Secondary</td>
<td>1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Household Income&lt;br&gt;Less than $40,000</td>
<td>1.42</td>
<td>0.73-2.76</td>
</tr>
<tr>
<td>$40,000 to $79,999</td>
<td>1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>$80,000 and greater</td>
<td>2.19</td>
<td>1.22-3.92</td>
</tr>
<tr>
<td>Smoking Status&lt;br&gt;Current Smoker</td>
<td>0.33</td>
<td>0.16-0.69</td>
</tr>
<tr>
<td>Former Smoker</td>
<td>0.46</td>
<td>0.21-1.01</td>
</tr>
<tr>
<td>Non-Smoker</td>
<td>1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Type of Delivery&lt;br&gt;Caesarean</td>
<td>0.99</td>
<td>0.56-1.76</td>
</tr>
<tr>
<td>Vaginal</td>
<td>1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Parity&lt;br&gt;One</td>
<td>0.98</td>
<td>0.46-2.11</td>
</tr>
<tr>
<td>Two</td>
<td>0.93</td>
<td>0.42-2.10</td>
</tr>
<tr>
<td>Three or more</td>
<td>1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Previous Breastfeeding Experience&lt;br&gt;Yes</td>
<td>1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0.68</td>
<td>0.40-1.17</td>
</tr>
<tr>
<td>Partner Support&lt;br&gt;Yes</td>
<td>1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0.29</td>
<td>0.13-0.62</td>
</tr>
<tr>
<td>Prenatal Breastfeeding Education&lt;br&gt;Yes</td>
<td>1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0.44</td>
<td>0.24-0.67</td>
</tr>
<tr>
<td>Difficulties or Concerns with Breastfeeding (In Hospital)&lt;br&gt;Yes</td>
<td>0.76</td>
<td>0.43-1.34</td>
</tr>
<tr>
<td>No</td>
<td>1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Formula Feed In Hospital (Any)&lt;br&gt;Yes</td>
<td>0.42</td>
<td>0.23-0.74</td>
</tr>
<tr>
<td>No</td>
<td>1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

BF = breastfeeding, OR = odds ratio, CI = confidence intervals
<sup>a</sup> Reference group
4.3.3 Relationship between ‘a priori’ interaction terms and duration of any breastfeeding

A number of interaction terms were associated with any breastfeeding to 6 weeks or beyond at a significance level of p<.25 (see Appendix L). These included the multiplicative effect of breastfeeding self-efficacy score and income, previous breastfeeding experience, and partner support. The relationship between breastfeeding self-efficacy scores and duration of ‘any breastfeeding’ was altered according to levels of these variables. These interaction terms were included in the multivariate analyses to assess for effect modification.

4.3.4 Multivariate analyses

4.3.4.1 Relationship between Breastfeeding Self-Efficacy Scale (Short-Form) and duration of ‘any breastfeeding’, adjusted for age, education and other significant predictors

Table 16 lists the unadjusted and adjusted odds ratios for the Breastfeeding Self-Efficacy Scale (Short-Form) score and partner support. Women who lacked partner support had a reduced estimated odds of sustained breastfeeding compared to women who reported that their partner supported their breastfeeding decision (OR = 0.3, 95% CI 0.1-0.8). When adjusted for age, education, and partner support, each point increase on the scale was associated with a 5% increase in estimated odds of breastfeeding to 6 weeks or beyond (OR = 1.05, 95% CI=1.0-1.1). There were no variables that changed the parameter estimate for Breastfeeding Self-Efficacy Scale (Short-Form) by >10% when deleted.

The Hosmer-Lemeshow test produced a non-significant p-value ($\chi^2$ (8, N=319) = 6.65, p=.58), indicating a good fit of the model to the data. The Nagelkerke adjusted $R^2$ statistic was 0.1617, indicating that this model explained 16.2% of the variation in duration of ‘any breastfeeding’.
Table 16 Unadjusted odds ratios and adjusted odds ratios for Breastfeeding Self-Efficacy Scale (Short-Form), and duration of ‘any breastfeeding’, adjusted for age, education and partner support, n=319: weighted analysis

<table>
<thead>
<tr>
<th>Significant Predictors</th>
<th>Unadjusted ORs</th>
<th>Adjusted ORs*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
</tr>
<tr>
<td>Breastfeeding Self-Efficacy Scale</td>
<td>1.06 1.03-1.10</td>
<td>1.05 1.01-1.09</td>
</tr>
<tr>
<td>Partner Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.00^a</td>
<td>1.00^a</td>
</tr>
<tr>
<td>No</td>
<td>0.29 0.13-0.62</td>
<td>0.30 0.12-0.74</td>
</tr>
</tbody>
</table>

OR = odds ratio, CI = confidence interval
*Adjusted for age, education and significantly associated covariates
^Reference group
Note: Hosmer-Lemeshow test for goodness of fit: \( \chi^2 (8, N=319) = 6.65, p=.58 \); Nagelkerke adjusted \( R^2 = 0.1617 \)
Chapter 5

Discussion

5.1 Summary of the current study

The objectives of this study were:

1. For the Kingston, Frontenac and Lennox & Addington area, to describe the breastfeeding practices of new mothers in terms exclusivity and duration, and
2. To assess the relationship between breastfeeding self-efficacy, measured in hospital with the Breastfeeding Self-Efficacy Scale (Short-Form), and
   i) exclusive breastfeeding from birth’ to six weeks
   ii) ‘any breastfeeding’ to six weeks

5.1.1 Proportions of mothers breastfeeding at specified time points

Practice of exclusive breastfeeding, both from birth and from discharge, declined significantly between 1 month and 3 months postpartum (from ~50% to 27% of mothers in both cases). At 6 months postpartum, exclusive breastfeeding dropped to ~7% in both cases. The proportion of women practicing high breastfeeding, which allows 1-2 formula feeds in total or an ‘occasional’ formula feed (less than 1 a week), declined steeply between 3 months (41%) and 6 months (12%). Overall, proportions of women breastfeeding to any extent declined slowly, indicating a gradual increase in mothers ceasing to breastfeed. Seventy-five percent of women were breastfeeding to some degree to 1 month postpartum, 60% were doing so to 3 months postpartum and 49% breastfed to 6 months postpartum.
5.1.2 Relationship between breastfeeding self-efficacy scores and ‘exclusive breastfeeding from birth’

After controlling for age, education, partner support, and experiencing difficulties or concerns with breastfeeding in hospital, a weak and non-significant association was found between the Breastfeeding Self-Efficacy Scale (Short-Form) and the likelihood of breastfeeding exclusively from birth to 6 weeks (OR = 1.05, 95% CI 1.0-1.1).

5.1.3 Relationship between breastfeeding self-efficacy scores and ‘any breastfeeding’

After controlling for age, education, and partner support, a weak and non-significant association was found between the Breastfeeding Self-Efficacy Scale (Short-Form) and the likelihood to breastfeed to any extent to 6 weeks (OR = 1.05, 95% CI 1.0-1.1).

5.2 Strengths

This study has a number of important strengths.

5.2.1 Comprehensive data collection

The Infant Feeding Survey collected detailed information about infant feeding practices to 12 months of age, allowing for a comprehensive description of breastfeeding practices. This approach offered a more accurate description of infant feeding practices than the commonly used 24-hour current status indicator, particularly in the context of exclusive breastfeeding. In public health, accuracy is important for the planning of support programs and services for breastfeeding mothers. In order to appropriately allocate resources, public health planners require an accurate description of the current breastfeeding trends to assess whether existing programs and services are effectively meeting mothers’ needs. Furthermore, in order to be accredited as a ‘Baby-Friendly’ community health service, public health units are required to monitor the proportions of women exclusively breastfeeding in their service region (Breastfeeding Committee for Canada, 2011). Staff at the Kingston, Frontenac, and Lennox & Addington Public Health are working towards accreditation and require surveillance of these infant-feeding trends.
In addition, the Infant Feeding Survey collected data on important potential confounders (such as age, education, income, previous breastfeeding experience, difficulties or concerns with breastfeeding experienced in hospital, and so on), often excluded in previous research focusing on breastfeeding behaviours. This allowed for the consideration of important potential confounders in studying the relationship between scores on the Breastfeeding Self-Efficacy Scale (Short-Form) and breastfeeding duration. Given the numerous determinants of breastfeeding duration, control of these potential confounders was important in describing this relationship.

5.2.2 Minimized measurement bias

In contrast to previous research where maternal breastfeeding confidence was poorly defined, the use of a validated tool (Dennis, 2003) grounded in a health behaviour theory (Bandura, 1977) to measure self-efficacy has likely minimized measurement error. Similarly, the use of detailed interview scripts by trained survey administrators from a third-party survey company has likely minimized interviewer bias in the assessment of breastfeeding duration. In addition, longitudinal follow-up of participants at regular periods over 12 months has likely minimized recall bias of breastfeeding practices.

5.2.3 Relevant public health variable

This study’s focus on the early postpartum period is of public health importance. Given the sharp decline in proportions of women breastfeeding during this period, evaluating the association between in-hospital assessments of self-efficacy and breastfeeding to 6 weeks provided important information regarding the potential for in-hospital screening for low breastfeeding self-efficacy. In contrast, previous studies have evaluated the relationship between postpartum self-efficacy scores assessed 1 week after birth and breastfeeding practices at a later date (McCarter-Spaulding & Gore, 2009; Mossman et al., 2008). Despite the statistical non-significance of this study’s results, the assessment of this relevant public health outcome is important to inform future studies on breastfeeding self-efficacy and public health planning.
5.3 Limitations

This study also has a number of limitations.

5.3.1 Non-representativeness of the study sample

Comparisons between the study sample and unsampled mothers in Kingston, Frontenac and Lennox & Addington area indicated significant differences in age, smoking during pregnancy, type of delivery, and formula feeding in hospital. In particular, mothers in the study sample were older, less likely to smoke, more likely to have had a caesarean birth and less likely to give a formula feed in hospital. With the exception of caesarean births, these characteristics have been related to positive breastfeeding behaviours including greater exclusivity and increased duration (Duijts et al., 2009; Meedya et al., 2010; World Health Organization, 1998).

Given these differences, estimates of breastfeeding trends described by this study are likely to be inflated. In an attempt to reduce the impact of this bias, weights calculated from the maternal age distribution for the general population of new mothers were applied to the study sample for descriptive and regression analyses. Unfortunately, maternal age was the only demographic trait available from the Niday database (BORN Ontario, 2010). Given the established associations between breastfeeding and age, education and income, this statistical procedure was carried out in an attempt to reduce the differences between the sample and the general population. While differences in multiple gestation, type of delivery, and intention to breastfeed were reduced, differences for other factors potentially associated with duration remained unchanged by the weighting procedure. As such, the generalizability of these results is limited.

5.3.2 Loss to follow-up

Non-random attrition of participants during the one-year follow-up period likely introduced another form of selection bias to the sample. As shown in the descriptive comparisons, significant socioeconomic differences existed between mothers lost to follow-up at the 2-month
time point and those who remained in the study. Specifically, women who remained in the study were older and had higher levels of education and income, all characteristics that have been associated with better breastfeeding behaviours (Dennis, 2002). This likely accentuated the selection biases already in the sample and further inflated the estimated proportions of women breastfeeding.

While loss to follow-up has restricted the generalizability of this study’s results, there are no indications that the internal validity of this study has been compromised since those loss to follow-up did not differ from those who remained in the study with regards to breastfeeding self-efficacy scores.

5.3.3 Residual confounding: Lack of information on important variables

While important confounders such as partner support and previous breastfeeding experience were considered in the relationship between in-hospital breastfeeding self-efficacy and breastfeeding duration, residual confounding by variables for which information was lacking may have obscured the true relationship between self-efficacy scores and breastfeeding at 6 weeks. For example, mothers’ knowledge of breastfeeding recommendations was not assessed in hospital. For mothers who were not aware that exclusive breastfeeding is recommended for 6 months, questions regarding whether mothers planned to supplement breastfeeding with formula when they returned home may have led to misunderstandings regarding the expectations for duration and exclusivity of breastfeeding (see Appendix E, Question 9c and 9d). In addition, there was no information regarding breastfeeding education received post-discharge or the usefulness of any breastfeeding interventions that were received. The relationship between in-hospital breastfeeding self-efficacy and breastfeeding duration may be different in mothers who experienced such education or interventions compared to mothers who did not.
5.3.4 Comparability of exclusive breastfeeding trends

Health Canada’s definition of ‘exclusive breastfeeding’ allows an infant to receive breast milk only (including expressed breast milk), vitamins, minerals, medicine or medically indicated formula feeds. Water, breast milk substitutes, and solids and other liquids that are not medically indicated are prohibited. Since the Infant Feeding Survey was intended to inform public health planning, this restrictive definition was not used in the development of the questionnaire. In determining the timing of introduction of solids and other fluids, mothers were asked ‘Other than breast milk or formula, has your baby had any other food, such as infant cereal or fruit juice, more than once?’ (Research and Education Division of Kingston, Frontenac and Lennox & Addington Public Health, 2011). The response to this question did not allow for the calculation of exclusive breastfeeding proportions according to the Health Canada and World Health Organization definition. This more liberal definition of exclusive breastfeeding was considered appropriate for program planning at the time of survey administration (email communication with S. Stewart, Manager of Family Health at Kingston, Frontenac, and Lennox & Addington Public Health). To guide the development of Kingston, Frontenac and Lennox & Addington Public Health programs, this more pragmatic definition of exclusive breastfeeding was used with the intention that it would more closely approximate the breastfeeding behaviors of women since it would not exclude women from the ‘exclusive breastfeeding’ category because of a single non-breast milk feeding. Furthermore, for the purposes of public health planning, mothers who gave their infant breast milk only with the exception of a single feeding of solids or other liquids are likely to require similar services as women who strictly gave their infant breast milk only. Since the time of survey administration, staff at Kingston, Frontenac and Lennox & Addington Public Health has taken steps to achieve ‘Baby-Friendly’ certification and now use definitions that conform to the Health Canada and World Health Organization definition. However, given the use of the liberal definition of exclusive breastfeeding in the Infant Feeding Survey, the proportion of women ‘exclusive breastfeeding’ from this study are not entirely comparable with studies that use
the stricter standard. Even with this more liberal definition, the proportions of mothers exclusively breastfeeding in this sample remain low. Under Health Canada’s definition of exclusive breastfeeding, it is likely that they would be further reduced.

5.4 Interpretation of findings

5.4.1 Proportions of women breastfeeding at specified time points

Six percent of women exclusively breastfed from birth to 6 months. While neighboring regions have not assessed exclusive breastfeeding, infant-feeding reports from central Ontario can be used to provide some context to this result. As a comparison, the City of Toronto, Halton Region and Peel Region report 18%, 16% and 10% of mothers exclusive breastfeed from birth to 6 months respectively (Toronto Public Health, 2010). Unlike the Infant Feeding Survey, these studies strictly followed the Health Canada’s definition of ‘exclusive breastfeeding’, making these comparisons particularly striking.

Canadian and Ontario statistics on exclusive breastfeeding use a 24-hour indicator of breastfeeding practice to calculate the proportion of women exclusively breastfeeding at 6 months (14% and 16% respectively). In this study, exclusive breastfeeding considers infant feeding practices from birth or from discharge. As such, these national and provincial proportions are not entirely comparable to the proportions of women breastfeeding described in this study and are likely higher than those that would be obtained if the from birth indicator was used.

The proportion of women ‘exclusive breastfeeding from discharge’ to 6 months (7%) was comparable with ‘exclusive breastfeeding from birth’ to 6 months (6%). This implies that the in-hospital experience was compatible with exclusive breastfeeding behaviours, since few women who were exclusively breastfeeding were discounted from the ‘exclusive breastfeeding from birth’ category due to violations of exclusivity restrictions in hospital.

Given the strict criteria of exclusive breastfeeding, the ‘high breastfeeding’ category was created to describe mothers who were mainly breastfeeding. This category allowed 1 to 2
formula feeds in total or an occasional formula feed (less than one a week). As expected, proportion of mothers practicing ‘high breastfeeding’ to 6 months (12%) was higher than those for ‘exclusive breastfeeding’, both from birth and from discharge.

The proportion of women practicing breastfeeding to some degree for 6 months (49%) was comparable to the proportions reported for Canada and Ontario (54% in both cases) (Public Health Agency of Canada, 2009; Sheehan et al., 2001). Compared to neighboring regions, these proportions were similar to that reported by the Leeds, Grenville and Lanark District Health Unit (46%) and higher than the proportion in Eastern Ontario (32%) (BORN Ontario, 2010).

5.4.2 Relationship between Breastfeeding Self-Efficacy Scale (Short-Form) and duration of breastfeeding

The statistical significance of the relationships between the Breastfeeding Self-Efficacy Scale (Short-Form) and duration of ‘exclusive breastfeeding from birth’ (OR = 1.05, 95% CI=1.02-1.09) and duration of ‘any breastfeeding’ (OR = 1.05, 95% CI=1.01-1.09) are marginal when the 95% confidence intervals are rounded to two decimal places and disappear when they are rounded to one decimal point (1.0-1.1 in both cases). Therefore, this study has not convincingly demonstrated that a relationship exists between breastfeeding self-efficacy scores, as measured in hospital with the Breastfeeding Self-Efficacy Scale (Short-Form), and duration of ‘exclusive breastfeeding from birth’ or between in-hospital breastfeeding self-efficacy scores and duration of ‘any breastfeeding’. This is contrary to previous research that has demonstrated a relationship between scores on the Breastfeeding Self-Efficacy Scale (Short-Form) and breastfeeding duration (McCarter-Spaulding & Gore, 2009; Mossman et al., 2008; Otsuka et al., 2008). As outlined in the literature review, there have been several studies that have assessed this association using various statistical approaches. In two studies, Cox proportional hazards regression analyses were conducted. The resulting hazard ratios are not directly comparable with the odds ratios produced by this study but they provide some context regarding the magnitude and statistical significance of previous examinations of these relationships. In a study of mothers of
African descent, higher scores on the Breastfeeding Self-Efficacy Scale (Short-Form) measured at 1-week postpartum were significantly associated with a lower chance of weaning at 4 weeks (HR = 0.97) and at 24 weeks (HR = 0.96) than lower scores (confidence intervals and p-values not reported, stated to be statistically significant in text). It was not clear which confounding variables were controlled for in this analysis (McCarter-Spaulding & Gore, 2009). In a study of adolescent mothers, low breastfeeding self-efficacy at 1-week postpartum was associated with an increased likelihood of weaning before 28 days (HR = 3.6, 95% CI 1.9-7.1, p=.0001) while controlling for smoking and planned duration of breastfeeding for less than 3 months (Mossman et al., 2008). In a study of Japanese mothers, logistic regression analysis was used to assess the relationship between supplementing formula at 4 weeks and in-hospital breastfeeding self-efficacy. Those who scored lower than the sample mean on the Breastfeeding Self-Efficacy Scale (Short-Form) had higher odds of supplementing with formula at 4 weeks (unadjusted OR = 3.5, 95% CI 1.84-6.56, p<.01) than those who scored higher than the sample mean (Otsuka et al., 2008).

The small magnitude and non-significance of this study’s assessment of breastfeeding self-efficacy and duration of ‘exclusive breastfeeding from birth’ and ‘any breastfeeding’ may be due to a number of reasons. As previously mentioned, selection bias played a significant role in producing a sample of women with characteristics that have been associated with positive breastfeeding behaviours. This sample also had high breastfeeding self-efficacy overall with low variability, with a mean score of 53 points (SD = 8, range = 30 to 70 on a scale ranging from 14-70). The lack of variability in the self-efficacy scores (and resulting ceiling effect) would have reduced the ability of regression analyses to find an association. Given that more than 50% of mothers answered ‘confident’ or ‘very confident’ (item score of 4 and 5 respectively) to 13 out of 14 items on the Breastfeeding Self-Efficacy Scale (Short-Form), there is reason to suspect that the lack of heterogeneity in the self-efficacy scores contributed to an inability to detect the true relationship between the scores and the duration of breastfeeding. In comparison, the previously described study of Japanese mothers reported a mean score of 45 points (SD = 12, range = 17 to
This sample had a much greater range in scores and a lower mean score. The study of mothers of African descent reported a mean of 52 points (SD = 12, range = 18 to 70) (McCarter-Spaulding & Gore, 2009). Again, the range of scores was much wider. While the mean score is comparable with the one reported by this study, the authors also report a minimal protective effect without stating the level of statistical significance. Unfortunately, the study of adolescents did not report postnatal self-efficacy scores (Mossman et al., 2008).

Another important difference between this study and previous studies is the timing of self-efficacy assessment. In this study, breastfeeding self-efficacy was measured in hospital. In comparison, in the study of mothers of African descent and the study of adolescent mothers, breastfeeding self-efficacy was measured at 1-week postpartum. During this week, mothers’ self-efficacy would be altered by their experiences with breastfeeding. In this time, their success or failure with breastfeeding (also known as ‘performance accomplishments’ by Bandura) (Bandura, 1977) would inform their perceptions of personal breastfeeding ability and, perhaps, have produced a wider variability in the scores and increased the likelihood that breastfeeding self-efficacy would be associated with duration of breastfeeding. In fact, in the same study of adolescent mothers, prenatal assessments of breastfeeding self-efficacy were not predictive of breastfeeding duration after controlling for potential confounders, while postnatal assessments conducted at 1-week postpartum were predictive of breastfeeding duration (Mossman et al., 2008).

From these studies, it seems that the earlier the Breastfeeding Self-Efficacy Scale (Short-Form) is administered, the weaker the association with breastfeeding behaviours at a later date. While positive, statistically significant associations between 1-week self-efficacy scores and breastfeeding duration have been demonstrated (McCarter-Spaulding & Gore, 2009; Mossman et al., 2008) there appears to be little or no association between the in-hospital measure and breastfeeding behaviours (Mossman et al., 2008; Pollard & Guill, 2009). In the study of Japanese mothers, the association between in-hospital breastfeeding self-efficacy and breastfeeding
behaviours at 4 weeks was not adjusted for potential confounders (Otsuka et al., 2008). After controlling for age, education, and other confounders, this study showed no significant relationship between in-hospital breastfeeding self-efficacy and breastfeeding behaviours at 6 weeks. This is consistent with previous studies of in-hospital assessments using the original Breastfeeding Self-Efficacy Scale and breastfeeding behaviours at 4 months (Blyth et al., 2002) and 6 months (Wilhelm et al., 2008). Taken together, these results suggest that the Breastfeeding Self-Efficacy Scale may not be an effective screening tool during the in-hospital period. However, as previously mentioned, selection bias limits the generalizability of this study’s results. Further research in diverse populations of new mothers is warranted.

Despite the lack of statistical significance, the similarity in the relationships between breastfeeding self-efficacy scores and duration of ‘exclusive breastfeeding from birth’, and duration of ‘any breastfeeding’ warrants discussion (OR = 1.05, 95% CI’s 1.0-1.1 for both definitions). Given the strictness of the Health Canada and World Health Organization definition, greater effort and persistence is required of mothers to exclusively breastfeed from birth than that which is required of mothers to breastfeed to any degree. According to Bandura, effort and persistence are outputs of self-efficacy (Bandura, 1977). As such self-efficacy may be more strongly associated with the duration of ‘exclusive breastfeeding from birth’ than with the duration of ‘any breastfeeding’. Based on this reasoning, the similarity of these two relationships may indicate that there are factors associated with the duration of exclusive breastfeeding that were not accounted for in this study. For example, breastfeeding experiences post-discharge may have affected the relationship between breastfeeding self-efficacy and duration of exclusive breastfeeding. Upon returning home, mothers may have been motivated by a number of experiences to supplement breast milk; such experiences could have included infant feeding problems (Murray et al., 2007), perceptions of insufficient milk supply (Ahluwalia et al., 2005; Li et al., 2008), and concerns over fulfilling infant’s energy needs (Murray et al., 2007).
Another potential explanation for the similarity between these two relationships is the fact that there were few items on the Breastfeeding Self-Efficacy Scale (Short-Form) that directly addressed exclusive breastfeeding (2 out of 14 items). These included the statements, ‘I can always breastfeed my baby without using formula as a supplement’ and ‘I can (always) continue to breastfeed my baby for every feeding’. Given the scarcity of items that are specific to exclusive breastfeeding, it is not surprising that the relationship between breastfeeding self-efficacy and duration of ‘exclusive breastfeeding from birth’ and ‘any breastfeeding’ were so similar.

5.4.3 Important covariates: Partner support and in-hospital difficulties or concerns with breastfeeding

Partner support was an important variable that warranted consideration in the final models. The relationship between partner support and duration of breastfeeding is supported in the literature; specifically, partner support has been shown to increase breastfeeding duration and reduce the likelihood of weaning (Bar-Yam & Darby, 1997). The association between partner support and duration of ‘any breastfeeding’ was statistically significant (OR = 0.3, 95% CI 0.1-0.7). The relationship between partner support and duration of ‘exclusive breastfeeding from birth’ was not statistically significant (OR = 0.4, 95% CI 0.1-1.3), but the removal of this variable changed the parameter estimate for the Breastfeeding Self-Efficacy Scale (Short-Form) by greater than 10% and it was included in the final model as a confounder. The effect of partner support on breastfeeding self-efficacy can potentially be explained with Bandura’s model of self-efficacy. According to this framework, verbal encouragement and praise are considered a source of self-efficacy. Partners supporting breastfeeding mothers are likely to engage in these common forms of support. As such, in comparing women who reported having partner support with those who did not, it is consistent with Bandura’s framework that the former have higher self-efficacy than the latter. In addition, given the challenges to exclusively breastfeeding for the recommended 6 months, partner support has been found to play an especially important role in the maintenance of breastfeeding (Rempel & Rempel, 2004). While abstaining from formula supplementation is a
fundamental part of breastfeeding exclusivity, item analysis of the Breastfeeding Self-Efficacy Scale (Short-Form) indicated that 42% of mothers were ‘not at all confident’, ‘not confident’, or only ‘somewhat confident’ in their ability to breastfeed their baby without using formula as a supplement. Verbal encouragement as well as tangible support with the challenges of feeding breast milk only for 6 months (such as help with storing and feeding expressed breast milk if a mother returns to work or financial support if a mother does not have sufficient maternity leave) likely play an important role in increasing the likelihood that a woman will breastfeed for a longer period of time.

The variable ‘experienced difficulties or concerns with breastfeeding in hospital’ proved to confound the relationship between self-efficacy scores and duration of ‘exclusive breastfeeding from birth’. Experiencing problems with breastfeeding has been negatively associated with breastfeeding duration (Scott, Binns, Oddy, & Graham, 2006). The effect of this variable on breastfeeding self-efficacy can also be explained with Bandura’s model of self-efficacy. In particular, problems with breastfeeding can be construed as negative breastfeeding performance. According to Bandura, performance accomplishments are a source of self-efficacy. Based on this framework, difficulties with breastfeeding could reduce breastfeeding self-efficacy. On the other hand, the lack of difficulties with breastfeeding demonstrates positive performance, which could enhance self-efficacy.

It is interesting to note that ‘experiencing difficulties or a concern with breastfeeding in hospital’ was a confounder in the relationship between breastfeeding self-efficacy and duration of ‘exclusive breastfeeding’ but that it was not a confounder in the relationship between breastfeeding self-efficacy and duration of ‘any breastfeeding’. This likely speaks to the strictness of the exclusive breastfeeding definition. Under this definition, problems experienced with breastfeeding in hospital can have a significant impact on duration of exclusive breastfeeding for which a single formula feed would preclude a mother from being categorized as ‘exclusively breastfeeding’. For example, if a mother reported that her infant nursed too often, she may be
more inclined to give a formula feed, which would immediately preclude her from the ‘exclusive breastfeeding from birth’ category.

5.5 Implications for public health

The recommendation by Health Canada and the World Health Organization for mothers to exclusively breastfeed for 6 months was met by 6% of mothers in this study. Given the health benefits for mothers and infants and wider societal benefits that support this recommendation, this low proportion is a serious public health concern. While 90% of mothers initiated breastfeeding, significant declines in all levels of breastfeeding occurred within the first month (15-39%). This is consistent with previous surveys that have demonstrated a significant decline in proportion of women breastfeeding in the initial 4 weeks postpartum (Public Health Agency of Canada, 2009; Sheehan et al., 2001) further supporting the need for interventions in the early postpartum period.

According to this study, breastfeeding self-efficacy, as measured in hospital by the Breastfeeding Self-Efficacy Scale (Short-Form), requires further research to assess its association with breastfeeding in the early postpartum period. Since selection bias selected for mothers who were systematically different from the general population of new mothers, the lack of association between scores on the Breastfeeding Self-Efficacy Scale (Short-Form) and breastfeeding duration cannot be generalized beyond the characteristics of women who participated in this study. Further research using more comprehensive procedures in sample selection and follow-up is warranted to assess the predictive validity of this instrument as it could potentially be used as an instrument to screen for low breastfeeding self-efficacy in a timely manner.

An association between partner support and duration of breastfeeding has been shown in this study as well as previous research (Pisacane, Continisio, Aldinucci, D'Amora, & Continsinio, 2005). There is also evidence that partner support can be increased through targeted interventions (Pisacane et al., 2005; Stremler & Lovera, 2004). As such, public health may consider developing
interventions to increase partner support. Breastfeeding information sessions for fathers led by midwives have been associated with increased duration of full breastfeeding. In a randomized controlled clinical trial, fathers were interviewed and offered a face-to-face information session about infant feeding, common breastfeeding difficulties, and strategies to help the mother manage them should they occur. Fathers’ concerns regarding their role in the infant feeding process were also addressed. Prevalence of full breastfeeding was higher among mothers in the intervention group (25%) than the control group (15%, p<.05) at 6 months (Pisacane et al., 2005).

To provide breastfeeding information to fathers, a male peer counselor may be an effective alternative to a midwife or lactation consultant educator. A peer-to-peer support program in Texas found an increased proportion of mothers initiating breastfeeding in the months following implementation (Stremler & Lovera, 2004). Expectant fathers may be more comfortable with requesting information on breastfeeding from a male peer, particularly when it pertains to sensitive topics such as postnatal sexuality. In addition, employing peer counselors may provide a cost-effective alternative for public health units with a restrictive budget. For these reasons, it may be worthwhile for public health to explore the effectiveness of father-to-father support programs in increasing breastfeeding duration.

In addition to partner support, support from other members of a mother’s social network has been shown to be associated with breastfeeding duration (Raj & Plichta, 1998). For mothers who do not have a partner or a significant other, support from family members and friends may play an even more important role. As such, it is important for public health to consider the involvement of family members in developing interventions to increase breastfeeding duration. In a systematic review of effective prenatal and postnatal interventions, two studies that used home visits involving family members reported increased breastfeeding duration and exclusivity (de Oliveira, Camacho, & Tedstone, 2001). In Bangladesh, peer counselors visited mothers and their
family members in late pregnancy and in the postnatal period. At 5 months, significantly more women in the intervention group were exclusively breastfeeding (70%) than in the control group (6%, p<.0001) (Haider, 1998). In Mexico, a similar intervention was implemented with more women in the intervention group breastfeeding for greater than 3 months (95%) than in the control group (85%, p=.039) (Morrow et al., 1999). Since the focus of these studies was not on the effect of involving family members in the counseling sessions, the control group did not receive counseling sessions without the involvement of family members. Further studies are needed to differentiate the effect of family member involvement and the impact of postnatal home visits on breastfeeding behaviours. In general, research exploring the effectiveness of interventions to improve family support is sparse and warrants greater attention.

At the same time, exploration of additional explanatory variables may also be necessary. From this study, variables associated with breastfeeding duration can be used to inform public health intervention. From single variable logistic regression analyses, a number of variables were found to be associated with duration of ‘exclusive breastfeeding from birth’ including experiencing difficulties or concerns breastfeeding in hospital (OR = 0.5, 95% CI 0.3-0.7), lack of previous breastfeeding experience (OR = 0.5, 95% CI 0.3-0.8), and smoking status (ORformer smoker vs. non-smoker =0.3, 95% CI 0.1-0.7). In terms of the in-hospital breastfeeding experience, working towards certification as a Baby-Friendly hospital could reduce the number of women experiencing breastfeeding difficulties. For example, Step 2 of the Integrated 10 Steps Practice Outcome Indicators requires that all health care providers have the knowledge and skills necessary to implement the institution’s breastfeeding policy (which must specify adherence to The 10 Steps). The institution must show records of orientation for all health care providers, volunteers and staff to its breastfeeding policy and attendance at breastfeeding education programs. For health care professionals providing direct breastfeeding care, a minimum of 20 hours of breastfeeding education, including three hours of supervised clinical instruction, is strongly recommended (Breastfeeding Committee for Canada, 2011). Health care professionals
who undergo such training would be prepared to help mothers manage breastfeeding difficulties, lessening their impact on cessation of exclusive breastfeeding. In addition to the Baby-Friendly Initiative, interventions involving hands-on teaching methods and encouragement (Hannula, Kaunonen, & Tarkka, 2008) have been found to be effective in empowering women with skills and knowledge to manage their breastfeeding difficulties. Item-analysis of responses to the Breastfeeding Self-Efficacy Scale (Short-Form) showed that a significant proportion of women had low confidence in important breastfeeding skills such as being able to determine if the baby is getting enough milk, ensuring that the baby is latched on for the whole feeding, managing to breastfeed even if the baby is crying and being able to tell when the baby is finished breastfeeding. By providing skills-based workshops in hospital, mothers may experience fewer difficulties, possibly reducing their impact on duration of exclusive breastfeeding.

Lack of previous breastfeeding experience is a non-modifiable variable that can be conceptualized as a risk factor for cessation of breastfeeding before 6 weeks. Public health can target postnatal support to women who are primiparous and/or who have no previous breastfeeding experience.

While public health encourages smoking cessation from all members of the public, prenatal breastfeeding education can target expecting mothers with information regarding the harmful effects of smoking on the fetus, infant and breastfeeding behaviours (Anderson & Cook, 1997; Dennis, 2002; Naeye, 1978). In addition, increased postnatal support can be provided for women who continue to smoke.

A number of variables were also associated with the duration of ‘any breastfeeding’ including lack of partner support (OR = 0.3, 95% CI 0.1-0.6), not receiving prenatal breastfeeding education (OR = 0.4, 95% CI 0.2-0.7), infant having received formula feed in hospital (OR = 0.4, 95% CI 0.2-0.7), and smoking status (OR\textsubscript{current smoker vs. non-smoker} =0.3, 95% CI 0.2-0.7). In terms of partner support, there is evidence that support from a significant other is a key variable in breastfeeding behaviours (Bar-Yam & Darby, 1997) and is amenable to change (Wolfberg et al., 2008).
Partner support has been found to play an especially important role in the maintenance of breastfeeding (Rempel & Rempel, 2004). Potential interventions to increase partner support have been discussed in an earlier section.

In terms of prenatal breastfeeding education, more information is required regarding why some women do not receive prenatal breastfeeding education. Focus groups comprised of new mothers who did not attend prenatal or breastfeeding classes could be organized to obtain this information. Potential explanations for nonattendance include being unaware that classes were offered, inconvenient class schedules and inaccessible class locations. This information could then be integrated into program planning by health units.

With regards to infants receiving formula in hospital, adhering to the Integrated 10 Steps to Successful Breastfeeding would reduce the likelihood of infants being given formula in hospital for non-medical reasons. Under this policy, hospital staff are educated in the importance of exclusive breastfeeding and infants are not offered food or drink other than human milk unless medically necessary. In anticipation of mothers requesting a formula feed, health care professionals are to ‘inform pregnant women and their families about the importance and process of breastfeeding’. The manager of the hospital must demonstrate that breastfeeding information is provided to at least 80% of pregnant women using the institution’s perinatal services (Breastfeeding Committee for Canada, 2011). If mothers experience difficulties breastfeeding, the hospital staff is to ‘assist mothers to breastfeed and maintain lactation’. All postpartum mothers should be offered breastfeeding support within six hours of delivery and at appropriate intervals thereafter (Breastfeeding Committee for Canada, 2011).

In terms of smoking status, potential strategies to target current and former smokers have been previously mentioned in the discussion regarding ‘exclusive breastfeeding from birth’. These public health interventions could also be effective in improving the duration of ‘any breastfeeding’.
5.6 Directions for future research

This study has identified that women in the Kingston, Frontenac and Lennox & Addington area are far from meeting the recommendations for breastfeeding set out by Health Canada and the World Health Organization. Given the previously described selection biases, the proportions described by this study should be viewed as inflated estimates of the true breastfeeding trends of the general Kingston, Frontenac and Lennox & Addington population of new mothers. To obtain more accurate estimates, future surveys should consider strategies to maximize participation and reduce loss to follow up. Since women of low socioeconomic status are less likely to participate in such surveys, future studies could oversample this population to maximize participation by this group of women. Statistical weighting procedures are then required to compensate for the unequal sampling probability. This is a common strategy used by researchers to study hard-to-reach populations (Centers for Disease Control and Prevention, n.d.).

With regards to participation attrition, the period of greatest loss to follow up was between the in-hospital point of contact and the 2-month telephone interview (18%). Sixty-four mothers could not be reached within 10 call attempts and were eliminated from future telephone interviews. CCI Research used an automated system to pull up telephone numbers for interviewers to call. Failed attempts to reach a mother were dealt with in the following manner: telephone numbers that were busy became available again in 2 hours and those that were not answered or were answered by a machine were available in 4 hours. In this manner, telephone numbers are called a total of 10 times before they are eliminated from future telephone interviews. Mothers were called between the hours of 9:00 am and 9:00 pm on weekdays, and between the hours of 10:00 am and 4:00 pm on weekends. If future infant feeding surveys are administered by CCI Research, attempts to call participants could be further spread out to maximize the 10 call attempts and to ensure that mothers receive call attempts on weekdays and weekends at varying times. As for loss to follow-up later on in the study, a number of procedures have been developed to reduce attrition in longitudinal surveys. In particular, Dillman, Smyth and Christian (2009) have described a
‘Tailored Design Method’ to maintaining participant response in longitudinal surveys. In this approach, the authors recommend varying the look and content of survey requests so that participants remain engaged in the survey (Dillman, Smyth, & Christian, 2009). For this survey, paragraphs of text were re-used from one reminder letter to the next (see Appendix D). In future infant feeding surveys, engaging mothers with creative reminder letters could potentially reduce the proportion of participants lost to follow-up.

This study found weak and non-significant relationships between in-hospital breastfeeding self-efficacy and duration of ‘exclusive breastfeeding from birth’ and between self-efficacy and duration of ‘any breastfeeding’ in a sample of mothers with high levels of education and income. It will be important to re-evaluate these relationships in a sample with a heterogenous socioeconomic background.

Given the minimal amount of variation explained by the self-efficacy regression models, other key concepts of the social cognitive theory can be assessed for their association with breastfeeding duration. Outcome expectancies and sociostructural factors are important constructs in social cognitive theory that interact with self-efficacy but which also independently contribute to health behaviours (Maddux, Norton, & Stoltenberg, 1986). Outcome expectancies can be categorized into three groups: 1) physical, 2) social, and 3) self-evaluative. In these three groups, expectations can be positive or negative. In the case of breastfeeding, physical expectancies refer to a mother’s expectations of the physical experiences related to breastfeeding such as warm skin-to-skin contact, soothing suckling, physical pain or discomfort. Social expectancies refer to a mother’s expectations of the social experiences related to breastfeeding such as encouragement from family and friends, social approval from other breastfeeding mothers or social disapproval from strangers in public. Self-evaluative expectancies refer to whether a mother feels that she will meet her personal expectations of maintaining breastfeeding.

Sociostructural factors that influence breastfeeding duration can be related to living conditions, politics, economy, environment, and the health system. These social structures can be
seen as facilitators or impediments to sustaining breastfeeding. For example, a woman’s living conditions, including her relationships with her partner and others she may live with, may aid or hinder her attempts to sustain breastfeeding. Politically, legal support for mothers to breastfeed in public facilitates a mother’s ability to sustain breastfeeding. Economically, a woman’s financial situation may require her to return to work earlier than 6 months postpartum, potentially impeding her efforts to maintain breastfeeding. Environmentally, a local mall may not have clean facilities in which to breastfeed thereby challenging her desire to breastfeed. In terms of the health care system, health professionals providing conflicting breastfeeding advice could hinder mothers’ efforts to sustain breastfeeding.

Future infant feeding surveys could integrate these aspects of outcome expectancies and sociostructural factors to explore variables that could contribute to breastfeeding behaviours in addition to breastfeeding self-efficacy. To address outcome expectancies, researchers could use objective statements relating the behaviour (sustaining breastfeeding) to the outcome (better health for the infant). In a previous study of self-efficacy expectancies, outcome expectancies and pain control in childbirth, a general statement assessing outcome expectations was highly correlated with measures of self-efficacy (r = 0.75, p<.001), indicating redundancy in the explanatory variables (Manning & Wright, 1983). As such, specific statements regarding physical, social and self-evaluative outcome expectancies are recommended to provide further information about this variable. In addition, self-efficacy and outcome expectancies may be more highly correlated when the individual’s assessment of personal efficacy is hypothetical and not informed by performance accomplishments (Manning & Wright, 1983). This would be the case when assessing breastfeeding self-efficacy and outcome expectancies of mothers who have not had previous experience breastfeeding, such as those of primiparous mothers in the prenatal period. Outcome expectancies may be more unique predictors of breastfeeding duration in postnatal assessments when mothers have had a chance to breastfeed. With regards to sociostructural factors, researchers could examine the existing literature to guide their exploration.
in this aspect of the social cognitive theory. For example, postnatal support by the health care system has been demonstrated to be significantly associated with breastfeeding duration (Kronborg & Vaeth, 2004). Researchers could assess the women’s perceptions of postnatal support and its role in influencing breastfeeding duration. In this case, it may not be logical to assess whether postnatal support is a facilitator or impediment to breastfeeding duration but rather whether women feel that the available support is a sufficient or insufficient facilitator of breastfeeding duration.

5.7 Conclusion

This study assessed the breastfeeding behaviours of new mothers in the Kingston, Frontenac, and Lennox & Addington area and the ability of the Breastfeeding Self-Efficacy Scale (Short-Form) to predict ‘exclusive breastfeeding from birth’ and ‘any breastfeeding’ at 6 weeks postpartum.

Overall, the proportion of women breastfeeding to any extent for 6 months is comparable with neighboring regions. In contrast, the proportion of women exclusively breastfeeding from birth to 6 months is much lower than those reported by other Ontario health units. A significant percentage of women are ceasing to exclusively breastfeed in the early postpartum period, indicating a need for increased breastfeeding support during this time.

This study found weak and non-significant relationships between in-hospital scores on the Breastfeeding Self-Efficacy Scale (Short-Form) and duration of ‘exclusive breastfeeding from birth’ and between self-efficacy and duration of ‘any breastfeeding’. Participant self-selection and loss to follow up resulted in a relatively homogenous sample. In addition, this sample had high breastfeeding self-efficacy with low variability in breastfeeding self-efficacy scores. This may have reduced the ability of this study to detect an association between breastfeeding self-efficacy scores and breastfeeding duration. The results of this study and previous research suggest that assessments of breastfeeding self-efficacy in the prenatal and early postpartum period may not be
associated with future breastfeeding behaviours. Further research exploring the relationship between in-hospital assessments of breastfeeding self-efficacy and breastfeeding duration in diverse populations is warranted.

Partner support was found to be significantly associated with duration of ‘any breastfeeding’ and was a confounder in the relationship between in-hospital breastfeeding self-efficacy and duration of ‘exclusive breastfeeding from birth’. In-hospital difficulties with breastfeeding confounded the relationship between in-hospital breastfeeding self-efficacy and duration of ‘exclusive breastfeeding from birth’. Future research on the relationship between breastfeeding self-efficacy and breastfeeding duration should consider the role of partner support and breastfeeding difficulties.
References


controlled trial of a breastfeeding self-efficacy intervention with primiparous mothers.

Meedya, S., Fahy, K., & Kable, A. (2010). Factors that positively influence breastfeeding
duration to 6 months: A literature review. *Women and Birth, 23*, 135-145.


Morrow, A. L., Guerrero, M. L., Shults, J., Calva, J.J., Lutter, C., Bravo, J., Ruiz-Palacios, G.,


Murray, E. K., Ricketts, S., & Dellaport, J. (2007). Hospital practices that increase breastfeeding
duration: Results from a population-based study. *Birth, 34*(3), 202-211.


intervention on short-term breast-feeding outcomes. *Health, Education & Behavior, 36*(2),
250-258.


Appendix A

In-Hospital Recruitment Procedure

Research assistants are to:

1. Ask charge nurse if patients recorded on the previous day have been discharged.
2. Ask charge nurse if there are any patients on the other side
3. Complete the hospital tracking form.
   a. Record the names of the patients who have not been discharged.
      i. If mother has completed the questionnaire, SKIP (put a line through her name on the form)
      ii. If mother has refused to participate, SKIP (put a line through her name on the form)
      iii. IF mother has only consented, ask her to complete the questionnaire
      iv. IF mother was missed on the day before, ask her to participate
           1. If she participates or refuses, CORRECT the number of “missed” on the PREVIOUS day’s form.
4. Ask new admissions and mothers who were missed the previous day if they are willing to participate in the study.
   a. Congratulate mother on the birth of her baby or babies
   b. Explain the study to her
      i. The purpose of the Infant Feeding Survey is to find out how new mothers are feeding their babies and why they choose the foods that they do. We will be asking about breastfeeding and formula feeding, and later in the study about starting your baby on solid foods. We will be asking these questions at birth, when babies are two months old, four months old, six months old and one year old. This information will help us to plan our services.
      ii. All mothers who agree to participate in this study will be given a book as a token of our appreciation for their time and willingness to help us with this study.
   c. Ask mother if she is willing to participate.
      i. IF YES, go over the consent form with her and have her sign it.
         1. Ask mother if she would prefer for you to read the questions to her or leave the questionnaire with her for her to complete. If you leave the questionnaire, tell the mother that you will be back in about 20 minutes to collect the questionnaire.
         2. When the questionnaire is completed…
            a. Collect the questionnaire
            b. thank the mother
            c. let her choose one of the two books.
      ii. IF NO, ask the mother if we can record her name on our tracking form so that we can ensure that she is not approached again about this study. Let her know that the form is for tracking purposes only and will not be used in the study. IF the mother consents, record the name on the hospital tracking form. If the mother does not consent, then thank her for her time. Leave name on tracking form blank but circle refused.
Appendix B
Introductory Letter for Potential Participants

Congratulations on the birth of your baby!

KFL&A Public Health is trying to improve our services to new mothers. To help us do this, we are carrying out an Infant Feeding Survey. This survey will ask new mothers how they are feeding their babies and why they choose the foods that they do. The Infant Feeding Survey will ask about breastfeeding, formula feeding and starting solids.

We will be asking these questions at birth, when your baby is two months old, four months old, six months old and one year old. This information will help us to understand how mothers in the Kingston area feed their babies.

If you agree to take part in the survey, we will ask you to complete a questionnaire before your baby is discharged from the hospital. This will take you 5 to 10 minutes. A company called Compustat Consultants will phone you when your baby is two, four, six and twelve months old. They will ask you questions about what you are feeding your baby and the reasons for your food choices. Each telephone interview will take about 15 minutes.

We will keep your answers strictly confidential. Only the research team will see the information you provide. Your name won’t be on the survey. We will keep the completed surveys in a locked cabinet, and only the research team will be able to look at them. We will not report any information that would allow you or any individual to be identified.

We sincerely hope that you will agree to participate in this important study. Of course, you can refuse to participate. You can refuse to answer any question that you don’t want to. If you decide not to participate, you will still receive the same care from the hospital and will still receive any and all community services for which you are eligible.

If you have any questions about the Infant Feeding Survey, please call me at KFL&A Public Health (549-1232 ext. 141). If you have any questions about your rights as a research subject, you can call Dr. Albert Clark, Chair, Research Ethics Board, Queen’s University at 533-6081.

Thank you for your help.

Sincerely,
Susan Stewart, M.A.
Research Associate
Public Health Research, Education and Development Program
549-1232 ext. 141
Appendix C

Consent Form

I, ________________________________________________ agree to participate in the Infant Feeding Survey. I understand that I will be asked to complete a survey in the hospital before my baby is discharged for home. This survey will take about 10 minutes and will ask me questions about breastfeeding and formula feeding. I also understand that I will receive telephone calls in about 2, 4, 6 and 12 months’ time. Compustat Consultants will call me on behalf of KFL&A Public Health. These telephone interviews will ask me about what I am feeding my baby and the reasons I have chosen these foods. These calls will each take about 15 minutes.

I understand that any information that I give will be kept strictly confidential. My name will not appear on my answers to the questions. The surveys will be kept in a locked cabinet. When the results are presented, it will not be possible to identify me.

I understand that I may stop participating in this survey at any time. I can refuse to answer any question that I do not want to answer. My decision to participate in the Infant Feeding Survey will not affect my care in the hospital or community services for which I am eligible.

I have been given the chance to ask questions about this survey, and my questions have been answered. I have a copy of the information letter to take home.
Appendix C

Consent Form cont’d

☐ I agree to participate in the Infant Feeding Survey.

☐ I do not agree to participate in the Infant Feeding Survey.

___________________________________________      ___________________________
Signature                                      Date

_____________________________________
Witness                                      Date

Below is my telephone number and address so that you can contact me in the future for the telephone interviews.

___________________________________________      ___________________________
Name. Please print                                      Telephone Number

___________________________________________
Address

___________________________________________
City                                      Province                                      Postal Code
Appendix D
Reminder Letters

Dear << Ms >>,

**RE: KFL&A Public Health Infant Feeding Survey – 2 Month Telephone Interview**

Thank you for participating in the *Infant Feeding Survey*. It has been two months since your baby was discharged from hospital so in the next couple of days, CCI Research Inc. will be calling you for the next stage of the *Infant Feeding Survey*. Just to remind you, KFL&A Public Health surveyed mothers in hospital to find out about their infant feeding choices at that time. We will also be following up with those mothers two, four, six and 12 months after their baby was discharged from hospital to find out how infant feeding practices change over a baby’s first year. The information that you and other mothers like you provide will be used by KFL&A Public Health to improve the services that we provide to new mothers.

In the next few days, CCI Research will be calling you to ask you questions about what you are feeding your baby now and your reasons for making those choices. This telephone interview will take approximately 15 minutes.

Remember, the information that you provide will be kept strictly confidential and your name will not be on your questionnaire.

If you would prefer not to participate or have any questions about this study, you can contact me at the below number. If you have any questions regarding your right as a research subject, you can contact Dr. Albert Clark, Chair, Research Ethics Board, Queen’s University at 533-6081.

Thank you so very much for your help with this important study.

Sincerely,
Susan Stewart, M.A.
Research Associate
Public Health Research Education
and Development Program
549-1232 ext. 141
Appendix D
Reminder Letters cont’d

Dear << Ms >>,

**RE: KFL&A Public Health Infant Feeding Survey – 4 Month Telephone Interview**

Thank you for participating in the *Infant Feeding Survey*. It has been four months since your baby was discharged from hospital so in the next couple of days, Compustat Consultants will be calling you for the next stage of the *Infant Feeding Survey*. Just to remind you, KFL&A Public Health surveyed you, and many other mothers like you, before your baby was discharged from hospital and again two months after your baby was discharged. We will be following up with those mothers four, six and 12 months after their baby was discharged from hospital to find out how infant feeding practices change over a baby’s first year. This information on infant feeding practices will be used by KFL&A Public Health to improve the services that we provide to new mothers.

In the next few days, Compustat Consultants will be calling you to ask you questions about what you are feeding your baby now and your reasons for making those choices. This telephone interview will take approximately 15 minutes.

Remember, the information that you provide will be kept strictly confidential and your name will not be on your questionnaire.

If you would prefer not to participate or have any questions about this study, you can contact me at the below number. If you have any questions regarding your right as a research subject, you can contact Dr. Albert Clark, Chair, Research Ethics Board, Queen’s University at 533-6081.

Thank you so very much for your help with this important study.

Sincerely,
Susan Stewart, M.A.
Research Associate
Public Health Research Education and Development Program
549-1232 ext. 141
Appendix D
Reminder Letters cont’d

Dear << Ms >>,

RE: KFL&A Public Health Infant Feeding Survey – 6 Month Telephone Interview

Thank you for participating in the Infant Feeding Survey. It has been six months since your baby was discharged from hospital so in the next couple of days, Compustat Consultants will be calling you for the next stage of the Infant Feeding Survey. Just to remind you, KFL&A Public Health surveyed you, and many other mothers like you, before your baby was discharged from hospital, and again two and four months after your baby was discharged. We will be following up with those mothers six and 12 months after their baby was discharged from hospital to find out how infant feeding practices change over a baby’s first year. This information on infant feeding practices will be used by KFL&A Public Health to improve the services that we provide to new mothers.

In the next few days, Compustat Consultants will be calling you to ask you questions about what you are feeding your baby now and your reasons for making those choices. This telephone interview will take approximately 15 minutes.

Remember, the information that you provide will be kept strictly confidential and your name will not be on your questionnaire.

If you would prefer not to participate or have any questions about this study, you can contact me at the below number. If you have any questions regarding your right as a research subject, you can contact Dr. Albert Clark, Chair, Research Ethics Board, Queen’s University at 533-6081.

Thank you so very much for your help with this important study.

Sincerely,
Susan Stewart, M.A.
Research Associate
Public Health Research Education and Development Program
549-1232 ext. 141
Appendix D
Reminder Letters cont’d

Dear << Ms >>,

RE: KFL&A Public Health Infant Feeding Survey – 12 Month Telephone Interview

Your baby is almost one year old! It is amazing how much a baby grows and develops in his/her first year. We also know that infant feeding choices change during the first year of life – beginning with breast milk and/or formula and then starting the transition to solid foods.

Once again, we would like to thank you for participating in the Infant Feeding Survey. In the next couple of days, Compustat Consultants will be calling you for the final stage of the Infant Feeding Survey. Just to remind you, KFL&A Public Health surveyed you, and many other mothers like you, before your baby was discharged from hospital, and again two, four, and six months after your baby was discharged. We are following up with those mothers now for the final time -- 12 months after their baby was discharged from hospital. Thanks to mothers like you, we will have solid information about local infant feeding practices and how those feeding practices changed over a baby’s first year. This information will be used by KFL&A Public Health to improve the services that we provide to new mothers.

In the next few days, Compustat Consultants will be calling you to ask you questions about what you are feeding your baby now and your reasons for making those choices. This telephone interview will take approximately 15 minutes.

Remember, the information that you provide will be kept strictly confidential and your name will not be on your questionnaire.

If you would prefer not to participate or have any questions about this study, you can contact me at the below number. If you have any questions regarding your right as a research subject, you can contact Dr. Albert Clark, Chair, Research Ethics Board, Queen’s University at 533-6081.

Thank you so very much for your help with this important study.

Sincerely,
Susan Stewart, M.A.
Research Associate
Public Health Research Education and Development Program
549-1232 ext. 141
Appendix E
Infant Feeding Survey 2008: In-Hospital Survey

(Research and Education Division of Kingston, Frontenac and Lennox & Addington Public Health, 2011)
Infant Feeding Survey

Congratulations on the birth of your baby!

Thank you for agreeing to participate in the Infant Feeding Survey. The information that you will provide to us about breastfeeding and/or formula feeding will be very helpful for us. With this information, KFL&A Public Health will be able to provide better programs and services for new mothers and their babies.
My baby was due...

Day _______  Month _______  Year _______

My baby was born...

Day _______  Month _______  Year _______

I had a...

☐ A single birth
☐ Twins
☐ Triplets
☐ Four or more babies

At birth my baby weighed...

If you had a multiple birth, please indicate the weight of all your babies.

___________________ grams  ___________________ grams

___________________ grams  ___________________ grams

My baby is a...

If you had a multiple birth, please indicate the sex of all your babies.

☐ Male  ☐ Female
☐ Male  ☐ Female
☐ Male  ☐ Female
☐ Male  ☐ Female

Feeding practices of infants in the Kingston, Frontenac and Lennox & Addington area during the first year of life.
I expect my baby to be discharged from the hospital on...

Day _______ Month _______ Year _______

1. I first thought about how I would feed my baby

☐ Before I became pregnant
☐ During my pregnancy
☐ After my baby was born
☐ Don’t Know

2. The following people or resources helped me with my decision about feeding my baby (Check all that apply)

☐ No one
☐ Partner
☐ Mother
☐ Mother-in-Law
☐ Other family relative: ________________________________
☐ Doctor/Midwife/Nurse
☐ Lactation Consultant
☐ Previous experience with another child
☐ Books/magazines/internet/media
☐ Friends/coworkers
☐ Community Group/La Leche League
☐ Prenatal class
☐ Breastfeeding class
☐ Other: ________________________________
3. When I was pregnant, I received information about feeding from the following sources

(Check all that apply)

☐ I didn’t get any information on feeding my baby when I was pregnant  ➔ Go to Question #5, on page 5 please.
☐ Prenatal classes
☐ Breastfeeding classes
☐ KFL&A Public Health (Health Unit)
☐ Pamphlets
☐ Internet
☐ Doctor/Midwife/Nurse
☐ Television Radio
☐ School
☐ Family/Friends
☐ Lactation Consultant
☐ Health information telephone line
☐ Hospital
☐ Other: ______________________________________
☐ Don’t know/can’t remember

4. Out of all the sources I checked, I found the following source the most useful (Check only ONE)

☐ Prenatal classes
☐ Breastfeeding classes
☐ KFL&A Public Health (Health Unit)
☐ Pamphlets
☐ Internet
☐ Doctor/Midwife/Nurse
☐ Television Radio
☐ School
☐ Family/Friends
☐ Lactation Consultant
☐ Health information telephone line
☐ Hospital
☐ Other: ______________________________________
☐ None were useful
5. I have breastfed my baby during my stay in hospital

☐ No ➔ If NO, go to Question #6, on page 7 please.
☐ Yes

5a) If YES, I fed my baby for the first time

☐ Less than 1 hour after birth
☐ 1 to 3 hours after birth
☐ 4 to 11 hours after birth
☐ 12 to 23 hours after birth
☐ More than 24 hours after birth

5b) I had the following difficulties or concerns breastfeeding while in hospital (Check all that apply)

☐ Baby could not latch
☐ Baby nursed too often
☐ Baby was too sleepy
☐ Baby was not well enough to breastfeed
☐ Baby cried when put to breast
☐ I had flat or inverted nipples
☐ I had sore or cracked nipples
☐ I didn’t have enough milk
☐ I was not well enough to breastfeed
☐ I received inconsistent advice from staff
☐ Other issues:
☐ No difficulties or concerns ➔ Go to Question #6, on page 7 please.

5c) For my breastfeeding difficulties or concerns, I received help from the following people.

☐ Nurse ➔ The help/advice I received was
  ☐ Very Useful
  ☐ Somewhat Useful
  ☐ Not Useful
☐ Midwife  ➤  The help/advice I received was
☐ Very Useful
☐ Somewhat Useful
☐ Not Useful

☐ Doctor  ➤  The help/advice I received was
☐ Very Useful
☐ Somewhat Useful
☐ Not Useful

☐ No one  ➤  I did not receive any help because
☐ I solved the problem myself
☐ I solved the problem with the help of family and friends
☐ The problem resolved itself
☐ There was no one available to help me
☐ Other: __________

5d) Overall, the amount of help I received was
☐ No help at all
☐ Less help than I wanted
☐ The amount of help that I wanted
☐ More help than I wanted
☐ Don’t know

6. My baby was fed water while in hospital

☐ Don’t Know
☐ No
☐ Yes
7. My baby was fed formula while in hospital

☐ Don’t know
☐ No  (IF NO, go to question # 8, on page 8 please)
☐ Yes

7a) If YES, my baby was given formula

☐ 0 to 12 hours after birth
☐ 13 to 24 hours after birth
☐ 24 to 36 hours after birth
☐ 36 to 48 hours after birth

7b) My baby was given formula because (Check all that apply)

☐ Advice of doctor
☐ Advice of nurse
☐ Pain when breastfeeding (e.g., sore nipples)
☐ Could not get baby to latch properly
☐ Not enough milk
☐ Wanted to sleep/Too tired to breastfeed
☐ I was too ill/was on medication
☐ I wanted my baby to have formula
☐ Baby needed fluids
☐ My baby was separated from me
☐ Unsure if I was doing it right
☐ Baby fussy or colicky
☐ Don’t know the reason
☐ Other: ____________________________

8. I am currently feeding my baby

☐ Breast milk only
☐ Breast milk and formula
☐ Formula only
9. I plan to breastfeed when my baby is home with me
   - Yes
   - No \(\Rightarrow\) (If NO, go to Question 11 on page 12)
   - Don’t Know \(\Rightarrow\) (If DON’T KNOW, go to Question 12, on page 13 please)

9a) If YES, I plan to breastfeed my baby for
   - Less than 2 weeks
   - 2 weeks up to 6 weeks
   - 6 weeks up to 3 months
   - 3 months up to 6 months
   - 6 months up to 12 months
   - 12 months or longer
   - Don’t know

9b) My main reasons for breastfeeding are (Check all that apply)
   - Previous experience
   - Better for baby
   - Help me lose weight
   - Protect baby from infection
   - Protect baby from allergies
   - Bonding/closeness to baby
   - Economies
   - Family traditions/culture beliefs
   - Easier
   - Other: __________________________
   - Don’t know

9c) I plan to supplement breastfeeding with formula when I return home
   - Don’t Know
   - No
   - Yes
9d) If YES, I plan to start supplementing with formula

☐ Right when I get home
☐ Within 2 weeks
☐ Between 2 and 6 weeks
☐ Between 6 weeks and 3 months
☐ Longer than 3 months

9e) How supportive is your partner on your decision to breastfeed

☐ Very supportive
☐ Supportive
☐ Not supportive
☐ Not applicable ➔ Skip Question 9f.

9f) Which sentence best describes your partner attitude

☐ My partner is positive about me breastfeeding the baby
☐ My partner is neutral about whether I breastfeed the baby or not
☐ My partner is negative about me breastfeeding the baby
For many of us, our confidence in breastfeeding is a combination of how skilled we think we are at it and how well we think we can manage breastfeeding. And certainly we will feel more confident about some aspects of breastfeeding and less confident about others. For the below statements, please indicate how confident you are that you can always do that skill or manage that aspect of breastfeeding. Remember, there are no right or wrong answers. Just tell us how you feel.

10. Please rate how CONFIDENT you feel for each of the below statements.

<table>
<thead>
<tr>
<th>I CAN ALWAYS....</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine that my baby is getting enough milk</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Successfully cope with breastfeeding like I have with other challenging tasks</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Breastfeed my baby without using formula as a supplement</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Ensure that my baby is properly latched on for the whole feeding</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Manage the breastfeeding situation to my satisfaction</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Manage to breastfeed even if my baby is crying</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Keep wanting to breastfeed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
10. Please rate how CONFIDENT you feel for each of the below statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfortably breastfeed with my family members present</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Be satisfied with my breastfeeding experience</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Deal with the fact that breastfeeding can be time-consuming</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Finish feeding my baby on one breast before switching to the other breast</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Continue to breastfeed my baby for every feeding</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Manage to keep up with my baby’s breastfeeding demands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Tell when my baby is finished breastfeeding</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Now please go to Question # 13, on page 14
11. I do not plan to breastfeed when my baby is home with me

My main reasons for formula feeding are (Check all that apply)

☐ Previous experience
☐ Advice of doctor
☐ Advice of partner
☐ Better for baby
☐ Unsure if I will be good at breastfeeding
☐ So I know how much food my baby is getting
☐ To make sure baby gets enough food
☐ Easier than breastfeeding
☐ Too tired – don’t want to breastfeed for all night feedings
☐ Baby fussy or colicky
☐ Baby sleepy
☐ Baby needs to feed too often
☐ Want to drink alcohol
☐ I am ill or on medication for illness
☐ My baby is ill
☐ Not enough time/too busy
☐ Father wants to help with feeding
☐ So others can help me care for the baby
☐ Overwhelmed
☐ Family traditions/cultural beliefs
☐ I don’t like breastfeeding
☐ Uncomfortable breastfeeding
☐ Other: ___________________________

Now please go to Question # 13, on page 14
12. I do not know if I will breastfeed when my baby returns home with me.

12a) Reasons why I might breastfeed include (Check all that apply)

☑ Better for baby
☑ Help me lose weight
☑ Protect baby from infection
☑ Protect baby from allergies
☑ Bonding/closeness to baby
☑ Economics
☑ Family traditions/culture beliefs
☑ Easier
☑ Other: __________________________

12b) Reasons why I might formula feed include (Check all that apply)

☑ Better for baby
☑ Unsure if I will be good at breastfeeding
☑ I will know how much food my baby is getting
☑ I will know that my baby gets enough food
☑ Easier than breastfeeding
☑ I don’t want to do all of the feedings
☑ I want to drink alcohol
☑ I am ill or on medication for illness
☑ My baby is ill
☑ I will not have enough time to breastfeed
☑ Father/Partner wants to help with feeding
☑ Others can help me care for the baby
☑ Family traditions/cultural beliefs
☑ I don’t like breastfeeding
☑ Uncomfortable with the idea of breastfeeding
☑ Other: __________________________
13. I attended a prenatal class

☐ No
☐ Yes

14. I attended a breastfeeding class BEFORE I had my baby

☐ No
☐ Yes

15. If I need help with breastfeeding after I go home, I could call the following services for help
(Please list all you can think of)

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________

16. My age is

☐ 15 to 19 years
☐ 20 to 24 years
☐ 25 to 29 years
☐ 30 to 34 years
☐ 35 to 39 years
☐ 40+ years
17. My highest level of education is
☐ Did not graduate from high school
☐ High school
☐ Some education after high school
☐ College/University diploma or degree
☐ Don’t know

18. My total household income (from all sources such as employment, investments) last year was
☐ Less that $20,000
☐ $20,000 to $39,999
☐ $40,000 to $59,999
☐ $60,000 to $79,999
☐ $80,000 to $99,999
☐ $100,000 or more
☐ Don’t Know

19. This baby is my
☐ 1st child
☐ 2nd child
☐ 3rd child
☐ 4th or more child

21a) I have breastfed at least one of my older children
☐ Yes
☐ No

21b) If yes, overall my previous experience with breastfeeding was
☐ Very satisfying
☐ Somewhat satisfying
☐ Neither satisfying nor dissatisfying
☐ Somewhat dissatisfying
☐ Very dissatisfying

Feeding practices of infants in the Kingston, Frontenac and Lennox & Addington area during the first year of life.
20. I was discharged from hospital before my baby.

☐ Yes
☐ No


☐ Yes
☐ I did but I quit when I was pregnant
☐ No

22. I had a

☐ Vaginal birth ➔ If VAGINAL, I received an epidural

☐ Yes
☐ No

☐ Caesarian birth

Thank you!
Appendix F

Infant Feeding Survey 2008: Interview Questions at 2-Months

(Research and Education Division of Kingston, Frontenac and Lennox & Addington Public Health, 2011)
**KGH-KFL&A Public Health Breastfeeding Questionnaire 2 months**

Hello, my name is ______________________ and I am calling on behalf of KFL&A Public Health. May I please speak to ____________________.

Speaking  
Go to 12

Goes to get them  
Go to 12b

Not available  
Record Call Back

Refused  
Thank you for your time. Goodbye (refused)

**If asked why you’re calling say:**

We are conducting a survey on infant feeding

12. Hello __________

We are conducting an important survey about Infant Feeding. This is the study you agreed to participate in soon after you had your baby. I will be asking you questions about breastfeeding and/or formula feeding your baby as well as starting solids. KFL&A Public Health will be using this information to plan programs and services for new mothers and babies in your community.

This survey will take about 10 to 15 minutes of your time. It is confidential and voluntary. However, your participation is IMPORTANT for us to get accurate information about infant feeding.

Is now a good time for you?

Yes  
Go to 13

No Later  
Record Call back

Don’t know  
Go to 12a

Refused  
Go to 12a
I2a. Would it be possible to call you at another time? Your participation is very important and we do understand that having a new baby means that life can get very busy.

Yes
Thank you. When would be a good time for you?(call back)

No
Would you like the contact number of KFL&A Public Health in case you change your mind or have any questions about the survey? (Susan Stewart, 613-549-1232 ext.141) Thank you very much. (Refused)

I2b. Hello __________ my name is _____________ and I am calling on behalf of KFL&A Public Health. We are conducting an important survey about Infant Feeding. This is the study you agreed to participate in soon after you had your baby. I will be asking you questions about breastfeeding and/or formula feeding your baby as well as starting solids. KFL&A Public Health will be using this information to plan programs and services for new mothers and babies in your community.

This survey will take about 10 to 15 minutes of your time. It is confidential and voluntary. However, your participation is IMPORTANT for us to get accurate information about infant feeding.

Is now a good time for you?

Yes
Go to I3

No Later
Record Call back

Don’t know
Go to I2c

Refused
Go to I2c

I2c. Would it be possible to call you at another time? Your participation is very important and we do understand that having a new baby means that life can get very busy.

Yes
Thank you. When would be a good time for you?(call back)

No
Would you like the contact number of the KFL&A Public Health in case you change your mind or have any questions about the survey? (insert number and name) Thank you very much. (Refused)
13. Thank you. Before we start, I'd like to let you know that I am not a Public Health Nurse. However, everything I ask you is confidential. There are no right or wrong answers and you may refuse to answer any question, or end the survey at any time.

[Interviewer Prompt: If mother has had a multiple birth (twins/triplets) ask the mother to “Please answer the questions with the first-born in mind.”]

AA. At this time, is your baby living in the same home as you?

IF Yes (GO TO Question A1)

IF No Terminate Survey

A1. What are you currently feeding your baby?

1) Breast milk (GO TO AA1)

2) Breast milk & formula (GO TO AB1)

3) Formula (GO TO AC1)

AA BREAST MILK...

AA1. How are you giving your baby breast milk? Breast? Bottle?

(Do Not Read) (Select all that Apply)

Probe: if mother says by bottle, ask if she is pumping and/or expressing breast milk.

1) Breast

2) Pumping breast milk – bottle

3) Expressing breast milk – bottle

4) Supplementary Nursing system (Lactation tube)

5) Refused
AA2. What are your main reasons for continuing to breastfeed?

(Do Not Read) (Select all that apply)

Probe: Any other reasons?

1) Better for baby/healthier
2) Nature’s way/natural
3) Protect baby from infection
4) Protect baby from allergies
5) Baby’s cognitive development
6) Bonding/closeness to baby
7) Enjoyment of breastfeeding
8) Previous experience
9) Help mother lose weight
10) Better for mother’s health
11) Economics/cost/financial reasons
12) Family traditions/cultural beliefs
13) Easier/convenience
14) Breastfeeding-friendly workplace
15) Baby refused bottle
16) Other: __________
17) Don’t know
18) Refused

AA3a. Have you had any difficulties or concerns with breastfeeding since coming home from the hospital, or if you had a home birth, since your baby was about two days old?

1) Yes
2) No difficulties or concerns with breastfeeding (GO TO AA4)
3) Refused (GO TO AA4)

AA3b. IF YES, what difficulties or concerns have you had?

(Do Not Read) (Select all that apply)

Probe: Any other difficulties or concerns?

1) Sore nipples
2) Mastitis/plugged duct
3) Not enough milk
4) Baby not latching
5) Unsure if I was doing it right
6) Baby fussy or colicky
7) Illness of mother or baby
8) Fatigue/stress
9) Uncomfortable with the idea of breastfeeding
10) Lack of family support
11) Separation of mother and baby
12) Thrush
13) Worry that baby is feeding too often
14) Worry that baby is not feeding often enough
15) Don’t know how much milk my baby is getting
16) Other: ________________
17) Refused

Feeding practices of infants in the Kingston, Frontenac and Lennox & Addington area during the first year of life.
AA3c. If YES, did you use any programs or services in the community to help with your breastfeeding difficulties or concerns?

1) Yes (GO TO AA3c1)
2) No (GO TO AA3c2)
3) Don’t know (GO TO AA4)
4) Refused (GO TO AA4)

AA3c1. Which programs or services did you use?

(Do Not Read) (Select all that apply)

Probe: If mother says Lactation Consultant, ask what organization is the consultant from? If mother doesn’t know, ask “Was it KFL&A Public Health?”

1) Doctor/Midwife/Health care professional
2) Baby Talk Phone Line (KFL&A Public Health)
3) Baby Talk Drop-Ins (KFL&A Public Health)
4) Breastfeeding Buddies (KFL&A Public Health)
5) Healthy Babies, Healthy Children (KFL&A Public Health)
6) Food for You, Food for Two (KFL&A Public Health)
7) KFL&A Public Health website
8) Lactation consultant (KFL&A Public Health)
9) Lactation consultant (not KFL&A Public Health)
10) LaLeche League
11) Better Beginnings for Kingston Children
12) Telephone information line (e.g., telehealth, EatRight Ontario)
13) Other: ________________________________
14) Don’t know
15) Refused

AA3c2. Can you tell me the reason or reason(s) for not using any programs or services in the community?

(Do Not Read) (Select all that apply)

Probe: If mother says that the problem went away, ask if she solved the problem or if the problem went away by itself.

Feeding practices of infants in the Kingston, Frontenac and Lennox & Addington area during the first year of life.
Probe: If mother says that she solved the problem, ask if she solved the problem by herself or with the help of family or friends

1) I solved the problem myself
2) I solved the problem with the help of family and friends
3) The problem resolved itself
4) I didn’t know where to go for breastfeeding help
5) I could not access the services
6) Used other sources of information (e.g. books, internet) to solve the problem
7) Other: _______________________
8) Don’t know
9) Refused

AA4. Do you know how to express breast milk by hand?

1) Yes
2) No
3) Unsure
4) Refused

AA5. How satisfied are you with your breastfeeding experience? Would you say you are:

1) Very satisfied
2) Satisfied
3) Neither satisfied nor dissatisfied
4) Dissatisfied
5) Very dissatisfied
6) Don’t know
7) Refused

AA6. How long do you plan to breastfeed your baby?

<table>
<thead>
<tr>
<th>If mother responds with age of baby</th>
<th>If mother responds with duration of breastfeeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Baby is less than 4 months of age</td>
<td>5) Less than 2 months</td>
</tr>
<tr>
<td>2) Baby is 4 months to less than 6 months</td>
<td>6) 2 more months to less than 4 months</td>
</tr>
<tr>
<td>3) Baby is 6 months to less than 12 months</td>
<td>7) 4 more months to less than 10 months</td>
</tr>
<tr>
<td>4) Baby is 12 months or older</td>
<td>8) At least another 10 months</td>
</tr>
<tr>
<td></td>
<td>9) Don’t know</td>
</tr>
<tr>
<td></td>
<td>10) Refused</td>
</tr>
</tbody>
</table>

Feeding practices of infants in the Kingston, Frontenac and Lennox & Addington area during the first year of life.
AA7a. Has it ever been suggested to you that you stop breastfeeding?

1) YES
2) No (GO TO AA8a)
3) Don’t know/Can’t remember (Go to AA8a)
4) Refused (GO TO AA8a)

AA7b. If YES, who suggested you stop breastfeeding?

(Do Not Read) (Select all that apply)

1) Pediatrician
2) Family doctor
3) Nurse in doctor’s office
4) Public Health Nurse
5) Hospital Nurse
6) Friend
7) Partner
8) Mother/Mother-in-Law
9) Other relative
10) Books/magazines/media
11) Other __________
12) Refused

AA7c. Why did they suggest you stop?

(Do Not Read) (Select all that apply)

Probe: Any other reasons?

1) Not enough milk
2) Poor quality milk/poor weight gain
3) Teething/biting
4) Weaned self/refused
5) Baby ill
6) Baby colicky/fussy
7) Baby old enough/right time
8) Partner wanted to help with feeding
9) My partner doesn’t want me to
10) My family members (not including partner) don’t want me to
11) Back to work or school
12) Overwhelmed
13) Not enough time/too busy
14) Tied down/travel
15) Mother taking medication/mother ill
16) Mother too tired
17) Mastitis
18) Sore nipples
19) Family traditions/cultural beliefs
20) Other: ______
21) Don’t know
22) Refused
AA8a. Have you ever felt too uncomfortable to breastfeed in a public place?

1) Yes
2) No (GO TO AA9a)
3) Not applicable/Never tried (GO TO AA10)
4) Don’t know/Can’t remember (GO TO AA10)
5) Refused (GO TO AA10)

AA8b. If YES, can you please tell me the place or places where you felt or do feel uncomfortable breastfeeding?

(Do Not Read) (Select all that apply)

1) All public places
2) Mall/Store
3) Restaurant/Fast food outlet
4) Place of worship
5) Park or bench
6) Recreational facility
7) Public transportation
8) Private residence
9) Office/office building
10) Other: ____________
11) Don’t know
12) Refused

AA8c. If YES, what, specifically, made you uncomfortable?

(Do Not Read) (Select all that apply)

Probe: Any other reasons?

1) Self-conscious/embarrassed
2) Partner/family self-conscious
3) Not dressed appropriately
4) Lack of confidence
5) Previous negative experience
6) Cultural values
7) Designated breastfeeding location inappropriate
8) No privacy/too many people
9) No designated breastfeeding location
10) Noisy or distractible baby
11) Other customers/people’s negative reaction
12) Location inappropriate (dirty, small)
13) Other: ____________
14) Don’t know
15) Refused
AA9a. If YES or NO in AA8a) Have you ever been prevented from breastfeeding in public when you wanted to?

1) Yes
2) No (GO TO AA10)
3) Not applicable (have not tried to breastfeed in a public place) (GO TO AA10)
4) Don’t know/Can’t remember (GO TO AA10)
5) Refused (GO TO AA10)

AA9b. If YES, where did this happen?

(Do Not Read) (Select all that apply)

1) Mall/Store
2) Restaurant/Fast food outlet
3) Place of worship
4) Park or bench
5) Recreational facility
6) Public transportation
7) Private residence
8) Office/office building
9) Other: ______________
10) Don’t know
11) Refused

AA9c. If YES, what, specifically, prevented you from breastfeeding?

(Do Not Read) (Select all that apply)

1) Designated breastfeeding location inappropriate
2) No designated breastfeeding location
3) Negative comment(s) or attitude(s) from patrons/public
4) Negative comment(s) or attitude(s) from family/friends
5) Negative comment(s) or attitude(s) from staff
6) Told by staff that I couldn’t
7) Other: __________
8) Don’t know
9) Refused
AA10. How supportive of breastfeeding is your partner? Would you say your partner is:

1) Very supportive?
2) Supportive?
3) Not supportive?
4) Not Applicable
5) Don’t know
6) Refused

AA11a. Has your baby ever had formula?

1) Yes
2) No (GO TO AA12)
3) Don’t know (GO TO AA12)
4) Refused (GO TO AA12)

AA11b. IF YES to formula, how often do you feed your baby formula?

1) One to two feedings since birth
2) Occasionally
3) One or two feedings per week (GO TO AB11)
4) Three to six feedings per week (GO TO AB11)
5) One feeding per day (GO TO AB11)
6) Two feedings per day (GO TO AB11)
7) Three or more feedings per day (GO TO AB11)
8) Don’t know
9) Refused

AA12. When breastfeeding, how do you know when your baby is full?

(Do Not Read) (Select all that apply)

Probe: Any other ways you can tell your baby is full?

1) Pulls off the breast/Pulls away from the bottle
2) Falls asleep
3) Sucking stops or almost stops/Shallow or non-nutritive sucks
4) Won’t take other breast/refuses bottle
5) Stops crying
6) Breast softer/less full
7) Spits up/vomits
8) Timed feedings
9) Other: ________________________________
10) Don’t know when my baby is full
11) Refused
AA13. Do you feed your baby on a schedule or on demand?

1) Schedule  
2) Feed on demand  
3) Combination of both  
4) Don’t know  
5) Refused

A1-2

AB If BREASTMILK AND FORMULA

AB1. How are you giving your baby breast milk? Breast? Bottle?

(Do Not Read) (Select all that apply)

Probe: if mother says by bottle, ask if she is pumping and/or expressing breast milk into the bottle.

1. Breast  
2. Pumping breast milk – bottle  
3. Expressing breast milk – bottle  
4. Supplementary Nursing system (Lactation tube)  
5. Refused

AB2. What are your main reasons for continuing to breastfeed?

(Do Not Read) (Select all that apply)

Probe: Any other reasons?

1. Better for baby/healthier  
2. Nature’s way/natural  
3. Protect baby from infection  
4. Protect baby from allergies  
5. Baby’s cognitive development  
6. Bonding/closeness to baby  
7. Enjoyment of breastfeeding
8. Previous experience
9. Help mother lose weight
10. Better for mother’s health
11. Economics/cost/financial reasons
12. Family traditions/cultural beliefs
13. Easier/convenience
14. Breastfeeding-friendly workplace
15. Baby refused bottle
16. Other: __________
17. Don’t know
18. Refused

**AB3a. Have you had any difficulties or concerns with breastfeeding since coming home from the hospital, or if you had a home birth, since your baby was about two days old?**

1. Yes
2. No difficulties or concerns with breastfeeding (GO TO AB4)
3. Refused (Go to AB4)

**AB3b. IF YES, what difficulties or concerns have you had?**

*(Do Not Read)* (Select all that apply)

Probe: Any other difficulties or concerns?

1. Sore nipples
2. Mastitis/plugged duct
3. Not enough milk
4. Baby not latching
5. Unsure if I was doing it right
6. Baby fussy or colicky
7. Illness of mother or baby
8. Fatigue/stress
9. Uncomfortable with breastfeeding
10. Lack of family support
11. Separation of mother and baby
12. Thrush
13. Worry that baby is feeding too often
14. Worry that baby is not feeding often enough
15. Don’t know how much milk my baby is getting
16. Other: __________________________
17. Refused
AB3c. If **YES**, did you use any programs or services in the community to help with your breastfeeding difficulties or concerns?

1. Yes
2. No (GO TO AB3c2)
3. Don’t know (GO TO AB4)
4. Refused (GO TO AB4)

AB3c1. If **YES**, which programs or services did you use?

(Do Not Read) (Select all that apply)

Probe: if mother says Lactation Consultant, ask what organization is the consultant from? If mother doesn’t know, ask “Was it KFL&A Public Health”?

1. Doctor/Midwife/Health care professional
2. Baby Talk Phone Line (KFL&A Public Health)
3. Baby Talk Drop-Ins (KFL&A Public Health)
4. Breastfeeding Buddies (KFL&A Public Health)
5. Healthy Babies, Healthy Children (KFL&A Public Health)
6. Food for You, Food for Two (KFL&A Public Health)
7. KFL&A Public Health website
8. Lactation consultant (KFL&A Public Health)
9. Lactation consultant (not KFL&A Public Health)
10. LaLeche League
11. Better Beginnings for Kingston Children
12. Telephone information line (e.g., telehealth, EatRight Ontario)
13. Other:
14. Don’t know
15. Refused
AB3c. If NO, can you tell me the reason or reason(s) for not using any programs or services in the community? (Do Not Read) (Select all that apply)

Probes:

1. I solved the problem myself
2. I solved the problem with the help of family and friends
3. The problem resolved itself
4. I didn’t know where to go for breastfeeding help
5. I could not access the services
6. I used other sources of information (e.g. books, internet) to solve the problem
7. Other: _______________________
8. Don’t know
9. Refused
10.

AB4. Do you know how to express breast milk by hand?

1. Yes
2. No
3. Unsure
4. Refused

AB5. How satisfied are you with your breastfeeding experience? Would you say you are...

1. Very satisfied
2. Satisfied
3. Neither satisfied nor dissatisfied
4. Dissatisfied
5. Very dissatisfied
6. Don’t know
7. Refused

AB6. How long do you plan to breastfeed your baby?

*If mother responds with age of baby*

1. Less than 4 months of age
2. Baby is 4 months to less than 6 months
3. Baby is 6 months to less than 12 months
4. Baby is 12 months or older
5. Don’t know

*If mother responds with duration of breastfeeding*

1. Less than 2 months
2. 2 more months to less than 4 months
3. 4 more months to less than 10 months
4. At least another 10 months
5. Refused
AB7a. Has it ever been suggested to you that you stop breastfeeding?

1. Yes
2. No (GO TO AB8a)
3. Don’t know/Can’t remember (GO TO AB8a)
4. Refused (GO TO AB8a)

AB7b. If YES, who suggested you stop breastfeeding?

(Do Not Read) (Select all that apply)

1. Pediatrician
2. Family doctor
3. Nurse in doctor’s office
4. Public Health Nurse
5. Hospital Nurse
6. Friend
7. Partner
8. Mother/Mother-in-Law
9. Other relative
10. Books/magazines/media
11. Other ___________
12. Refused

AB7c. Why did they suggest you stop?

(Do Not Read) (Select all that apply)  Probe: Any other reasons?

1. Not enough milk
2. Poor quality milk/poor weight gain
3. Teething/biting
4. Weaned self/refused
5. Baby ill
6. Baby colicky/fussy
7. Baby old enough/right time
8. Partner wanted to help with feeding
9. My partner doesn’t want me to
10. My family members (not including partner) don’t want me to
11. Back to work or school
12. Overwhelmed
13. Not enough time/too busy
14. Tied down/travel
15. Mother taking medication/mother ill
16. Mother too tired
17. Mastitis
18. Sore nipples
19. Family traditions/cultural beliefs
20. Don’t know
21. Other: _____
22. Refused

AB8a. Have you ever felt too uncomfortable to breastfeed in a public place?

1. Yes
2. No (GO TO AB9a)
3. Not applicable/Never tried (GO TO AB10)
4. Don’t know/Can’t remember (GO TO AB10)
5. Refused (GO TO AB10)

AB8b. If YES, can you please tell me the place or places where you felt or do feel uncomfortable breastfeeding?

(Do Not Read) (Select all that apply)

1. All public places
2. Mall/Store
3. Restaurant/Fast food outlet
4. Place of worship
5. Park or bench
6. Recreational facility
7. Public transportation
8. Private residence
9. Office/office building
10. Other: __________
11. Don’t know
12. Refused

AB8c. What, specifically, made you uncomfortable?

(Do Not Read) (Select all that apply)

Probe: Any other reasons?

1. Self-conscious/embarrassed
2. Partner/family self-conscious
3. Not dressed appropriately
4. Lack of confidence
5. Previous negative experience
6. Cultural values
7. Designated breastfeeding location inappropriate
8. No privacy/too many people
9. No designated breastfeeding location
10. Noisy or distractible baby
11. Other customers’/people’s negative reaction
12. Location inappropriate (dirty, small)
13. Other: __________
14. Don’t know
15. Refused

**AB9a. Have you ever been prevented from breastfeeding in public when you wanted to?**

1. Yes
2. No (GO TO AB10)
3. Not applicable (have not tried to breastfeed in a public place) (GO TO AB10)
4. Don’t know/Can’t remember (GO TO AB10)
5. Refused (GO TO AB10)

**AB9b. If YES, where did this happen?**

*(Do Not Read) (Select all that apply)*

1. Mall/Store
2. Restaurant/Fast food outlet
3. Place of worship
4. Park or bench
5. Recreational facility
6. Public transportation
7. Private residence
8. Office/office building
9. Other: __________
10. Don’t know
11. Refused

**AB9c. What, specifically, prevented you from breastfeeding?**

*(Do Not Read) (Select all that apply)*

1. Designated breastfeeding location inappropriate
2. No designated breastfeeding location
3. Negative comment(s) or attitude(s) from patrons/public
4. Negative comment(s) or attitude(s) from family/friends
5. Negative comment(s) or attitude(s) from staff
6. Told by staff that I couldn’t
7. Other: __________
8. Don’t know
9. Refused
AB10. How supportive of breastfeeding is your partner? Would you say your partner is

1. Very supportive?
2. Supportive?
3. Not supportive?
4. Not applicable
5. Don’t know
6. Refused

IF STARTED ON THE BREASTFEEDING QUESTIONNAIRE AND MOTHER INDICATED THAT SHE FED HER BABY FORMULA, START HERE.

AB11. When did you start giving your baby formula?

1. Within two days of birth
2. Two days up to one week of birth
3. One week to up to two weeks
4. Two weeks up to four weeks
5. Four weeks up to six weeks
6. After six weeks
7. Don’t know
8. Refused

AB12a. Can you please tell me your reason or reasons for supplementing breastfeeding with formula?

(Do Not Read) (Select all that apply)

Probe: Any other reasons?

1. Not enough milk
2. Difficulty with breastfeeding techniques (latching)
3. Pain while breastfeeding (sore nipples/engorged breasts/mastitis)
4. Unsure if I was doing it right
5. Knew how much food my baby was getting
6. Advice of doctor
7. Advice of partner/Lack of family support
8. Baby not very interested in breastfeeding/baby preferred bottle
9. Baby fussy or colicky
10. Baby sleepy
11. Worried baby was not gaining enough weight/Dehydration
12. Breastfeeding inconvenient/Tied me down/travel
13. Fatigue/Too tired/Didn’t want to get up at night
14. Baby too hungry/needed more food/fed too often
15. Child weaned himself/herself
16. Returned to work/school
17. Wanted to drink alcohol
18. Mom ill or on medication for illness
20. Not enough time/too busy
21. Baby teething/biting mom
22. Dried up/Stopped producing
23. Got pregnant
24. Father wanted to help with feeding
25. Overwhelmed
26. Family traditions/cultural beliefs
27. Poor quality milk
28. Baby old enough/right time
29. Mother didn’t like breastfeeding
30. Other: ________________
31. Don’t know
32. Refused

If more than one reason for supplementing...

AB12b. Of all the reasons that you listed, can you please tell me your MAIN reason for supplementing with formula?

(DO NOT READ)

1. Not enough milk
2. Difficulty with breastfeeding techniques (latching)
3. Pain while breastfeeding (sore nipples/engorged breasts/mastitis)
4. Unsure if I was doing it right
5. Knew how much food my baby was getting
6. Advice of doctor
7. Advice of partner/Lack of family support
8. Baby not very interested in breastfeeding/baby preferred bottle
9. Baby fussy or colicky
10. Baby sleepy
11. Worried baby was not gaining enough weight/Dehydration
12. Breastfeeding inconvenient/Tied me down/travel
13. Fatigue/Too tired/Didn’t want to get up at night
14. Baby too hungry/needed more food/fed too often
15. Child weaned himself/herself
16. Returned to work/school
17. Wanted to drink alcohol
18. Mom ill or on medication for illness
20. Not enough time/too busy
21. Baby teething/biting mom
22. Dried up/Stopped producing
23. Got pregnant
24. Father wanted to help with feeding
25. Overwhelmed
26. Family traditions/cultural beliefs
27. Poor quality milk
28. Baby old enough/right time
29. Mother didn’t like breastfeeding
30. Other:
31. Don’t know
32. Refused

AB13a. What kind of formula or milk are you feeding your baby now?

(Do Not Read) (Select all that apply)

1. Alimentum
2. Aisoy 2
3. Carnation Evaporated Milk
4. Cow’s milk - 2%
5. Cow’s milk - Chocolate
6. Cow’s milk - Skim
7. Cow’s milk – Whole milk
8. Enfamil/Enfamil Regular
9. Enfamil Lactose Free
10. Enfamil Soy (Prosobee)
11. Enfamil with Iron (Enfamil Iron Fortified)
12. Enfagro Toddler (Toddler formula – not for babies under 1 year)
13. Enfra Pro A+ (Next Step formula for babies 6 mo. +)
14. Follow Up
15. Goat’s milk
16. Good Start
17. Good Start 2
19. Isomil
20. Neocate (hypoallergenic/hydrolyzed formula for term babies with allergies)
21. Neosure (pre-term baby formula)
22. Nursoy
23. Nutramigen (hypoallergenic/hydrolyzed formula designed for babies with food allergies).
24. Pregestimil (hypoallergenic formula for babies with ft malabsorption syndromes such as Cystic Fibrosis)
25. Similac Advance Lactose Free
26. SMA Formula
27. Soya beverage (not formula)
28. Unilac formula (Zellers)
29. Enfamil A+
30. Enfamil with Lower Iron
31. Good Start with Omega 3 & Omega 6
32. Good Start 2 with Omega 3 & Omega 6
33. Alsoy with Omega 3 and Omega 6
34. President’s Choice Infant Formula with Iron
35. President’s Choice Organics Infant Formula
36. Similac Advance Step 1 with Iron
37. Similac Advance Step 1
38. Similac Advance Step 1 with Omega 3 & Omega 6
39. Similac Advance Step 2
40. Similac Go & Grow with Omega 3 & Omega 6
41. Similac Sensitive Lactose Free
42. Isomil Advance with Omega 3 & Omega 6
43. Isomil Step 2
44. Other formula (specify)
45. Don’t know/Can’t remember
46. Refused

AB14. What were your main reasons for choosing that formula?

(Do Not Read) (Select all that apply)
1. Baby had problems (allergy, lactose intolerant, diarrhea, constipation, etc.)
2. Used with other children
3. Family history of allergies
4. Healthier for baby (e.g., antibiotics in cow’s milk)
5. Family is vegan/vegetarian
6. Cultural background
7. Doctor/midwife/nurse recommended
8. Hospital used it/gave it to me
9. Had free samples (not from hospital)
10. Family/friends recommended it
11. Advertisements (TV, magazines, etc.)
12. Don’t know
13. Refused

AB15. How do you know when your baby is full?

(Do Not Read) (Select all that apply)

Probe: Any other ways you can tell your baby is full?
1. Pulls off the breast/Pulls away from the bottle
2. Falls asleep
3. Sucking stops or almost stops/Shallow or non-nutritive sucks
4. Won’t take other breast/refuses bottle
5. Stops crying
6. Breast softer/less full
7. Spits up/vomits
8. Timed feedings
9. Other: 
10. Don’t know when my baby is full
11. Refused

AB16. Do you feed your baby on a schedule or on demand?

1. Schedule
2. Feed on demand
3. Combination of both
4. Don’t know
5. Refused

QA1=3

AC IF FORMULA FEEDING

AC1. Did you ever give your baby breastmilk?

1. Yes
2. No (GO TO AC10)
3. Refused (GO TO AC10)

AC2a. What age was your baby when you stopped breastfeeding?

1. Never started (GO TO AC10)
2. 1 to 3 days
3. 4 to 6 days
4. 1 week up to 2 weeks (7 to 13 days)
5. 2 weeks up to 3 weeks (14 to 20 days)
6. 3 weeks up to 4 weeks (21 to 34 days)
7. 5 weeks up to 6 weeks (35 to 62 days)
8. 6 weeks up to 2 months (63+ days)
9. Don’t know
10. Refused

AC2b. Can you please tell me your reason or reasons for stopping breastfeeding?

(Do Not Read) (Select all that apply)

1. I had planned on feeding my baby formula
2. Not enough milk
3. Poor quality milk
4. Difficulty with breastfeeding techniques (latching)
5. Pain while breastfeeding (sore nipples/engorged breasts/mastitis)
6. Unsure if I was doing it right
7. Advice of doctor
8. Advice of partner/Lack of family support
9. Baby not very interested in breastfeeding/baby preferred bottle
10. Baby fussy or colicky
11. Baby sleepy
12. Worried baby was not gaining enough weight/Dehydration
13. Breastfeeding inconvenient/Tied me down/travel
14. Fatigue/Too tired/Didn’t want to get up at night
15. Baby too hungry/needed more food/fed too often
16. Wanted to know how much milk my baby was getting
17. Child weaned himself/herself
18. Returned to work/school
19. Wanted to drink alcohol
20. Mom ill or on medication for illness
21. Baby ill
22. Not enough time/too busy
23. Baby teething/biting mom
24. Dried up/Stopped producing
25. Got pregnant
26. Father wanted to help with feeding
27. Overwhelmed
28. Family traditions/cultural beliefs
29. Baby old enough/right time
30. Mother didn’t like breastfeeding
31. Separation of mom and baby
32. Other: ____________________________
33. Don’t know
34. Refused

Probe: Any other reasons?

AC2c. Of all of the reasons that you listed, what would you say was the MAIN reason why you stopped breastfeeding?

(DO NOT READ)

1. I had planned on feeding my baby formula
2. Not enough milk
3. Poor quality milk
4. Difficulty with breastfeeding techniques (latching)
5. Pain while breastfeeding (sore nipples/engorged breasts/mastitis)
6. Unsure if I was doing it right
7. Advice of doctor
8. Advice of partner/Lack of family support
9. Baby not very interested in breastfeeding/baby preferred bottle
10. Baby fussy or colicky
11. Baby sleepy
12. Worried baby was not gaining enough weight/Dehydration
AC3. Did you breastfeed your baby at home after you were discharged from hospital or, if you had a home birth, since your baby was about two days old?

1. Yes
2. No (GO TO AC5a)
3. Don’t know/Can’t remember (GO TO AC5a)
4. Refused (GO TO AC5a)

AC4a. Did you have any difficulties or concerns with breastfeeding since coming home from the hospital or, if you had a home birth, since your baby was about two days old?

1. Yes
2. No difficulties or concerns with breastfeeding (GO TO AC5a)
3. Refused (GO TO AC5a)

AC4b. IF YES, what difficulties or concerns did you have?

(Do Not Read) (Select all that apply)

Probe: Any other difficulties or concerns?
1. Sore nipples
2. Mastitis/plugged duct
3. Not enough milk
4. Baby not latching
5. Unsure if I was doing it right
6. Baby fussy or colicky
7. Illness of mother or baby
8. Fatigue/stress
9. Uncomfortable with breastfeeding
10. Lack of family support
11. Separation of mother and baby
12. Thrush
13. Worry that baby was feeding too often
14. Worry that baby was not feeding often enough
15. Didn’t know how much milk my baby was getting
16. Other: ______________________
17. Refused

AC4c. If YES, did you use any programs or services in the community to help with your breastfeeding difficulties or concerns?

1. Yes (GO TO AC4c1)
2. No (GO TO AC4c2)
3. Don’t know (GO TO AC5a)
4. Refused (GO TO AC5a)

AC4c1. If yes, which programs or services did you use? (Do Not Read) (Select all that apply)

Probe: if mother says Lactation Consultant, ask what organization is the consultant from? If mother doesn’t know, ask “Was it KFL&A Public Health”?

1. Doctor/Midwife/Health care professional
2. Baby Talk Phone Line (KFL&A Public Health)
3. Baby Talk Drop-Ins (KFL&A Public Health)
4. Breastfeeding Buddies (KFL&A Public Health)
5. Healthy Babies, Healthy Children (KFL&A Public Health)
6. Food for You, Food for Two (KFL&A Public Health)
7. KFL&A Public Health website
8. Lactation consultant (KFL&A Public Health)
9. Lactation consultant (not KFL&A Public Health)
10. LaLeche League
11. Better Beginnings for Kingston Children
12. Telephone information line (e.g., telehealth, EatRight Ontario)
13. Other: ______________________
14. Don’t know
15. Refused
AC4a2. If NO, can you tell me the reason or reasons for not using any programs or services in the community?

(Do Not Read) (Select all that apply)

Probe: if mother says that the problem went away, ask if she solved the problem or if the problem went away by itself.

Probe: if mother says that she solved the problem, ask if she solved the problem by herself or with the help of family or friends.

1. I solved the problem myself
2. I solved the problem with the help of family and friends
3. The problem resolved itself
4. I didn’t know where to go for breastfeeding help
5. I could not access the services
6. Used other sources of information (e.g., books, internet) to solve the problem
7. Other: ______________________
8. Don’t know
9. Refused

AC5a. Was it ever suggested to you that you stop breastfeeding?

1. Yes
2. No (GO TO AC6a)
3. Don’t know/Can’t remember (GO TO AC6a)
4. Refused (GO TO AC6a)

AC5b. If YES, who suggested you stop breastfeeding?

(Do Not Read) (Select all that apply)

1. Pediatrician
2. Family doctor
3. Nurse in doctor’s office
4. Public Health Nurse
5. Hospital Nurse
6. Friend
7. Partner
8. Mother/Mother-in-Law
9. Other relative
10. Books/magazines/media
11. Other: ______________
12. Refused
ACSc. Why did they suggest you stop?

(Do Not Read) (Select all that apply)

1. Not enough milk
2. Poor quality milk/poor weight gain
3. Teething/biting
4. Weaned self/refused
5. Baby ill
6. Baby colicky/fussy
7. Baby old enough/right time
8. Partner wanted to help with feeding
9. My partner doesn’t want me to
10. My family members (not including partner) don’t want me to
11. Lack of support from family
12. Back to work or school
13. Overwhelmed
14. Not enough time/too busy
15. Tied down/travel
16. Mother taking medication/mother ill
17. Mother too tired
18. Mastitis
19. Sore nipples
20. Family traditions/cultural beliefs
21. Other: ______
22. Don’t know
23. Refused

*NEXT TWO QUESTIONS: ONLY IF MOTHER BREASTFED FOR AT LEAST 7 DAYS.

(A1=3 and AC2a=4,5,6,7 or 8)

*AC6a. Did you ever feel too uncomfortable to breastfeed in a public place?

1. Yes
2. No (GO TO AC7a)
3. Not applicable/Never tried (GO TO AC8)
4. Don’t know/Can’t remember (GO TO AC8)
5. Refused (GO TO AC8)

AC6b. If YES, can you please tell me the place or places where you felt uncomfortable breastfeeding?

(Do Not Read) (Select all that apply)

1. All public places
2. Mall/Store
3. Restaurant/Fast food outlet
4. Place of worship
5. Park or bench
6. Recreational facility
7. Public transportation
8. Private residence
9. Office/office building
10. Other:
11. Don't know
12. Refused

**AC6c.** What, specifically, made you uncomfortable?

(Do Not Read) (Select all that apply)

1. Self-conscious/embarrassed
2. Partner/family self-conscious
3. Not dressed appropriately
4. Lack of confidence
5. Previous negative experience
6. Cultural values
7. Designated breastfeeding location inappropriate
8. No privacy/too many people
9. No designated breastfeeding location
10. Noisy or distractible baby
11. Other customers'/people's negative reaction
12. Location inappropriate (dirty, small)
13. Other: ______
14. Don't know
15. Refused

**AC7a.** Were you ever prevented from breastfeeding in public when you wanted to?

1. Yes
2. No (GO TO AC8)
3. Not applicable (have not tried to breastfeed in a public place) (GO TO AC8)
4. Don't know/Can't remember (GO TO AC8)
5. Refused (GO TO AC8)

**AC7b.** If YES, where did this happen?

(Do Not Read) (Select all that apply)

1. Mall/Store
2. Restaurant/Fast food outlet
3. Place of worship
4. Park or bench
5. Recreational facility
6. Public transportation
7. Private residence
8. Office/office building
9. Other: __________
10. Don’t know
11. Refused

AC7c. What, specifically, prevented you from breastfeeding?

(Do Not Read) (Select all that apply)

1. Designated breastfeeding location inappropriate
2. No designated breastfeeding location
3. Negative comment(s) or attitude(s) from patrons/public
4. Negative comment(s) or attitude(s) from family/friends
5. Negative comment(s) or attitude(s) from staff
6. Told by staff that I couldn’t
7. Other: __________
8. Don’t know
9. Refused

AC8. How satisfied were you with your breastfeeding experience? Would you say you were...

1. Very satisfied
2. Satisfied
3. Neither satisfied nor dissatisfied
4. Dissatisfied
5. Very dissatisfied
6. Don’t know
7. Refused

AC9. How supportive of breastfeeding was your partner? Would you say your partner was

1. Very supportive?
2. Supportive?
3. Not supportive?
4. Not applicable
5. Don’t know
6. Refused
4. Park or bench  
5. Recreational facility  
6. Public transportation  
7. Private residence  
8. Office/office building  
9. Other:  
10. Don’t know  
11. Refused

AC7c. What, specifically, prevented you from breastfeeding?  

(Do Not Read) (Select all that apply)  
1. Designated breastfeeding location inappropriate  
2. No designated breastfeeding location  
3. Negative comment(s) or attitude(s) from patrons/public  
4. Negative comment(s) or attitude(s) from family/friends  
5. Negative comment(s) or attitude(s) from staff  
6. Told by staff that I couldn’t  
7. Other:  
8. Don’t know  
9. Refused

AC8. How satisfied were you with your breastfeeding experience? Would you say you were...  
1. Very satisfied  
2. Satisfied  
3. Neither satisfied nor dissatisfied  
4. Dissatisfied  
5. Very dissatisfied  
6. Don’t know  
7. Refused

AC9. How supportive of breastfeeding was your partner? Would you say your partner was  
1. Very supportive?  
2. Supportive?  
3. Not supportive?  
4. Not applicable  
5. Don’t know  
6. Refused
AC10. When did you start giving your baby formula?

1. Within two days of birth
2. Two days to one week of birth
3. One week to up to two weeks
4. Two weeks up to four weeks
5. Four weeks up to six weeks
6. After six weeks
7. Don’t know
8. Refused

AC11a. What kind of formula or milk are you feeding your baby now?

(Do Not Read) (Select all that apply)

1. Alimentum
2. Alsoy 2
3. Carnation Evaporated Milk
4. Cow’s milk - 2%
5. Cow’s milk - Chocolate
6. Cow’s milk - Skim
7. Cow’s milk – Whole milk
8. Enfalac/Enfamil Regular
9. Enfamil Lactose Free
10. Enfamil Soy (Prosobee)
11. Enfamil with Iron (Enfalac Iron Fortified)
12. Enfagro Toddler (Toddler formula – not for babies under 1 year)
13. Enf Pro A+ (Next Step formula for babies 6 mo. +)
14. Follow Up
15. Goat’s milk
16. Good Start
17. Good Start 2
19. Isomil
20. Neocate (hypoallergenic/hydrolyzed formula for term babies with allergies)
21. Neosure (pre-term baby formula)
22. Nursoy
23. Nutramigen (hypoallergenic/hydrolyzed formula designed for babies with food allergies)
24. Pregestimil (hypoallergenic formula for babies with ft malabsorption syndromes such as Cystic Fibrosis)
25. Similac Advance Lactose Free
26. SMA Formula
27. Soya beverage (not formula)
28. Unilac formula (Zellers)
29. Enfamil A+
30. Enfamil with Lower Iron
31. Good Start with Omega 3 & Omega 6
32. Good Start 2 with Omega 3 & Omega 6
33. Alsoy with Omega 3 and Omega 6
34. President’s Choice Infant Formula with Iron
35. President’s Choice Organics Infant Formula
36. Similac Advance Step 1 with Iron
37. Similac Advance Step 1
38. Similac Advance Step 1 with Omega 3 & Omega 6
39. Similac Advance Step 2
40. Similac Go & Grow with Omega 3 & Omega 6
41. Similac Sensitive Lactose Free
42. Isomil Advance with Omega 3 & Omega 6
43. Isomil Step 2
44. Other formula (specify)
45. Don’t know/Can’t remember
46. Refused

**AC12. What was your main reason for choosing that formula?**

(Do Not Read) (Select all that apply)

1. Baby had problems (allergy, lactose intolerant, diarrhea, constipation, etc.)
2. Used with other children
3. Family history of allergies
4. Healthier for baby (e.g., antibiotics in cow’s milk)
5. Family is vegan/vegetarian
6. Cultural background
7. Doctor/midwife/nurse recommended
8. Hospital used it/gave it to me
9. Had free samples (not from hospital)
10. Family/friends recommended it
11. Advertisements (TV, magazines, etc.)
12. Don’t know
13. Refused

**AC13. How do you know when your baby is full?**

(Do Not Read) (Select all that apply)

_Probe: Any other ways you can tell your baby is full?_

1. Pulls away from the bottle
2. Falls asleep
3. Sucking stops or almost stops/Shallow or non-nutritive sucks
4. Refuses bottle
5. Stops crying
6. Spits up/vomits
7. Timed feedings  
8. Other:  
9. Don’t know when my baby is full  
10. Refused  

AC14. Do you feed your baby on a schedule or on demand?  
1. Schedule  
2. Feed on demand  
3. Combination of both  
4. Don’t know  
5. Refused  

A1=1 or 2 or 3  

AZ ALL MOTHERS  

AZ1. Since your baby was born, have you ever received any free samples of formula?  
1. Yes  
2. No  
3. Don’t know/Can’t remember  
4. Refused  

AZ2. Since your baby was born, have you ever received any coupons for formula?  
1. Yes  
2. No  
3. Don’t know/Can’t remember  
4. Refused  

AZ3. Are you currently giving your baby any of the following supplements?  

<table>
<thead>
<tr>
<th>1. Multivitamins such as Poly-vi-sol or Tri-vi-sol</th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Iron such as Fer-in-sol (includes formula fortified with iron)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Vitamin D supplements such as D-vi-sol</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4. Fluoride supplements such as Tri-vi-fluor, Poly-vi-fluor,</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
AZ4. Other than breast milk or formula, has your baby had any other food or drink such as plain water, infant cereal or fruit juice, more than once?

1. Yes
2. No (GO TO AZ8)
3. Water only (GO TO AZ8) Probe: Besides breast milk or formula you have only fed your baby plain water?
4. Don’t know (GO TO AZ8)
5. Refused (GO TO AZ8)

AZ5a. Which of the following has your baby had more than once?

<table>
<thead>
<tr>
<th>Choice</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice- Infant cereal or Pablum</td>
<td>If yes → Was the cereal fortified with iron? □ Yes □ No</td>
</tr>
<tr>
<td></td>
<td>How many weeks old was your baby when you introduced this food? ____________</td>
</tr>
<tr>
<td>Barley - Infant cereal or Pablum</td>
<td>If yes → Was the cereal fortified with iron? □ Yes □ No</td>
</tr>
<tr>
<td></td>
<td>How many weeks old was your baby when you introduced this food? ____________</td>
</tr>
<tr>
<td>Oat - Infant cereal or Pablum</td>
<td>If yes → Was the cereal fortified with iron? □ Yes □ No</td>
</tr>
<tr>
<td></td>
<td>How many weeks old was your baby when you introduced this food? ____________</td>
</tr>
<tr>
<td>Wheat - Infant cereal or Pablum</td>
<td>If yes → Was the cereal fortified with iron? □ Yes □ No</td>
</tr>
<tr>
<td></td>
<td>How many weeks old was your baby when you introduced this food? ____________</td>
</tr>
</tbody>
</table>

2. Fruit juice diluted with water or infant juice  
   If yes → How many weeks old was your baby when you introduced this food? ____________

3. Undiluted fruit juice  
   If yes → How many weeks old was your baby when you introduced this food? ____________

4. Plain water  
   If yes → How many weeks old was your baby when you introduced this food? ____________
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 5. Vegetables, including fresh, frozen or in jars or cans (includes “baby” food vegetables) | If yes | How many weeks old was your baby when you introduced this food?  
| 6. Fruit, including fresh, frozen or in jars or cans (includes “baby” food pureed fruits) | If yes | How many weeks old was your baby when you introduced this food?  
| 7. Cow’s milk (not formula) | If yes | How many weeks old was your baby when you introduced this food?  
|   |   |   |
|   |   |   |
|   |   |   |
|   |   |   |
|   |   |   |
|   |   |   |
|   |   |   |
| 8. Evaporated milk like Carnation | If yes | How many weeks old was your baby when you introduced this food?  
| 9. Goat’s milk | If yes | How many weeks old was your baby when you introduced this food?  
| 10. Soy or rice beverage (not formula) | If yes | How many weeks old was your baby when you introduced this food?  
| 11. Pop, Kool Aid, sugar water or fruit drinks (not real juice) | If yes | How many weeks old was your baby when you introduced this food?  
| 12. Tea, including herbal | If yes | How many weeks old was your baby when you introduced this food?  
<p>| | | |
|   |   |   |
|   |   |   |
|   |   |   |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>If yes</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Cooked cereal such as Oatmeal</td>
<td>If yes</td>
<td>How many weeks old was your baby when you introduced this food? ________</td>
</tr>
<tr>
<td>14. Teething biscuits,</td>
<td>If yes</td>
<td>How many weeks old was your baby when you introduced this food? ________</td>
</tr>
<tr>
<td>15. Cookies or sweetened breakfast cereals (e.g., Fruit Loops)</td>
<td>If yes</td>
<td>How many weeks old was your baby when you introduced this food? ________</td>
</tr>
<tr>
<td>16. Bread, crackers, breadsticks, or unsweetened breakfast cereals</td>
<td>If yes</td>
<td>How many weeks old was your baby when you introduced this food? ________</td>
</tr>
<tr>
<td>(e.g., Cheerios)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Rice or pasta, including cooked or canned liked Zoodles or Kraft dinner</td>
<td>If yes</td>
<td>How many weeks old was your baby when you introduced this food? ________</td>
</tr>
<tr>
<td>18. Mixed foods with meat like stews or dinners</td>
<td>If yes</td>
<td>How many weeks old was your baby when you introduced this food? ________</td>
</tr>
<tr>
<td>19. Meat</td>
<td>If yes</td>
<td>How many weeks old was your baby when you introduced this food? ________</td>
</tr>
<tr>
<td>20. Processed meats like hot dogs or bologna</td>
<td>If yes</td>
<td>How many weeks old was your baby when you introduced this food? ________</td>
</tr>
<tr>
<td>21. Meats alternatives like fish, beans or tofu (not including eggs)</td>
<td>If yes</td>
<td>How many weeks old was your baby when you introduced this food? ________</td>
</tr>
<tr>
<td>22. Milk products like cheese, ice cream or yogurt</td>
<td>If yes</td>
<td>How many weeks old was your baby when you introduced this food? ________</td>
</tr>
<tr>
<td>23. Snack food like potato chips or popcorn</td>
<td>If yes</td>
<td>How many weeks old was your baby when you introduced this food? ________</td>
</tr>
<tr>
<td>24. Candy, chocolate?</td>
<td>If yes</td>
<td>How many weeks old was your baby when you introduced this food? ________</td>
</tr>
</tbody>
</table>
AZ6. Can you please tell me your reasons for starting your baby on solid food?

(Do Not Read) (Select all that apply)

1. Sleep through the night
2. Baby hungry all the time
3. Needed iron or other nutrients
4. Medical reasons
5. Drinking too much formula
6. Economical/cost
7. Big baby
8. Not gaining weight
9. Baby interested in food
10. Previous experience
11. Got a free sample
12. Other person fed baby solids
13. Can't pump enough breastmilk
14. Advice of doctor
15. Advice of other health care professional
16. Advice of partner or family
17. Other: __________________________
18. Don't know
19. Refused

AZ7. When feeding your baby solids, how do you know when your baby is full?

(Do Not Read) (Select all that apply)

1. Turns head away from spoon
2. Spits food out
3. Plays with food
4. Won't open mouth
5. Puts hands over mouth
6. Puts hands out to block spoon
7. Throws up/vomits
8. Other: __________________________
9. Don't know
10. Refused
AZ8. Have you ever given your baby any of the following:

<table>
<thead>
<tr>
<th></th>
<th>1. Nuts, peanuts or peanut butter</th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
<th>Refused</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Egg white or whole egg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Honey</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>4. Unpasteurized milk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Unpasteurized juice or cider</td>
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</tr>
</tbody>
</table>

AZ9a. Since your baby was born, have you ever obtained information about introducing solids to your baby?

1. Yes
2. No (GO TO END)
3. Don’t know/Can’t remember (GO TO END)
4. Refused (GO TO END)

AZ9b. If YES, Where did you get this information?

(Do Not Read) (Select all that apply)

1. Books/magazines
2. Television/radio/newspaper
3. Internet
4. Videos/pamphlets
5. Info or free samples
6. In-store advertisement
7. School
8. Family/friends
9. Doctor
10. Nurse at doctor’s office
11. Midwife or NP
12. Hospital
13. Family/home visitor (not PHN)
14. Public Health Nurse
15. Nutritionist or dietitian
16. Lactation consultant
17. Pharmacist/pharmacy
18. Prenatal classes
19. Parenting classes
20. Breastfeeding or well baby clinic
21. Health information telephone line
22. Other: _________
23. Don’t know/Can’t remember
24. Refused

If more than one source of information...

AZ9c. Of all the sources of information that you listed, which one was most useful?

(DO NOT READ)

1. Books/magazines
2. Television/radio/newspaper
3. Internet
4. Videos/pamphlets
5. Info or free samples
6. In-store advertisement
7. School
8. Family/Friends
9. Doctor
10. Nurse at doctor’s office
11. Midwife or NP
12. Hospital
13. Family/home visitor (not PHN)
14. Public Health Nurse
15. Nutritionist or dietitian
16. Lactation consultant
17. Pharmacist/pharmacy
18. Prenatal classes
19. Parenting classes
20. Breastfeeding or well baby clinic
21. Health information telephone line
22. Other: _________
23. Don’t know/Can’t remember
24. Refused

That is the end of the survey. I would like to thank you very much on behalf of KFL&A Public Health. It is important for Public Health to examine how feeding practices change as babies get older. So as a reminder, we will be calling you in another two months. Thanks again for your time today.

[Interviewer Prompt: If you have any questions about this survey you can contact Susan Stewart @ 613-549-1232 ex 141 at KFL&A Public Health]
Appendix G

Survey Questions Used to Determine Breastfeeding Exclusivity

In-hospital Survey:
Question 5 (Q5). I have breastfed my baby during my stay in hospital.
Question 6 (Q6). My baby was fed water while in hospital.
Question 7 (Q7). My baby was fed formula while in hospital.

Surveys at 2, 4, and 6 months:
Question 1 (Q1). What are you currently feeding your baby? (Answer options: breast milk, breast milk and formula, formula)
Question A11A (QA11A). (Asked only of mothers who answered ‘breast milk only to Q1) Has your baby ever had formula?
Question A11B (QA11B). If yes to formula, how often do you feed your baby formula?
   a) One or two feedings in total
   b) Occasionally
   c) One or two feedings per week
   d) Three to six feedings per week
   e) One feeding per day
   f) Two feedings per day
   g) Three or more feeding per day.
If a mother answered C through G, she was switched to the ‘breast milk and formula’ questionnaire.

Introduction to solids and other fluids:
Question Z4: Other than breast milk or formula, has your baby had any other food, such as infant cereal or fruit juice, more than once?

<table>
<thead>
<tr>
<th>1. Exclusive breastfeeding from birth</th>
<th>To be in this group, mothers must meet the following criteria:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, mother is exclusively breastfeeding from birth.</td>
<td>• This group consisted of those mothers who said ‘Yes’ to breastfeeding their baby in hospital (Q5) and ‘No’ to water (Q6) and formula feeding (Q7).</td>
</tr>
<tr>
<td></td>
<td>• A mother was only allowed to give formula in hospital if medically indicated by a doctor.</td>
</tr>
<tr>
<td></td>
<td>• Mother’s must say they feeding breast milk only to Q1.</td>
</tr>
<tr>
<td></td>
<td>• Mother’s must answer ‘No’ to QA11A – has your baby ever had formula.</td>
</tr>
<tr>
<td></td>
<td>• Mother’s must answer ‘No’ to Q Z4 –i.e. no solids or other fluids were given to her baby.</td>
</tr>
</tbody>
</table>
# Appendix G

## Survey Questions Used to Determine Breastfeeding Exclusivity Cont’d

<table>
<thead>
<tr>
<th>2. Exclusive breastfeeding from discharge</th>
<th>To be in this group, mothers must meet the following criteria:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, mother is exclusively breastfeeding from discharge.</td>
<td>• Mother’s must say they feeding breast milk only to Q1.</td>
</tr>
<tr>
<td></td>
<td>• Mother’s must answer ‘No’ to QA11A – has your baby ever had formula.</td>
</tr>
<tr>
<td></td>
<td>• Mother’s must answer ‘No’ to Q Z4 – i.e. no solids or other fluids were given to her baby.</td>
</tr>
<tr>
<td></td>
<td>• A mother’s experience in hospital has no bearing in this category as feeding starts from discharge.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. High breastfeeding</th>
<th>To be in this group, mothers must meet the following criteria:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, mother is high breastfeeding.</td>
<td>• Mother’s must say they feeding breast milk only to Q1.</td>
</tr>
<tr>
<td></td>
<td>• Mother’s who answer ‘No’ to QA11A (has your baby ever had formula) are included in this category.</td>
</tr>
<tr>
<td></td>
<td>• In addition, mother’s who answer ’Yes’ to QA11A and answer options ‘a’ or ‘b’ to question QA11B are also included in this category. That is, mothers who have given their baby 1 or 2 feedings in total of formula, or who have fed their baby formula occasionally. Mothers who answer C through G are no longer considered to be high breastfeeding and are placed into the any breastfeeding category.</td>
</tr>
<tr>
<td></td>
<td>• Mother’s must answer ‘No’ to Q Z4 – no solids or other fluids were given to her baby. The exception to this rule is water. In this category, a mother is allowed to feed her baby water.</td>
</tr>
<tr>
<td></td>
<td>• A mother’s experience in hospital has no bearing in this category as feeding starts from discharge.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4. Any breastfeeding</th>
<th>To be in this group, mothers must meet the following criteria:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• A mother must answer ‘breast milk’ or ‘breast milk and formula’ to Q1.</td>
</tr>
<tr>
<td></td>
<td>• A mother is allowed to feed water, formula and solids and other fluids. As long as she is feeding some breast milk, she is included in this category.</td>
</tr>
</tbody>
</table>

Adapted from Research and Education Division of Kingston, Frontenac and Lennox & Addington Public Health. Feeding practices of infants in the Kingston, Frontenac and Lennox & Addington area for the first year of life. 2011
Appendix H

Responses Used to Determine the Timing of Formula Introduction

<table>
<thead>
<tr>
<th>Q: When did you start giving your baby formula?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Month Survey</td>
</tr>
<tr>
<td>• Within two days of birth</td>
</tr>
<tr>
<td>• Two days up to one week of birth</td>
</tr>
<tr>
<td>• One week up to two weeks</td>
</tr>
<tr>
<td>• Two weeks up to four weeks</td>
</tr>
<tr>
<td>• Four weeks up to six weeks</td>
</tr>
<tr>
<td>• After six weeks</td>
</tr>
<tr>
<td>• Don’t know</td>
</tr>
<tr>
<td>• Refused</td>
</tr>
<tr>
<td>4-Month Survey</td>
</tr>
<tr>
<td>• 2 months and up to 3 months of age</td>
</tr>
<tr>
<td>• 3 months and up to 4 months of age</td>
</tr>
<tr>
<td>6-Month Survey</td>
</tr>
<tr>
<td>• 4 months and up to 5 months of age</td>
</tr>
<tr>
<td>• 5 months and up to 6 months of age</td>
</tr>
<tr>
<td>12-Month Survey</td>
</tr>
<tr>
<td>• 6 months and up to 8 months of age</td>
</tr>
<tr>
<td>• 8 months and up to 10 months of age</td>
</tr>
<tr>
<td>• 10 months and up to 12 months of age</td>
</tr>
<tr>
<td>• Don’t know</td>
</tr>
<tr>
<td>• Refused</td>
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**Appendix I**

Comparison of the study sample to the unsampled Kingston, Frontenac and Lennox & Addington population of new mothers with regard to demographic characteristics and factors potentially associated with breastfeeding duration

<table>
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<tr>
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<th>Study Sample</th>
<th>Unsampled KFL&amp;A Population</th>
<th>P-Value</th>
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<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
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<tr>
<td><strong>Age</strong></td>
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<tr>
<td>&lt;20</td>
<td>16</td>
<td>3.5</td>
<td>37</td>
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<td>20-24</td>
<td>62</td>
<td>13.7</td>
<td>109</td>
</tr>
<tr>
<td>25-29</td>
<td>137</td>
<td>30.2</td>
<td>189</td>
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<td>30-34</td>
<td>162</td>
<td>35.7</td>
<td>192</td>
</tr>
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<td>35-39</td>
<td>67</td>
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<td>63</td>
</tr>
<tr>
<td>40+</td>
<td>10</td>
<td>2.2</td>
<td>13</td>
</tr>
<tr>
<td><strong>Smoking during pregnancy</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>55</td>
<td>12.2</td>
<td>153</td>
</tr>
<tr>
<td>No</td>
<td>397</td>
<td>87.8</td>
<td>427</td>
</tr>
<tr>
<td><strong>Parity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>214</td>
<td>47.9</td>
<td>250</td>
</tr>
<tr>
<td>Two</td>
<td>164</td>
<td>36.7</td>
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<td>Three or more</td>
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<td><strong>Multiple Gestation</strong></td>
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<td>1.8</td>
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<tr>
<td>No</td>
<td>447</td>
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<td>594</td>
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<tr>
<td><strong>Type of Delivery</strong></td>
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<td>Caesarean</td>
<td>126</td>
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<td>124</td>
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<td>Vaginal</td>
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<td>71.8</td>
<td>486</td>
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<td><strong>Intention to Breastfeed at Home</strong></td>
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<td>Yes</td>
<td>402</td>
<td>89.7</td>
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<td>No</td>
<td>46</td>
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<td>79</td>
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<td><strong>Formula Feed In Hospital</strong></td>
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<td>Yes</td>
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<tr>
<td>No</td>
<td>354</td>
<td>76.5</td>
<td>259</td>
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KFL&A = Kingston, Frontenac and Lennox & Addington

* P-value < .05
## Appendix J
Description of Education and Income in the Study Sample

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<th>n</th>
<th>%</th>
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<tr>
<td>High school certificate</td>
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<td>12.6</td>
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<td>Some education after high school</td>
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<td>9.0</td>
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<td>College/university diploma or degree</td>
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<td>Don’t know</td>
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<td>0.2</td>
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<table>
<thead>
<tr>
<th>Household Income</th>
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<th>%</th>
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</thead>
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<td>Less than $20,000</td>
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<td>8.5</td>
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<td>$20,000 to $39,999</td>
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<td>$40,000 to $59,999</td>
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<td>11.9</td>
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<td>$60,000 to $79,999</td>
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<td>17.9</td>
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<td>$80,000 to $99,999</td>
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<td>$100,000 and greater</td>
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<td>23.5</td>
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<td>Don’t know</td>
<td>47</td>
<td>10.5</td>
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</table>
### Appendix K

**Assessment of Multicollinearity**

| Term                  | DF | Parameter Estimate | Standard Error | t-Value | Pr > |t| | Variance Inflation Factor |
|-----------------------|----|--------------------|----------------|---------|------|------|---------------------------|
| Intercept             | 1  | 0.04               | 0.26           | 0.16    | 0.87 | 0    |                           |
| BSES-SF Score         | 1  | 0.01               | 0.00           | 2.54    | 0.01 | 1.35 |                           |
| Age                   |    |                    |                |         |      |      |                           |
| < 25                  | 1  | -0.05              | 0.11           | -0.40   | 0.69 | 2.04 |                           |
| 25-29                 | 1  | 0.05               | 0.07           | 0.71    | 0.48 | 1.47 |                           |
| 30-34                 | -a |                    |                |         |      |      |                           |
| 35 +                  | 1  | 0.02               | 0.08           | 0.21    | 0.84 | 1.32 |                           |
| Education             |    |                    |                |         |      |      |                           |
| High School or Less   | 1  | 0.00               | 0.09           | 0.04    | 0.97 | 1.62 |                           |
| Post-Secondary        | -a |                    |                |         |      |      |                           |
| Household Income      |    |                    |                |         |      |      |                           |
| Less than $40,000     | 1  | 0.07               | 0.09           | 0.81    | 0.42 | 1.52 |                           |
| $40,000 to $79,999    | -a |                    |                |         |      |      |                           |
| $80,000 and greater   | 1  | 0.06               | 0.06           | 0.91    | 0.37 | 1.36 |                           |
| Smoking Status        |    |                    |                |         |      |      |                           |
| Current Smoker        | 1  | -0.11              | 0.11           | -1.08   | 0.28 | 1.37 |                           |
| Former Smoker         | 1  | -0.16              | 0.10           | -1.63   | 0.10 | 1.15 |                           |
| Non-Smoker            | -a |                    |                |         |      |      |                           |
| Type of Delivery      |    |                    |                |         |      |      |                           |
| Caesarean             | 1  | -0.05              | 0.06           | -0.85   | 0.39 | 1.09 |                           |
| Vaginal               | -a |                    |                |         |      |      |                           |
| Parity                |    |                    |                |         |      |      |                           |
| One                   | 1  | -0.01              | 0.17           | -0.04   | 0.97 | 9.82 |                           |
| Two                   | 1  | -0.00              | 0.09           | -0.03   | 0.97 | 2.57 |                           |
| Three or more         | -a |                    |                |         |      |      |                           |
| Previous Breastfeeding|    |                    |                |         |      |      |                           |
| Yes                   | -a |                    |                |         |      |      |                           |
| No                    | 1  | -0.12              | 0.15           | -0.80   | 0.43 | 7.74 |                           |
| Partner Support       |    |                    |                |         |      |      |                           |
| Yes                   | -a |                    |                |         |      |      |                           |
| No                    | 1  | -0.02              | 0.12           | -0.15   | 0.88 | 1.21 |                           |

*Continued*
## Appendix K

### Assessment of Multicollinearity Cont’d

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<th>DF</th>
<th>Parameter Estimate</th>
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<th>t-Value</th>
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<th>Variance Inflation Factor</th>
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<tr>
<td>Prenatal Breastfeeding Education</td>
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<td>0.06</td>
<td>-1.61</td>
<td>0.11</td>
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<td></td>
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<td>Breastfeeding (In Hospital)</td>
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<td>Yes</td>
<td>1</td>
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<td>0.06</td>
<td>0.32</td>
<td>0.75</td>
<td>1.28</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Formula Feed In-Hospital (Any)</td>
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<td></td>
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</tr>
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<td>0.07</td>
<td>-5.18</td>
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</tr>
</tbody>
</table>

*BSES-SF = Breastfeeding Self-Efficacy Scale (Short-Form)

* Reference group
### Appendix L

**Assessment of Interaction Terms**

Bivariate analysis of plausible first-order interactions and duration of ‘exclusive breastfeeding from birth’. Interaction terms included in the multivariate analyses for assessment (p-value <0.25) (Bursac et al., 2008)

<table>
<thead>
<tr>
<th>Interaction Term</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>Chi Square Value</th>
<th>P-Value</th>
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<td><strong>Age and BSES-SF Score</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>&lt; 25</td>
<td>0.04</td>
<td>0.06</td>
<td>0.61</td>
<td>0.43</td>
</tr>
<tr>
<td>25-29</td>
<td>0.05</td>
<td>0.04</td>
<td>2.12</td>
<td>0.15</td>
</tr>
<tr>
<td>30-34</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 +</td>
<td>0.02</td>
<td>0.04</td>
<td>0.31</td>
<td>0.58</td>
</tr>
<tr>
<td><strong>Household Income and BSES-SF Score</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $40,000</td>
<td>0.06</td>
<td>0.05</td>
<td>1.58</td>
<td>0.21</td>
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<td>$40,000 to $79,999</td>
<td>0.04</td>
<td>0.03</td>
<td>1.11</td>
<td>0.29</td>
</tr>
<tr>
<td>$80,000 and greater</td>
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</tr>
<tr>
<td><strong>Parity and BSES-SF Score</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>0.05</td>
<td>0.04</td>
<td>1.52</td>
<td>0.22</td>
</tr>
<tr>
<td>Two</td>
<td>0.02</td>
<td>0.04</td>
<td>0.22</td>
<td>0.64</td>
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<tr>
<td>Three or more</td>
<td>--</td>
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<td></td>
</tr>
<tr>
<td><strong>Previous Experience and BSES-SF Score</strong></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Yes</td>
<td>--</td>
<td></td>
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<tr>
<td>Yes</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>No</td>
<td>-0.06</td>
<td>0.03</td>
<td>3.45</td>
<td>0.06</td>
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<td>0.04</td>
<td>0.03</td>
<td>1.36</td>
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BSES-SF = Breastfeeding Self-Efficacy Scale (Short-Form)

* Reference group
Appendix L

Assessment of Interaction Terms Cont’d

Bivariate analysis of plausible first-order interactions and duration of ‘exclusive breastfeeding from birth’: Interaction terms excluded from multivariate analyses (p-value >0.25)

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>Chi Square Value</th>
<th>P-Value</th>
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<tbody>
<tr>
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<td>Partner Support and BSES-SF Score</td>
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BSES-SF = Breastfeeding Self-Efficacy Scale (Short-Form)

a Reference group

Bivariate analysis of plausible first-order interactions and duration of ‘any breastfeeding’: Interaction terms included into the multivariate analyses for assessment (p-value <0.25)

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>Chi Square Value</th>
<th>P-Value</th>
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</thead>
<tbody>
<tr>
<td>Household Income and BSES-SF Score</td>
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<td>0.06</td>
<td>0.75</td>
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<td>$40,000 to $79,999</td>
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<td>---</td>
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<tr>
<td>$80,000 and greater</td>
<td>-0.07</td>
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<td>2.80</td>
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<tr>
<td>Previous Experience and BSES-SF Score</td>
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<tr>
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<td>0.05</td>
<td>0.04</td>
<td>2.09</td>
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<tr>
<td>No</td>
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</tr>
<tr>
<td>Partner Support and BSES-SF Score</td>
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</tr>
<tr>
<td>Yes</td>
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</tr>
<tr>
<td>No</td>
<td>0.07</td>
<td>0.06</td>
<td>1.40</td>
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</table>

BSES-SF = Breastfeeding Self-Efficacy Scale (Short-Form)

a Reference group
### Appendix L

**Assessment of Interaction Terms Cont’d**

Bivariate analysis of plausible first-order interactions and duration of ‘*any breastfeeding*’:

Interaction terms excluded from multivariate analyses (p-value >0.25)

<table>
<thead>
<tr>
<th>Parameter Description</th>
<th>Parameter Estimate</th>
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<th>P-Value</th>
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<tbody>
<tr>
<td>Age and BSES-SF Score</td>
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</tr>
<tr>
<td>&lt; 25</td>
<td>0.04</td>
<td>0.05</td>
<td>0.58</td>
<td>0.45</td>
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<td>30-34</td>
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<td>Education and BSES-SF Score</td>
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<td>Parity and BSES-SF Score</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>0.06</td>
<td>0.05</td>
<td>1.14</td>
<td>0.29</td>
</tr>
<tr>
<td>Two</td>
<td>0.02</td>
<td>0.05</td>
<td>0.14</td>
<td>0.71</td>
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<tr>
<td>Three or more</td>
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<td>Prenatal Breastfeeding Education and BSES-SF Score</td>
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<td>Yes</td>
<td>-0.02</td>
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<td>0.67</td>
</tr>
<tr>
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<td>0.04</td>
<td>0.59</td>
<td>0.44</td>
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<td>Formula Feed In-Hospital (Any) and BSES-SF Score</td>
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<td>-0.02</td>
<td>0.05</td>
<td>0.19</td>
<td>0.67</td>
</tr>
<tr>
<td>No</td>
<td>-0.03</td>
<td>0.04</td>
<td>0.59</td>
<td>0.44</td>
</tr>
<tr>
<td>Difficulties or Concerns with Breastfeeding</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0.02</td>
<td>0.04</td>
<td>0.31</td>
<td>0.58</td>
</tr>
<tr>
<td>No</td>
<td>-0.03</td>
<td>0.04</td>
<td>0.59</td>
<td>0.44</td>
</tr>
</tbody>
</table>

BSES-SF = Breastfeeding Self-Efficacy Scale (Short-Form)

* Reference group
Appendix M

Power Calculations

Exclusive Breastfeeding from Birth (weighted sample)

To calculate power, the following formula was used: (Rosner, 2006)

\[
\text{Power} = \Phi \left( -z_{1-\alpha/2} + \frac{\Delta}{\sqrt{\sigma^2_{<6\text{ weeks}} / \eta_{<6\text{ weeks}} + \sigma^2_{\geq 6\text{ weeks}} / \eta_{\geq 6\text{ weeks}}}} \right)
\]

The following variables were used:

<table>
<thead>
<tr>
<th>$\alpha$</th>
<th>$\Delta$</th>
<th>$\sigma_{&lt;6\text{ weeks}}$</th>
<th>$\sigma_{\geq 6\text{ weeks}}$</th>
<th>$\eta_{&lt;6\text{ weeks}}$</th>
<th>$\eta_{\geq 6\text{ weeks}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>8.30*</td>
<td>12.35</td>
<td>9.85</td>
<td>213†</td>
<td>126†</td>
</tr>
</tbody>
</table>

Power = $\Phi \left[ -1.96 + 8.30 / \sqrt{152.52/213 + 97.02/126} \right]$

$= \Phi \left[ -1.96 + 6.80 \right]$

$= \Phi \left[ 4.84 \right]$

$= 1.00$

With the given variables, the study has 100% power to detect a difference of 8.3 points in mean self-efficacy score between mothers who breastfed <6 weeks and mothers who breastfed >=6 weeks under the “exclusive breastfeeding from birth” definition.

Any Breastfeeding (weighted sample)

To calculate power, the following formula was used: (Rosner, 2006)

\[
\text{Power} = \Phi \left( -z_{1-\alpha/2} + \frac{\Delta}{\sqrt{\sigma^2_{<6\text{ weeks}} / \eta_{<6\text{ weeks}} + \sigma^2_{\geq 6\text{ weeks}} / \eta_{\geq 6\text{ weeks}}}} \right)
\]

The following variables were used:

<table>
<thead>
<tr>
<th>$\alpha$</th>
<th>$\Delta$</th>
<th>$\sigma_{&lt;6\text{ weeks}}$</th>
<th>$\sigma_{\geq 6\text{ weeks}}$</th>
<th>$\eta_{&lt;6\text{ weeks}}$</th>
<th>$\eta_{\geq 6\text{ weeks}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>8.30*</td>
<td>12.35</td>
<td>9.85</td>
<td>80†</td>
<td>259†</td>
</tr>
</tbody>
</table>

Power = $\Phi \left[ -1.96 + 8.30 / \sqrt{152.52/80 + 97.02/259} \right]$

$= \Phi \left[ -1.96 + 5.49 \right]$

$= \Phi \left[ 3.53 \right]$

$= 0.9998$

With the given variables, the study has 99.98% power to detect a difference of 8.3 points in mean self-efficacy score between mothers who breastfed <=6 weeks and mothers who breastfed >6 weeks under the definition of breastfeeding to any degree.

*The average difference in self-efficacy scores measured in hospital between mothers who were breastfeeding compared to mothers who were bottle-feeding at 4 weeks (Dennis, 2007; Gregory, Dennis, Morrison, Penrose, & MacArthur, 2008) and 8 weeks postpartum (Wutke & Dennis, 2007) from previous studies of similar populations

†Combined sample from $\eta_{<6\text{ weeks}}$ and $\eta_{\geq 6\text{ weeks}} = 339$. Nine women did not provide their age and were excluded from weighted analyses.
Appendix N
Ethics Approval

QUEEN'S UNIVERSITY HEALTH SCIENCES & AFFILIATED TEACHING HOSPITALS RESEARCH ETHICS BOARD

March 21, 2011

This Ethics Application was subject to:
☐ Full Board Review
☐ Expedited Review

Ms. Karen Poon
Department of Community Health and Epidemiology
Caruthers Hall, 2nd Floor
Queen's University

Dear Ms. Poon,

Study Title: Does breastfeeding self-efficacy, as measured by the Breastfeeding Self-Efficacy Scale (Short-Form), predict breastfeeding duration?
Co-Investigators: Dr. Kathleen Steel O'Connor and Dr. Heather Stuart

I am writing to acknowledge receipt of your recent ethics submission. We have examined the protocol for your project (as stated above) and consider it to be ethically acceptable. This approval is valid for one year from the date of the Chair's signature below. This approval will be reported to the Research Ethics Board. Please attend carefully to the following list of ethics requirements you must fulfill over the course of your study.

➢ Reporting of Amendments: If there are any changes to your study (e.g. consent, protocol, study procedures, etc.), you must submit an amendment to the Research Ethics Board for approval. (See http://www.queensu.ca/vpr/reb.htm).

➢ Reporting of Serious Adverse Events: Any unexpected serious adverse event occurring locally must be reported within 2 working days or earlier if required by the study sponsor. All other serious adverse events must be reported within 15 days after becoming aware of the information.

➢ Reporting of Complaints: Any complaints made by participants or persons acting on behalf of participants must be reported to the Research Ethics Board within 7 days of becoming aware of the complaint. Note: All documents supplied to participants must have the contact information for the Research Ethics Board.

➢ Annual Renewal: Prior to the expiration of your approval (which is one year from the date of the Chair's signature below), you will be reminded to submit your renewal form along with any new changes or amendments you wish to make to your study. If there have been no major changes to your protocol, your approval may be renewed for another year.

Yours sincerely,

Chair, Research Ethics Board

Original to Investigator - Copy to Department Head - Copy to Hospital - Binder Copy - File Copy

Study Code: EPID-343-11

➢ Investigators please note that if your trial is registered by the sponsor, you must take responsibility to ensure that the registration information is accurate and complete
## Appendix O

**Comparison of mothers with missing scores from the Breastfeeding Self-Efficacy Scale (Short-Form) and mothers with valid scores: weighted analysis**

<table>
<thead>
<tr>
<th></th>
<th>Mothers with missing scores</th>
<th>Mothers with valid scores</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (n=23, n=315)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;24</td>
<td>30.4</td>
<td>15.2</td>
<td>0.16</td>
</tr>
<tr>
<td>25-29</td>
<td>26.1</td>
<td>31.4</td>
<td></td>
</tr>
<tr>
<td>30+*</td>
<td>43.5</td>
<td>53.3</td>
<td></td>
</tr>
<tr>
<td><strong>Education (n=23, n=314)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School or Less</td>
<td>30.4</td>
<td>19.4</td>
<td>0.28</td>
</tr>
<tr>
<td>Post-Secondary Education</td>
<td>69.6</td>
<td>80.6</td>
<td></td>
</tr>
<tr>
<td><strong>Income (n=21, n=285)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;40,000</td>
<td>47.6</td>
<td>21.4</td>
<td>0.02</td>
</tr>
<tr>
<td>40-80</td>
<td>28.6</td>
<td>32.6</td>
<td></td>
</tr>
<tr>
<td>80+</td>
<td>23.8</td>
<td>46.0</td>
<td></td>
</tr>
</tbody>
</table>

*Adjacent cells collapsed due to small cell count*