EXCLUSIVE BREASTFEEDING RATES OF WOMEN AT DISCHARGE, THREE AND SIX MONTHS POSTPARTUM PRIOR TO BFHI IMPLEMENTATION AT A TERTIARY FACILITY: A PROSPECTIVE COHORT STUDY.

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CERTIFICATE OF AUTHORSHIP/ORIGINALITY

I certify that the work in this thesis has not previously been submitted for a degree, nor has it been submitted as part of the requirements for a degree, except as fully acknowledged within the test.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of candidate

GOD BE WITH THE MOTHER

God be with the mother.

As she carried her child, may she carry her soul.

As her child was born, may she give birth and life and form to her own higher truth.

As she nourished and protected her child, may she nourish and protect her inner life and her independence.

For her soul shall be her most painful birth

and her most difficult child,

and the dearest sister to her children.

Michael Leunig

Dedicated to my children, Samantha, Connor and Harper, who have taught me all I have learned about myself so far. These beautiful children have brought me to my life and to what it is to love and cherish another, and in so doing learn to love oneself.

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ABBREVIATIONS AND GLOSSARY

Abbreviations

ABA	Australian Breastfeeding Association
ABS	Australian Bureau of Statistics
ACM	Australian College of Midwives
ACU	Australian Catholic University
AHMC	Australian Health Ministers' Conference
AIFS	Australian Institute of Family Studies
AIHW	Australian Institute of Health and Welfare
ATSI	Aboriginal and Torres Strait Islander
BBB	Triple B study—breastfeeding, babies and BFHI
BFHI	Baby Friendly Health Initiative
CHAMP	**C**ontinuity of care by **H**ealth professionals **A**ttending alcohol and drug problems and **M**eeting mother's needs for **P**ositive family outcomes.
CPAP	Continuous positive airway pressure
GP	General practitioner
HREC	Human Research Ethics Committee
IBCLC	International Board Certified Lactation Consultant
LTFU	Lost to follow-up
NCCU	Neonatal Critical Care Unit
NHMRC	National Health and Medical Research Council
NMAA	Nursing Mothers Association of Australia
OAC	Open Access Clinic
ORS	Oral rehydration salts
PD	Patient details
PROBIT	Promotion of Breastfeeding Intervention Trial
RA	Research assistant
RCT	Randomised Controlled Trial
SEIFA	Socio-economic Indexes for Areas
SPSS	Statistical Package for the Social Sciences
UNICEF	United Nations Children's Emergency Fund

VDHS	Victorian Department of Human Services
WCRF	World Cancer Research Fund
WHO	World Health Organisation

Glossary

Antenatal period	Duration of pregnancy, from conception to birth.
Any (partial) breastfeeding	The infant is receiving some breastfeeds but has also been given other food, or food based fluids, such as artificial baby milk or weaning foods.
Apgar	Apgar score is a method of assessing whether a baby requires any resuscitation at birth. The baby is given a score between zero and two, in five different categories: activity, heart rate, reflex, muscle tone and breathing. A score, out of a possible ten, is given at one and five minutes after birth. A score between seven and 10 is usually regarded as normal.
Artificial feeding	Infant is fed only on artificial baby milk (formula).
Baby Friendly Health Initiative	WHO/UNICEF evidence-based initiative, launched in 1991, ensuring that accredited health care facilities apply *The Ten Steps to Successful Breastfeeding to protect, promote and support breastfeeding.*
Bottle feed	A baby being feed artificial baby milk (formula) using a bottle and teat.
Breastfeeding duration	Length of time a mother continues to breastfeed.
Breastfeeding initiation	Time that breastfeeding commenced.
Breastfeeding intention	Women's intention regarding feeding her baby; decision usually made during pregnancy.
Cohort	Group of people with a common purpose or interest.
Complementary feeding	The child receives both breast milk and solid (semi-solid or soft) foods.
Continuous positive airway pressure	A type of respiratory ventilation provided by a mask.
De-identified	Participant unable to be identified by paperwork, or any other means, related to the study.
Endogenous opiates	Endorphins produced by the body.
Epidural anaesthesia	Medication (local anaesthetic) introduced into the epidural space for the purposes of pain relief or anaesthesia in labour.

Ethnicity	Belonging to an ethnic group i.e. Australian, Aboriginal and Torres Strait Islander.
Exclusive breastfeeding	The infant has received only breast milk from the mother or from a wet nurse or expressed breast milk, and no other liquids or solids with the exception of drops or syrups consisting of medicines, vitamins and minerals.
Exclusion criteria	Specific criteria that determine whether a person is ineligible to be included in the study cohort.
Expressed milk	Human milk expressed from the mother's breasts.
Formula	Artificial baby milk.
Formula supplementation	Breastfed baby receiving artificial baby milk (formula).
Inclusion criteria	Specific criteria that determine whether a person is eligible to be included in the study cohort.
Innocenti declaration	In response to poor breastfeeding rates worldwide, UNICEF, with representatives from over 30 countries, developed The Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding. This declaration has international support and resulted in the development and implementation of BFHI, leading to a corresponding rise in world breastfeeding rates.
Insurance status	For the purposes of health care, the woman is either private (has private health insurance) or public (does not have private health insurance or choses to be admitted as un-insured).
International Board Certified Lactation Consultant	Specialist in breastfeeding with certificate (IBCLC).
Lactation consultant	International Board Certified Lactation Consultant—specialist in breastfeeding with certificate (IBCLC).
Long term breastfeeding duration	Breastfeeding into the second year of life
Lost to follow-up	Those from the study's cohort that withdrew their consent continue to participate in the study.
Mode of birth	Type of birth i.e. vaginal, caesarean, assisted.
Mother-infant dyad	Mother and infant as an entity where each has the potential to influence the other.
Multipara	A woman who has birthed more than one infant at a viable gestation.

Neonatal Critical Care Unit	The 79 cot intensive and special care nursery within the tertiary hospital where this study was conducted.
Nipple shield	A thin silicone nipple shaped cover placed over the nipple to assist with certain breastfeeding difficulties i.e. flat or inverted nipples.
Obstetric database	Database containing demographic, pregnancy, birthing and postpartum information relating to each mother and her baby. Known as Matrix.
Oxytocin	A hormone that facilitates birth and breastfeeding. May also be referred to as the 'love hormone'.
Pacifier	Used for an infant to suck on; also known as a dummy.
Parity	Number of times a women has birthed a live infant.
Partial (any) breastfeeding	The infant is receiving some breastfeeds but has also been given other food, or food based fluids, such as artificial baby milk or weaning foods.
Postpartum (postnatal)	After birth.
Postpartum (postnatal) period	Period after birth; usually six weeks.
Preadmission booking interview	First interview with a midwife for both public and private women to collect demographic, general health, family, medical, surgical and obstetric history and pregnancy information. This information is entered into the obstetric database and is also used to determine a plan of care for each woman.
Predominant breastfeeding	The infants predominant source of nourishment has been breast milk, including EBM or from a wet nurse. However, the infant may also have received other liquids such as water, water-based drinks, fruit juice; oral rehydration salts (ORS), ritual fluids, and drops or syrups consisting of medicines, vitamins and minerals.
Primagravida	A woman who is pregnant for the first time.
Primipara	A woman who has birthed one infant at a viable gestation.
Prolactin	A hormone that stimulates the breasts to produce milk.
Qualitative responses	Words and observations rather than numbers (quantitative).
Skin to skin contact	Mother and baby with their bare skin in direct contact (usually chest to chest). Baby may have a nappy on.
Solid foods	Solid and semi-solid food; usually commenced at around six months of age.

Supplements	In addition to; i.e. breastfed infants may be supplemented with artificial baby milk (formula), tea, water.
Team leader	Midwife in charge of a shift on a postnatal ward.
Ten Steps to Successful Breastfeeding	*The ten steps to successful breastfeeding* (The Ten Steps) were established by WHO and UNICEF and provide a template for health care facilities to aid in improving breastfeeding rates by protecting, promoting and supporting breastfeeding.
Tertiary educated	Education achieved after high school i.e. undergraduate degree, diploma or other post graduate qualifications.
Tertiary hospital (facility)	Hospital or health care facility that provides complete and/or specialty services. The tertiary facility used for this study provides obstetric care, for both public and private women, and accepts retrievals of high risk women and babies from throughout Queensland and northern New South Wales.
Tongue tie	The tongue is anchored to the floor of the mouth by the shortened frenulum. There are degrees of severity for this condition. Tongue tie may impact on breastfeeding by interfering with effective attachment; therefore, potentially causing nipple damage and reduced milk supply. Usually requires snipping, after a full assessment.

ABSTRACT

Background: Exclusive breastfeeding for the first six months of life is recommended for both short and long term optimal infant and maternal health. There is currently a national focus on improving breastfeeding duration rates, with Australian rates for exclusive breastfeeding at six months postpartum 15.4%, below the national recommendation of 50%. The Baby Friendly Health Initiative (BFHI) promotes *The Ten Steps to Successful Breastfeeding* as a benchmark that assists maternity facilities to improve breastfeeding practices and thus breastfeeding rates. This project explored breastfeeding initiation and duration rates of women discharged from a tertiary hospital in Australia prior to achieving BFHI accreditation. It is planned to collect the same data post-BFHI accreditation, which will be the first time such a study has been conducted in the Australian setting.

Methods: A prospective cohort design was used to explore the initiation and duration of breastfeeding from a sample (n=475) of well women and their infants. The primary outcome was exclusive breastfeeding rates of women at discharge, three and six months postpartum, prior to the BFHI at a tertiary hospital. Women were interviewed using a 24-hour dietary recall survey. Data was collected at discharge from hospital and at three and six months postpartum to determine exclusive breastfeeding rates. Descriptive statistics were used to present exclusive breastfeeding rates; bivariate analysis and regression models were used to analyse relationships between these rates and variables that potentionally influenced the breastfeeding rates. Secondary outcomes included predominant breastfeeding rates and complementary feeding.

Results: Exclusive breastfeeding rates were 71.9% at discharge from hospital, 57.6% at three months postpartum and 4.6% at six months postpartum. Exclusive breastfeeding was negatively associated with Socio-Economic Indexes for Areas (SEIFA) Category One or

most disadvantaged (OR: 0.369, CI 0.148, 0.920, p=0.30). Women who supplemented with formula in hospital were more likely to have ceased breastfeeding at three months postpartum compared to those who did not supplement (OR: 0.388, CI 0.23, 0.65, p=0.001) and exclusive breastfeeding at three months was assoicated with continuation of beastfeeding at six months (OR: 25.9, CI 13.8, 48.6, p=0.001). Lack of support was assoicated with ceasing breastfeeding by three months postpartum (OR: 29.0, 12.9, 65.4, p=0.001) and women indicated that a lack of support was a key factor influencing their decision to cease breastfeeding.

Conclusion and recommendations: The results have implications for practice prior to BFHI accreditation. These include a need for greater support in the early postpartum period particurlarly for women from disadvantaged areas. Formula supplementation prior to discharge is an area that should be targeted to ensure women receive adequate information, about the risks of giving suppplementation to healthy, term breastfed infants, so they can provide informed consent. Further research post-BFHI accreditation is required.

CHAPTER ONE: INTRODUCTION

In Australia, exclusive breastfeeding rates are currently less than the recommended Australian targets. Despite approximately 90% of women initiating breastfeeding there is a sharp decline in exclusive breastfeeding shortly after birth, and long-term breastfeeding duration rates continue to be below Australian targets at three (60%) and six (50%) months postpartum. Furthermore, only around 28% of infants receive any breast milk at 12 months of age despite targets indicating that all infants should receive breast milk into the second year of life (Australian Institute of Family Studies, 2008; Australian Institute of Health and Welfare, 2011).

The World Health Organisation (WHO) recommends that infants are breastfed exclusively for six months. After six months, complementary foods are given as well as breastfeeding continuing into the second year of life (World Health Organisation, 2008). There is sound evidence to support WHO recommendations as breastfeeding significantly contributes to improved health outcomes for both women and babies. Breastfeeding duration is important as the health outcomes are dose related; meaning, the more breast milk or the longer a baby is breastfed the better the health outcomes (Kramer, 2010; Lawrence & Lawrence, 2011), with early cessation of breastfeeding associated with adverse health consequences for women and babies (Hoddinott, Tappin, & Wright, 2008). Moreover, exclusive breastfeeding, to six months, is associated with improved health outcomes such as decreased gastro-intestinal infection and hospital admissions in the first year of life and better long term outcomes when continued into the second year of life (Kramer & Kakuma, 2007).

However, the term ‘exclusive breastfeeding’ can mean different things to different people so it is important to clarify the use of breastfeeding definitions as they are referred to throughout this thesis. Additionally, it is also relevant to clarify other terminology associated with

breastfeeding that frequently appears in this thesis and contemporary literature. Therefore, Table 1 (below) outlines the WHO breastfeeding definitions that have been employed throughout this document.

Table 1: Breastfeeding definitions (World Health Organisation, 2008)

Breastfeeding definitions	
Exclusive breastfeeding	The infant has received only breast milk from the mother or from a wet nurse or expressed breast milk, and no other liquids or solids with the exception of drops or syrups consisting of medicines, vitamins and minerals.
Predominant breastfeeding	The infant's predominant source of nourishment has been breast milk, including EBM or from a wet nurse. However, the infant may also have received other liquids such as water, water-based drinks, fruit juice, ORS, ritual fluids and drops or syrups consisting of medicines, vitamins and minerals.
Partial (any) breastfeeding	The infant is receiving some breastfeeds but has also been given other food, or food based fluids, such as artificial baby milk or weaning foods.
Artificial feeding	Infant is fed only on artificial baby milk (formula).
Complementary feeding	The child receives both breast milk and solid (semi-solid or soft) foods.

Despite the positive intention of the majority of mothers to exclusively breastfeed their babies and the overwhelming evidence suggesting health benefits, many women do not continue to breastfeed long term. Early cessation of breastfeeding presents a dilemma for health professionals, breastfeeding advocates and public health advocates. As such, government initiatives that promote exclusive breastfeeding as a public health strategy have been introduced.

The reasons women cease breastfeeding are multi-faceted with current research suggesting early cessation is likely to be due to a combination of social, political, physical, emotional, cultural and demographic factors as well as the hospital practices and experiences surrounding the birth (Bosnjak, Grguric, Stanojevic, & Sonicki, 2009; Dowling, 2005; Dubois & Girard, 2003b; Flacking, Nyqvist, & Ewald, 2007; Forster, McLachlan, & Lumley, 2006b; Kruse, Denk, Feldman-Winter, & Mojta Rotondo, 2005; Meedya, Fahy, & Kable, 2010; Palmer, 1988). Interventions surrounding birth, such as caesarean birth, are known to negatively impact on breastfeeding duration (Hauck, Fenwick, Dhaliwal, & Butt, 2011) and with Australia's caesarean birth rate increasing from 19.3% in 1997 to 31.1% in 2008 (Li,

McNally, Hilder, & Sullivan, 2011) protecting breastfeeding in this environment of rising intervention has become a challenge. A woman's environment, social influences and resources, her partner, mother and extended family and whether she was breastfed herself are all likely to have an impact on her breastfeeding experience (Forster, McLachlan, & Lumley, 2006; Meedya, Fahy, & Kable, 2010). If the woman is disadvantaged in some way or from a vulnerable group, such as a single mother or younger mother, this may also have an impact on her decisions and experience surrounding breastfeeding (Dennis, 2002a; Jackson & Nazar, 2006).

Furthermore, the way mothers and motherhood are viewed in western society, the worth that is given to mothering, breastfeeding and breast milk and how women interpret and integrate this societal view for themselves all influence decision making and the breastfeeding experience for women today (Cooke, Schmied, & Sheehan, 2007; Kruse et al., 2005; Palmer, 1988). Successful breastfeeding is not often as simple as making a choice to breastfeed, and doing so without difficulty, because long term breastfeeding requires both motivation and support (Renfrew, M. J., McCormick, F. M., Wade, A., Quinn, B., & Dowswell, T, 2012). The breastfeeding difficulties experienced by many women mostly occur in western societies and rarely occur in non-colonised traditional societies and cultures (Stuart-Macadam & Dettwyler, 1995). The experience for women living in traditional society is that breastfeeding is a bodily function, much like giving birth (Stuart-Macadam & Dettwyler, 1995). Breastfeeding is something a woman's body does naturally and it has been argued that the idea or notion of choice is not something that is cognitively considered (Stuart-Macadam & Dettwyler, 1995). At times women may perceive that they receive conflicting advice from health professionals and that the experience of breastfeeding is influenced by this and their personal culture, environment and expectations so that breastfeeding is not only a physical and emotional undertaking, but also a socially driven experience (Cooke et al., 2007; Sheehan, Schmied, & Barclay, 2010). Thus, the question to be asked is how can

women be supported to breastfeed long term when then are societal complexities that may impede this process?

The setting in which a woman gives birth may have an impact on her breastfeeding outcomes, independently of socio-demographic factors (Kruse et al., 2005; Kuan, Britto, Schoettker, Atherton, & Kotagol, 1999). Maternity care providers have influence and capacity to impact the birthing, breastfeeding and mothering experience of women and for implementing interventions for women and babies to create change (Swanson & Power, 2005). Midwives and health professionals occupy a vital role in supporting breastfeeding and communicating positively about breastfeeding to mothers and families (Swanson et al, 2005). Furthermore, hospital policies employed by health professionals that protect and support breastfeeding have been shown to have a positive impact on breastfeeding outcomes (Rosenberg, Stull, Adler, Kasehagen, & Crivelli-Kovach, 2008). The Baby Friendly Health Initiative (BFHI) is a process that maternity facilitates may choose to employ and consists of *The Ten Steps to Successful Breastfeeding* (The Ten Steps). The Ten Steps are implemented, as an auditable standard, to help mothers initiate and continue to breastfeed (World Health Organisation, 1998). Further, The Ten Steps are considered a robust approach for maternity facilities to improve breastfeeding rates and international evidence has shown that introducing the BFHI improves exclusive breastfeeding duration (Kramer et al., 2000). The main premise of the BFHI is that it aims to implement policy, educate staff and limit the amount of interventions to the breastfeeding experience that the mother is exposed to. For example, the goal of Step Four is to maintain skin-to-skin contact between mothers and babies after birth until after the first breastfed. The implied understanding of this initiative is that separation of mother and baby is an intervention to be avoided.

The setting for this study is a maternity facility which is in the early stages of implementing the BFHI. Collecting data surrounding current breastfeeding rates of women who birth in the facility will provide baseline data to measure the success of implementing the BFHI. The

BFHI is a costly exercise that requires financial commitment and skilled staff to implement. Currently there is no published evidence to suggest that the BFHI improves long term breastfeeding rates in the Australian context. Furthermore, it is considered that where breastfeeding initiation rates are high, as they are in Australia, the BFHI may be of limited benefit (Fallon, Crepinsek, Hegney, & O Brien, 2005). Therefore, to answer the question of the benefit of the BHFI for improving breastfeeding duration rates in the Australian context, baseline data pre-BFHI is needed with which to contrast post-BFHI breastfeeding duration data.

Aim

The aim of this study is to determine the exclusive breastfeeding rates of women at discharge, three and six months postpartum from a tertiary birthing facility prior to BFHI accreditation. Therefore, this study sought to collect baseline breastfeeding duration data. Secondly, the study will collect and report on the complementary feeding that the babies are receiving up to six months postpartum. Additionally, data will be collected on women's responses to questions surrounding their decision to breastfeed, breastfeeding support, and the reasons for ceasing breastfeeding.

The study employed a prospective cohort methodology and used a validated 24-hour dietary recall survey that has been recommended for use when studying infant feeding practices in Australia (Webb, Marks, Lund-Adams, Rutishauser, & Abraham, 2001) and the WHO (World Health Organisation, 2008). The cohort included women who birthed at the facility and who were recruited from the postnatal ward. Data collection occurred at discharge from hospital by face to face interview and at three and six months postpartum by telephone interview. The primary outcome determined exclusive breastfeeding rates at discharge from hospital and at three and six months postpartum. Factors that influenced duration rates, such as

mode of birth, skin-to-skin contact, medical insurance status or support, were also explored and recorded.

Organisation of the thesis

Chapter Two presents a review of the literature including a brief account of the historical context of breastfeeding in Australia and the current breastfeeding rates. Further, the term exclusive breastfeeding will be explored, in addition to the health implications of breastfeeding for women and babies, and the evidence of predictors of breastfeeding outcomes. A review of the evidence for the BFHI, both internationally and the BFHI in the Australian context, is presented.

Chapter Three presents the methods employed for this study and describes key elements of the study design. The main aims and objectives of the study are defined and the setting outlined. The primary and secondary outcomes in addition to a summary of the inclusion and exclusion criteria, the recruitment process and the ethical considerations that were relevant. Chapter Three will also present the sample size and sampling plan and provide evidence and rationale for the data collection tool and methods. Additionally, this chapter affords a detailed explanation of the data analysis plan, inclusive of the specifics and rationale of the variables analysed, and discusses methods of consent, confidentiality, data entry and storage.

Chapter Four presents the results of the study and reports on the maternal demographics and participant flow. The cohort characteristics are outlined and compared to national data. Furthermore, the characteristics of those participants who were lost to follow-up (LTFU) and those who remained in the study are compared to the wider population of women attending the facility and national data. Statistical analysis techniques used to analyse the data are also detailed in this chapter as well as the rationale for their use. The primary and secondary

outcomes at discharge, three and six months are reported, as are the variables associated with the primary outcome. The women's responses regarding particular questions of support in the postpartum period are also described and discussed.

Chapter Five presents an overview and discussion of the significant findings of the study. The findings are explored in terms of how they relate to current research and recommendations are made in relation to further research, policy development and the possible implementation of education programs. This final chapter also outlines the limitations and bias of the study, summarises the findings and presents a conclusion.

CHAPTER TWO: LITERATURE REVIEW

Introduction

Chapter Two presents a review of the literature around the benefits of breastfeeding and includes a brief account of the historical context of breastfeeding in Australia and the current breastfeeding rates. Further, the term exclusive breastfeeding will be explored, in addition to examining the evidence of the health implications of breastfeeding for women and babies, and the evidence of predictors of breastfeeding outcomes. Finally a review of the evidence for the BFHI, both internationally and in the Australian context, is presented.

Breastfeeding through the ages

Exclusive breastfeeding for the first six months of life is recommended for optimal short and long term infant and maternal health (Horta, Bahl, Martines, & Victora, 2007; Lawrence & Pane, 2007; National Health and Medical Research Centre, 2003). Evidence is accumulating to support the view that breastfeeding is far superior to artificial baby milk in many ways (Allen & Hector, 2005; Goldman, 2007; Hasselbalch, Jeppesen, Engelmann, Michaelsen, & Nielsen, 1996b; Hoddinott et al., 2008; Horta et al., 2007; Kramer, 2010). In Australia, awareness of the health benefits of breastfeeding is gathering momentum with a recent report committing to improving the health and nutrition of infants and children, and the health and wellbeing of mothers by protecting, promoting and supporting breastfeeding as a public health strategy (Australian Health Ministers Conference, 2009). Although there is strong commitment to breastfeed, the reality of increasing breastfeeding duration rates is complex and challenging involving a myriad of social, cultural, economic and scientific factors (Cooke, Schmied, & Sheehan, 2007b; Dowling, 2005; Dubois & Girard, 2003b).

For centuries awareness has grown surrounding the relationship between the method of infant feeding and infant survival; with breast milk alternatives long associated with higher infant mortality rates (Castilho & Barros Filho, 2010; Dowling, 2005). Throughout history, and

before the advent of modern breast milk alternatives, women did not always breastfeed their infants. Evidence exists in the form of ancient art and tools for depicting the practice of artificial infant feeding (Castilho & Barros Filho, 2010; Dowling, 2005). However, throughout the 1700s and 1800s wet nursing was the most favoured alternative to breastfeeding but by the late 1800s and early 1900s dominant attitudes about mothering began to change. For instance, mothers taking responsibly for their own infants became the prevailing view and the incidence of wet nursing began to decline (Dowling, 2005).

Despite societal influences encouraging mothers to care for their own infants, complex dynamics surrounding class structure and culture emerged. For example, even though women were attending more to their infants, wet nursing and indeed breastfeeding were considered practices of the lower class (Dowling, 2005). At the same time women from the upper class who could afford to seek medical advice were influenced by the medicalisation of infant feeding (Castilho & Barros Filho, 2010; Dowling, 2005). The emergence of a more scientific model of feeding infants further devalued mother's milk and promoted alternatives to breast milk based on modern science (Dowling, 2005). This model of infant feeding and mothering dominated the mid-1900s to the extent that artificial feeding became more popular, and more common, than breastfeeding. Alongside this trend was the emergence of breastfeeding advocacy groups. Breastfeeding advocacy gathered strength in the 1970s, leading to a growing body of research about the benefits of mother's milk for infants and an understanding of the importance of breastfeeding for the overall health of society (Allen & Hector, 2005; Dowling, 2005; Hoddinott et al., 2008).

Australia mirrored international trends of declining breastfeeding rates and by the 1970s breastfeeding rates in Australia had reached a record low with approximately 31% of women breastfeeding at discharge from hospital (Mortensen, 2008). Given the increasing body of research and understanding of the benefits of breastfeeding, government and professional organisations began to focus on improving breastfeeding rates (Lund-Adams & Heywood, 1995). Subsequently, breastfeeding women also became very active in helping to promote

breastfeeding—the Nursing Mothers Association of Australia (NMAA) was founded and has occupied a significant role in the promotion and support of breastfeeding in Australia ever since (Lund-Adams & Heywood, 1995). The association's name has now changed to the Australian Breastfeeding Association (ABA).

The benefits of breastfeeding

Breastfeeding has been identified as optimal nutrition for the newborn and the health benefits of breastfeeding for infants and mothers are undisputed (Horta et al., 2007; Kramer et al., 2000; Leung & Reginald, 2005). Breastfeeding is measured in a number of ways, such as exclusive breastfeeding, which has become known as the optimum in terms of breastfeeding recommendations (Kramer & Kakuma, 2007; WHO/UNICEF, 1989; World Health Organisation, 1998). As mentioned in Chapter One, the definition of exclusive breastfeeding is that the infant receives only breast milk and no other food or drink, even water, but includes vitamins, minerals and medications (World Health Organisation, 2008). Exclusive breastfeeding, up to six months of life when complementary foods begin to be introduced, with breastfeeding continuing into the second year, is currently recommended (World Health Organisation, 2008). This recommendation is based on evidence that exclusively breastfed babies have reduced infant morbidity and mortality, decreased rates of gastrointestinal infection, protection against hospitalisation in the first year of life, protection against respiratory tract infection pneumonia, and recurrent otitis media (Chantry, Howard, & Auinger, 2006; Kramer et al., 2000; Kramer & Kakuma, 2007; Quigley, Kelly, & Sacker, 2007).

In Australia, it is recommended that 60.0% of babies continue to be exclusively breastfed at three months and 50.0% at six months and after the introduction of solid foods, at approximately six months, the infant should continue to be breastfed into the second year of life (Australian Health Ministers Conference, 2009; Nutbeam, 1993; Queensland Health,

2003). There have been a number of reports in the previous five years that define exclusive breastfeeding rates in Australia and Queensland. The 2010 Australian National Infant Feeding Survey by the Australian Institute of Health and Welfare (AIHW) provides the most recent and extensive national data on breastfeeding duration in Australia. The report found greater than a 90.0% breastfeeding initiation rate, with a sharp decline in exclusive breastfeeding post-birth. By one month, 61.4 % of infants were exclusively breastfed with only 48% at three months and 15.4% at six months (Australian Institute of Health and Welfare, 2011). A longitudinal study of Australian children by the Australian Institute of Family Studies (AIFS) conducted in 2007 also provided extensive national data on breastfeeding duration in Australia. For instance, the infant cohort in 2004 had a 92% breastfeeding initiation rate, with a sharp decline in full and any breastfeeding post-birth. By one month, 71% of infants were fully breastfed with only 56% fully breastfed at three months, 46% at four months and 14.0% at six months (Australian Institute of Family Studies, 2008).

A study in Brisbane (Queensland) details exclusive breastfeeding duration rates (Queensland Health: Paul, Johnston, Walker, Stanton, & Bibi, 2007). This prospective study collected infant nutrition data from a cohort (n=991) of mother and infant pairs at three Brisbane public maternity hospitals. Data was collected at two different intervals, at two months (2.99) and five months (5.99) of age and both rates were lower than the national data (see Figure 1). At two months of age 38.1% of infants were exclusively breastfed but this decreased to 9.5% at five months.

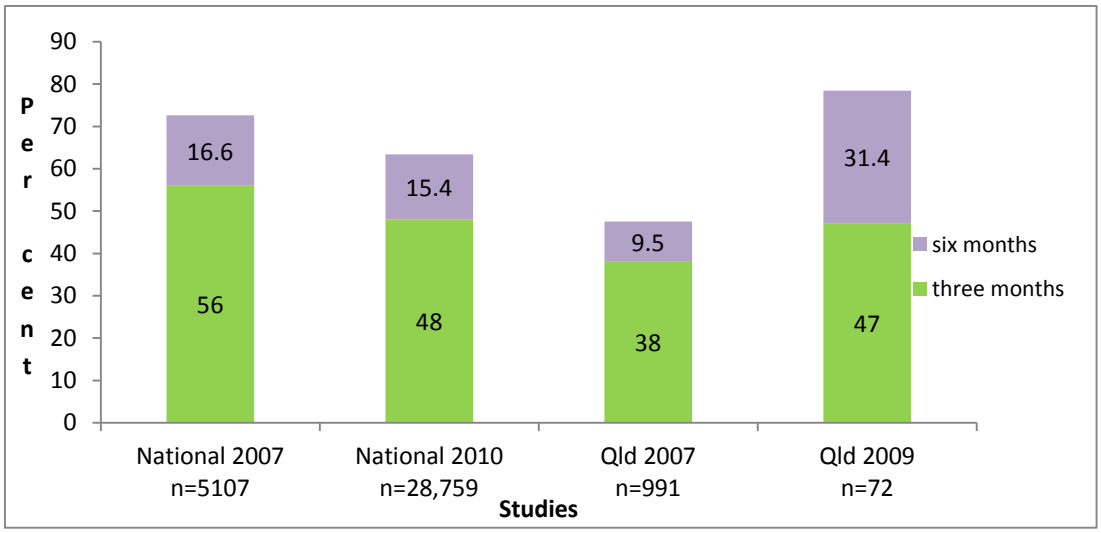

Figure 1: Exclusive breastfeeding duration rates reported in four Australian studies
Adapted from (Australian Institute of Family Studies, 2008; Australian Institute of Health and Welfare, 2011; Kearney, Fulbrook, & Howlet, 2009; Queensland Health: Paul et al, 2007.

Further, a prospective Queensland study followed a small cohort (n=72) of women and babies during the first 18 months of life. This cohort of women attended an Open Access Clinic (OAC) for child health services. Open Access Clinics provide a service where parents are able to have their baby weighed, attend developmental assessments and discuss their infant and family health needs with a care provider at a time that best suited the parents, for up to 18 months. Data collected for exclusive breastfeeding duration rates found at two months (2.99) 47.1% and at six months (5.99) 31.4% of infants were exclusively breastfed. These rates were higher than those reported for similar time frames in the infant nutrition project previously discussed; however, it is possible that the favourable data identified was related to the supportive continuity offered by the ongoing care of the OAC and the women who chose to attend (Kearney, Fulbrook, & Howlet, 2009). Clearly the current Australian data supports the notion that exclusive breastfeeding rates are falling below target levels and may be falling across Australia. The results of Kearney et al's study (Queensland data) and national data of breastfeeding duration rates at three and six months are combined and displayed in Figure 1 (see above).

A standardised approach to collecting infant feeding data is desirable to achieve congruency between studies and enable recommendations to be made based on a consistent understanding of the nation's breastfeeding rates. The monitoring and reporting of breastfeeding duration rates was discussed at length in the report :*Towards a national system for monitoring breastfeeding in Australia* (Webb et al., 2001). Due to the range of positive health outcomes related to exclusive breastfeeding to six months and not introducing solids until this time (Kramer et al., 2008) recommendations by WHO (2008), adopted in Australia, state that infants should be exclusively breastfeeding until six months of age and not receive solid foods until around six months of age. Thus, information about infant feeding practices at six months is crucial for further research surrounding health outcomes of infants (WHO, 2008). Further, recommendations from this report encourage a standard approach to the development of breastfeeding indicators and monitoring and for collection of data on infant feeding practices throughout the first twelve months of life (Webb et al., 2001). Standardised information based on WHO international guidelines will inform national policy and programs around recommendations for exclusive breastfeeding and also allow international comparisons to be made (Webb et al., 2001; WHO, 2008). Additionally, data collected in future studies that conform to these guidelines will increasingly add to the body of knowledge surrounding the benefits of breastfeeding for mothers and infants. The available research on the health benefits of breastfeeding for infants and mothers is considerable and there follows a review and discussion highlighting the importance of breastfeeding for the health outcomes of mothers and their infants.

Health benefits of breastfeeding for infants and mothers

There has been extensive and ongoing research in the field of breastfeeding with steadily increasing evidence that breastfeeding is an important preventative health measure for the infant and mother (Beilin & Bodian, 2005; Ip, 2007; Lawrence & Lawrence, 2011; Symonds & Ramsay, 2010). Breastfeeding has been described as having optimal nutritional benefits

from birth to the first six months, and beyond, for a variety of reasons (Kramer & Kakuma, 2007; Leung & Reginald, 2005). Benefits of breastfeeding for the infant and mother begin at birth and are both physiological and psychological. For example, physiological and psychological benefits are enhanced by skin-to-skin contact between mother and infant directly after birth as this stimulates oxytocin release in both the mother and infant (Moore & Anderson, 2007; Schore, 2005). Oxytocin is the hormone responsible for feelings of love, maternal mothering behaviours and for promoting instinctual breastfeeding responses in the newborn (Odent, 2006). Furthermore, being undisturbed during the first hours following birth allows mothers and infants to take advantage of hormonal responses during this heightened time of awareness, with beneficial effect on the initiation and continuation of breastfeeding (Crenshaw, 2007). The initiation of breastfeeding is said to begin the bonding process with oxytocin and prolactin, the hormones of breastfeeding, working in concert to promote maternal attachment behaviours and vigilant, or protective, instincts (Odent, 2006). Thus, breastfeeding has been described as the basis and formation for secure and ongoing attachment between the mother-infant dyad (AIHW, 2009; Buckley, 2002; Crenshaw, 2007; Hoddinott et al., 2008; Moore, 2005; Odent, 2006).

Since 1969, literature has reported that secure mother-infant attachment forms a basis for long term psychological health and the ongoing ability to form secure adult attachments (Bowlby, 1969). Birth involves a complex amalgamation of hormonal activity that, given the right circumstance, provides the ideal physiological conditions for mother-infant attachment (Odent, 2006). Nature provides the perfect circumstances by ensuring a release of hormones that mediate and enhance attachment behaviours in the mother and infant immediately following birth and for a period of time afterwards (Odent, 2006). Women experience a peak oxytocin surge immediately following a normal un-medicated vaginal birth (Odent, 2006). This surge is the highest peak of oxytocin a woman will reach in her lifetime and along with a surge of endogenous opiates and prolactin she is physiologically primed to ‘fall in love’ and attach to her baby. Oxytocin is referred to as the hormone of love and

endogenous opiates induce attachment and addictive behaviours; furthermore, prolactin is also released which induces instinctual mothering behaviours such as vigilance and nurturing (Crenshaw, 2007). At the same time the baby is born with high levels of the same hormones; in particular, oxytocin and endogenous opiates which also induce the infant to instinctively nuzzle for the breast and self-attach (Odent, 2006).

This process, and indeed the release of these hormones, is reliant to a large degree on normal physiological birth which allows the release of endogenous hormones during skin-to-skin contact directly after birth. Therefore, not washing either the mother or infant immediately after birth is vital as smell encourages attachment and instinctual breastfeeding behaviours (Doucet, Soussignan, Sagot, & Schaal, 2007; Varendi & Porter, 2001). Continued skin-to-skin contact in the hours following birth encourages the attachment process by promoting the ongoing release of birth and breastfeeding hormones and concomitant attachment behaviours in both the mother and infant. The first hours following birth have been described as a critical period for bonding and attachment with the ideal circumstances of this time never repeated (Odent, 2006). Not separating mother and baby and allowing the intimate process of attachment to occur has been shown to positively influence breastfeeding and encourage secure attachment to develop and thrive; thus, promoting long term psychological health (Crenshaw, 2007).

The range of physical health benefits of breastfeeding for infants has also been extensively documented (Harder, Bergmann, Kallischnigg, & Plagemann, 2005; Kramer et al., 2007). Breastfeeding is described as optimal nutrition providing all the necessary nutrients, growth factors and immunological factors the infant needs (Leung & Reginald, 2005). For instance, breastfed infants are less likely to suffer from gastrointestinal infections, respiratory infection, otitis media, allergy, eczema and asthma (Brew et al., 2012; Chantry et al., 2006; Kramer et al., 2000; Leung & Reginald, 2005; Saarinen & Kajosaari, 1995; Smyth, 2012). There is also strong evidence that the lack of breastfeeding is linked to childhood obesity and obesity later

in life (Baxtor, 2008; Harder et al., 2005). Furthermore, breastfeeding is associated with improved cognitive development, particularly in preterm infants (Quigley et al., 2009), and breastfed infants are less likely to have chronic diseases such as auto-immune diseases and high blood pressure later in life (Lawlor et al., 2004; Martin, Gunnell, & Davey Smith, 2005; Quigley et al., 2009). Finally, breastfed infants have a decreased risk of developing type two diabetes (Owen, Martin, Whincup, Smith, & Cook, 2006).

The health benefits associated with breastfeeding for mothers include faster recovery from childbirth with decreased postpartum bleeding (AIHW, 2009; Leung & Reginald, 2005; National Health and Medical Research Centre, 2003; World Cancer Research Fund/American Institute for Cancer Research, 2009). Additionally, there is evidence to suggest breastfeeding protects women from developing type two diabetes later in life (Stuebe, Rich-Edwards, Willett, Manson, & Michels, 2005). Women who breastfeed have a reduced risk of ovarian cancer and women who have breastfed for up to 12 months have a 28% reduction in risk of breast cancer (Hoddinott et al., 2008). The strength of recent research that breastfeeding confers protection against ovarian and breast cancer has led the World Cancer Research Fund (World Cancer Research Fund/American Institute for Cancer Research, 2009) to recommended breastfeeding for mothers and infants as a cancer prevention strategy (AIHW, 2009; Leung & Reginald, 2005; National Health and Medical Research Centre, 2003; World Cancer Research Fund/American Institute for Cancer Research, 2009). This advice is highly significant as many health campaigns around the prevention of cancer, in particular breast cancer, have stopped short of mentioning the link between breastfeeding and decreased cancer risk for women. Of note, this recommendation is evidence that awareness is growing about the benefits of breastfeeding and the quality of breastfeeding research.

With the myriad of health benefits for mothers and infants concomitant with breastfeeding it is an obvious and essential health promotion initiative for Government policy makers to aim

to increase breastfeeding initiation and duration rates in Australia. Duration is particularly important in the Australian context as initiation rates are high and drop sharply thereafter (Australian Institute of Health and Welfare, 2011). Furthermore, as previously stated, the benefits of breastfeeding are dose related meaning, the longer infants are fed breast milk the greater the health benefits are likely to be for infants (Hoddinott et al., 2008; Horta et al., 2007; WHO/UNICEF, 1989; World health Organisation, 2007). Similarly, the benefits of breastfeeding for mothers are dose related and a dose response relationship is seen for breastfeeding longer and maternal cancer risk, with the risk decreasing with every year the mother breastfeeds (Hoddinott et al., 2008). As shown in Figure 1 the current Australian statistics illustrate that breastfeeding duration rates are low, and fall short of the national and Queensland Health target of 50% of infants exclusively breastfeed at six months (Nutbeam, 1993; Queensland Health, 2003). Therefore, health providers are seeking to investigate strategies to improve breastfeeding duration rates in Australia (Australian Institute of Family Studies, 2008).

The reasons surrounding poor breastfeeding duration rates are likely to be varied. Breastfeeding is a complex mixture of social, emotional and physical abilities and a learned behaviour that requires motivation and support. Breastfeeding does not occur in a social vacuum, void of influences that may negatively impact on the duration or success of breastfeeding (Kruse et al., 2005; Palmer, 1988). The way in which women experience breastfeeding as part of their culture and how they integrate the wider culture of breastfeeding and public health discourse for themselves is said to have an impact on breastfeeding decision making and the experience of breastfeeding and early mothering (Burns, Schmied, Sheehan, & Fenwick, 2010). Breastfeeding initiation and duration is therefore influenced by many factors involving physical, physiological and socio-cultural influence as well as the breastfeeding behaviour of the baby and maternal motivation to breastfeed (Cooke et al., 2007a). Additionally, health professionals hold a position of authority and influence, and the way in which they give advice may have either a positive or

negative impact contributing to how a woman embodies her breastfeeding experience. For example, communication from health professionals and the impact of words and actions may influence the way in which a woman integrates and interprets her breastfeeding and mothering experience, with either positive or negative impact (Burns et al., 2010). The dilemma of mother-guilt and the way in which infant feeding discourse and advice influences a woman's breastfeeding experience today has been identified as a discursive construction giving rise to the complex and problematic nature of breastfeeding advocacy. Additionally, the way in which women interpret messages from health professionals may induce guilt and have a negative impact, not only on their first breastfeeding experience but with subsequent experiences also (Williams, Kurz, Summers, & Crabb, 2012).

Furthermore, lack of paid maternity leave up until recently in Australia, lack of support, conflicting advice, a familial history of not breastfeeding, low socio-economic and educational status, marketing from the formula industry and lack of recognition of women's work are all social factors that may contribute to why a women may not breastfeed (Australian Health Ministers Conference, 2009; Fairbank et al., 2000; Fallon et al., 2005; Hofvander, 2003; Palmer, 1988; Victorian Department of Human Services, 2005). As well as the social, political and cultural risks associated with not breastfeeding long-term that have been highlighted, hospital practices around the time of birth and the early postpartum period, such as the rising intervention rate, formula supplementation of the well breastfed baby and caesarean birth have been implicated as having a negative impact on breastfeeding duration rates (Biro, Sutherland, Yelland, Hardy, & Brown, 2011; Forster et al., 2006; Hauck, Fenwick, Dhaliwal, & Butt, 2011; Meedya et al., 2010; World Health Organisation, 1998). Recognising this, and the role maternity facilities occupy in supporting breastfeeding and in improving breastfeeding rates, in 1989 The World health Organisation (WHO) and United Nations International Children's Emergency Fund (UNICEF) released a joint statement outlining *The Ten Steps for Successful Breastfeeding* and the special role of maternity services in implementing The Ten steps. (see below in Figure 2)

The Ten Steps to Successful Breastfeeding

The Ten Steps have become widely known and accepted in Australia as a template to implement the BFHI in maternity facilities and as a way for maternity facilities to protect, promote and support breastfeeding within the hospital environment (Australian Breastfeeding Association, 2004; Australian Health Ministers Conference, 2009; National Health and Medical Research Centre, 2003; World Health Organisation, 1998)The relevance and acknowledgement of The Ten Steps also extends to the broader health sector and health authorities. For instance, in 1991 the attendees at the convention on the Rights of the Child produced the Innocenti Declaration to protect the rights of the innocent. The Innocenti Declaration also endorsed *The Ten Steps to Successful Breastfeeding* to help improve access for babies to breast milk, and in the same year WHO and UNICEF launched the BFHI, to implement The Ten Steps within maternity services worldwide (WHO/UNICEF, 1989). The BFHI has been given (in principal) support by the Australian government and the initiatives are included as recommendations in the National Breastfeeding Strategy 2010–15 (Australian Health Ministers Conference, 2009). Furthermore, today the BFHI is administered, in Australia, by the Australian College of Midwives (ACM) who are responsible for the BFHI accreditation of maternity facilities.

The World health Organisation's *The Ten Steps to Successful Breastfeeding* state that every facility providing maternity services and care for newborn infants should:
1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Place babies in skin-to-skin contact with their mothers, immediately following birth, for at least an hour and encourage mothers to recognise when their babies are ready to breastfeed; offering help if needed.
5. Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breast milk, unless medically indicated.
7. Practice rooming-in—that is, allow mothers and infants to remain together—24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or dummies to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

Figure 2: BFHI–*The Ten Steps to Successful Breastfeeding*

Today, the majority of women (99.1%) give birth in hospitals or birthing centres (Li et al., 2011b) and largely rely on maternity care in hospital to assist and support the initiation of breastfeeding. Therefore, the BFHI has been promoted in many maternity facilities as a means to improve breastfeeding policies and practices and thus, breastfeeding rates (Australian Health Ministers Conference, 2009; Baby Friendly Health Initiative Australia, 2009; Kramer et al., 2000). Despite promotion and government support for the BFHI and The Ten Steps (that underpin the BFHI) research confirming the BFHI is associated with improving breastfeeding rates in Australia is sparse or non-existent (Fallon et al., 2005; Pincombe, Baghurst, Antoniou, Peat, et al., 2008). Currently there are no pre and post-BFHI implementation studies in Australia to measure the benefit of BFHI or otherwise. As such, this research aims to report the exclusive breastfeeding rates at discharge, three and six months from a tertiary hospital pre-BFHI accreditation, to provide baseline data.

Overview of the Baby Friendly Health Initiative

The Baby Friendly Health Initiative (BFHI) is a strategy of the WHO and UNICEF to improve health through protecting, promoting, and supporting breastfeeding within the hospital environment (WHO/UNICEF, 1989). The Ten Steps (Figure 2) were developed to provide the ideal hospital environment for breastfeeding success. The overarching aim of the BFHI is to improve negative practices that may interfere with successful breastfeeding within hospitals, such as routine separation of mother and infant, night nurseries, formula supplementation, lack of staff education and lack of access to breastfeeding support for women (WHO, 1998). Practices that have been shown to improve breastfeeding rates are early skin to skin contact between mothers and babies, frequent and unrestricted breastfeeding and help with positioning and attachment (Renfrews et al., 2005). As exclusive breastfeeding, while in hospital, has been described as protective against early breastfeeding cessation in several studies it is particularly important that the BFHI endeavours to address unnecessary formula supplementation of the well newborn (Forster & McLachlan, 2007; Merten, Dratva, &

Ackermann-Liebrich, 2005; Tarrant et al., 2011). With this in mind the BFHI role also extends to limiting marketing strategies from formula companies that may undermine breastfeeding success. The WHO *International Code for the Marketing of Breast milk Substitutes*, endorsed by the BFHI, aims to limit the effect of marketing of formula such as visible promotional material, free gifts of formula and group education about formula for women in hospital (World Health Organisation, 1998). The BFHI is a policy and education process that is followed by an audit of the facility to measure against The Ten Steps (Baby Friendly Hospital Initiative Australia, 2009). Obtaining BFHI accreditation can be achieved by undergoing an assessment and achieving a pass for the standard criteria that will now be discussed (Baby Friendly Hospital Initiative Australia, 2009).

Baby Friendly Health Initiative assessment criteria

A maternity facility applying for BFHI accreditation is required to undergo an assessment process. In Australia, the BFHI is facilitated through the Australian College of Midwives (ACM) whereby assessors conduct an audit of the organisation (Baby Friendly Hospital Initiative, 2009). The assessment team includes one clinical lactation specialist and other members (at least two) selected for their experience working with breastfeeding mothers. Assessors should not have current, or previous, connections with facilities being assessed (Baby Friendly Health Initiative Australia, 2009). The accreditation process follows the use of the baby friendly hospital global assessment criteria which uses assessment and interview data to address specific questions around each of The Ten Steps. Well mothers and their infants are included in the audit as unwell babies or those born preterm may require more flexible practices in relation to feeding (Baby Friendly Hospital Initiative, 2009). The assessment team interviews a senior midwife and reviews the breastfeeding policy. Interviews are also conducted with ten staff including doctors, midwives and nurses. Additionally, 10 interviews are conducted with women who have had vaginal births, and five who have had caesarean births. The interview process outlined is undertaken in separate

antenatal and inpatient areas. Observations in maternity wards, well baby nursery and birthing areas also form part of the process. Assessors strive to ensure a random sample rather than a convenience sample in order to eliminate bias. Assessors may undertake evaluations during the night. Organisations must receive an 80.0% pass level on approximately 80.0% of the steps listed to achieve the pass standard for accreditation. For example, for Step Four the facility must be able to show that 80.0% of well breastfeeding mothers and their infants had skin to skin contact at birth. This data is obtained by reviewing the facility's documentation and through interviewing the mother. Assessments generally last two days and should culminate in recognition of accomplishments and suggestions for improvements, where necessary (Baby Friendly Health Initiative Australia, 2009) International literature indicates that a fully accredited BFHI facility has a range of benefits for mothers and babies that will now be discussed (Kramer et al., 2000)

Baby Friendly Health Initiative: An international perspective

From an international perspective, there has been extensive research on the effectiveness of the introduction of the BFHI and improved breastfeeding rates (Abrahams & Labbok, 2009; Hannula, Kaunonen, & Tarkka, 2008; Kramer et al., 2000). In particular, in countries where breastfeeding initiation is low, or lower, than Australia the introduction of the BFHI has resulted in positive effects surrounding both initiation and duration rates of exclusive breastfeeding and breastfeeding overall (Fallon et al., 2005; Forster & McLachlan, 2007; Kramer et al., 2000). As it is difficult to randomise a breastfeeding intervention, most studies are observational and involve retrospective or prospective data collection, or a mixture of several methods. Often data collection focuses on pre and post-BFHI interventions, or assesses hospitals with BFHI and contrasts them with hospitals without BFHI. A number of studies have reported improved breastfeeding outcomes for women who gave birth to their babies at BFHI accredited hospitals (Kramer et al., 2000; Abrahams & Labbok, 2009).

To date, the only randomised controlled trial (RCT) undertaken to investigate the BFHI as an intervention against standard care as the control is the Promotion of Breastfeeding Intervention Trial (PROBIT) conducted in Belarus, Europe in 1996–97. This study involved over 17, 000 women and infants, randomly assigned to 31 hospitals and polyclinics that had either fully implemented the BFHI (intervention); or standard care (control) in which the BFHI had not been implemented (Kramer et al., 2000). Compared to hospitals in which the BFHI was not implemented, infants in the intervention hospitals were more likely to be exclusively breastfeeding at three months (43.3% versus 6.4%) and at six months (7.9% versus 0.6%). Significantly higher rates of any breastfeeding at 12 months were seen in the intervention hospitals (19.7% versus 11.4%). The PROBIT also found the BFHI intervention was protective for episodes of gastrointestinal illness and atopic eczema for infants at twelve months of age, but found no positive effect for respiratory illness. The results of this well controlled study are encouraging as were the findings from a systematic review of international literature involving 14 countries that was able to report an upward trend in both exclusive breastfeeding and breastfeeding overall post-BFHI implementation (Abrahams & Labbok, 2009). Additionally, findings from a further systematic review comparing 17 studies on interventions in primary care to promote breastfeeding found that the BFHI was likely to have a positive effect, particularly when combined with support and peer support interventions of interventions (Chung et al., 2008). Other key findings from this review included the notion that peer support was more effective than structured education or professional support for increasing both short and long-term breastfeeding rates (Chung et al., 2008). Empirical evidence appears to suggest, from an international perspective at least, that introduction of the BFHI does improve breastfeeding rates and should be an intervention that is pursued by maternity facilities. Health outcomes are considerably improved with exclusive breastfeeding; thus, upwards trends in breastfeeding duration attributable to the BFHI are encouraging and likely to have a positive effect on infant health (Kramer et al., 2007; Quigley et al., 2007).

Improving hospital practices around the time of birth and immediate postpartum period is unlikely to be successful if not combined with support interventions (Hannula et al., 2008) and the review by Chung et al., (2008) found that the BFHI had a positive effect, particularly when combined with continual postpartum support. Similarly, a prospective study in Croatia collected breastfeeding data from women up to 12 months in a BFHI and non-BFHI hospital pre and post a support intervention. Findings were that the BFHI hospital was associated with an increased breastfeeding rate at one month (87% versus 68%), three months (54% versus 30%), six months (28% versus 11.5%) and at 11–12 months (3.5% versus 2%) (p=0.05); however, after postpartum breastfeeding support groups were introduced alongside the BFHI, the benefits improved again (with the exception of one month rates) with findings at three months (66% versus 30%), six months (49% versus 11.5%) and at 11–12 months (23% versus 2%) (*p*=0.05) (Bosnjak, Batinica, Hegedus-Jungvirth, Grgurić, & Bozikov, 2004). Evidence suggests that support in the postpartum period improves exclusive breastfeeding rates and outcomes of the BFHI and these studies highlight the importance of an integrated approach to the BFHI that includes support after discharge and in the early postpartum period (Britton, McCormick, Renfrew, Wade, & King, 2007).

A broad range of observational studies have also shown positive breastfeeding duration outcomes with the BFHI; in fact, it is difficult to find a published study that does not show benefit. For instance, a prospective design was used to compare the prevalence of exclusive breastfeeding at 30 and 90 days postpartum for women giving birth at a hospital in Brazil with a BFHI program and women giving birth at a nearby (control) hospital without BFHI. Giving birth at the BFHI program hospital was associated with exclusive breastfeeding. For instance, there was a median duration of 75 days compared to 22 days for the control hospital; a difference of 53 days (Lutter et al., 1997).

Employing a different methodology, a retrospective study gathered data from a random sample of 2861 mothers from 145 different hospitals in the United States of America (USA)

on breastfeeding and complementary feeding (Merten et al., 2005) and obtained similar findings for breastfeeding duration. The proportion of exclusively breastfed infants at five months of age was 42% versus 34% for BFHI hospitals compared to non-BFHI hospitals. Breastfeeding duration for infants born in BFHI hospitals was longer; 35 weeks versus 29 weeks for any breastfeeding, 20 weeks versus 17 weeks for full breastfeeding and 12 weeks versus six weeks for exclusive breastfeeding. (Lutter et al., 1997; Merten et al., 2005).

Another equally relevant study, undertaken in the USA, found similar results, gathering data nationally from twenty-nine hospitals that achieved BFHI accreditation (Merewood, Mehta, Chamberlain, Philipp, & Bauchner, 2005). The mean breastfeeding initiation rate for BFHI hospitals was compared with non-BFHI hospitals and was 83.8% versus 69.5% respectively. The mean rate of exclusive breastfeeding during hospital stay was 78.4% versus 46.3% (Merewood et al., 2005). This study revealed elevated rates of breastfeeding initiation and exclusivity with a positive effect, particularly for exclusive breastfeeding rates. Findings also indicated that elevated initiation and exclusivity rates persisted regardless of demographic factors that were traditionally linked with low breastfeeding rates (Merewood et al., 2005). Studies conducted in the USA have all demonstrated a benefit for both exclusive, and any, breastfeeding duration and are encouraging, particularly for the Australian context, as it has been suggested that where breastfeeding initiation rates are high the BFHI may be of minimal benefit (Fallon et al., 2005). However, in the USA, the breastfeeding initiation rates are similar to those in Australia and; therefore, the results may be more transferable to an Australian context. Of note, the population in Merewood et al's (2005) study had high initiation rates, similar to those in the Australian context, of between 70–80% and has been able to demonstrate improved initiation and, importantly, exclusive duration rates even though the rates were reasonably high before BHFI implementation.

Another relevant study was conducted in Taiwan in 2004 (Gau, 2004). This study was undertaken over three years and consisted of a quasi-experimental pre and post-test design

that involved 12 hospitals and a very large cohort (n=4614). The aim of the study was to assess the effect of the BFHI across many parts of Taiwan. The intervention hospitals (BFHI) included BFHI training programs and the control hospitals provided standard care. The results indicated that the exclusive and overall breastfeeding rates of the intervention group were higher than those of the control group ($p<0.001$) and the breastfeeding rate showed an increasing trend year by year ($p<0.001$) (Gau, 2004). Therefore, Gau's (2004) results are similar to the systematic reviews that also showed increasing trends year by year and to the USA results that showed increasing trends of exclusive breastfeeding over time.

Where the BFHI is studied in an international setting findings have been demonstrated not only for exclusive breastfeeding duration but also for breastfeeding overall, or any breastfeeding. For example, a Scottish observational study involving 464 246 participants found that women giving birth in a BFHI hospital were 28% more likely to be breastfeeding at seven days than if they gave birth in another hospital ($p=0.001$) (Broadfoot, Britten, Tappin, & MacKenzie, 2005). Moreover, a hospital in Turkey discovered that breastfeeding duration at four months was improved after BFHI accreditation was achieved (Camurdan et al., 2007). Finally, an interesting finding was revealed in a Russian study whereby it was established that women were less likely to abandon their infants after BFHI implementation. For example, the infant abandonment rate decreased from 50.3 per 10 000 births before BFHI to 27.8 per 10 000 births after BFHI (Lvoff, Lvoff, & Klaus, 2000). These results, from international research, lend credibility to the argument that bonding and attachment behaviours are enhanced by skin-to-skin contact and breastfeeding (Moore et al., 2007) as this study mentioned that before the BFHI implementation skin-to-skin contact was not encouraged and mothers and their infants slept in separate rooms. However, it is difficult to know if there were other interventions in place that may have contributed to this outcome at the time of this study. Thus, it is clear that where the BFHI is introduced internationally positive outcomes for women and their infants are demonstrated, although it remains likely, but unclear, if these findings can be transferred to the Australian context.

Australia and the Baby Friendly Health Initiative

The term adopted in Australia is the Baby Friendly Health Initiative (BFHI). In Australia, 19% or 76 of 394 maternity facilities have current BFHI accreditation with many more facilities working towards accreditation (Ford, 2012; Li et al., 2011b). Implementation of the BFHI within Australian hospitals was recommended by the Federal Government in the Australian National Breastfeeding Strategy (2009). Breastfeeding initiation rates in Australia are measured following birth and are reported to be 80.0–90.0% (Australian Institute of Health and Welfare, 2011). As previously outlined, there is a need for research to be conducted to explain whether the implementation of the BFHI increases breastfeeding duration rates in Australia (Australian Institute of Family Studies, 2008; Fallon et al., 2005). Current international literature suggests implementing the BFHI has had a positive effect on both initiation and duration rates (Abrahams & Labbok, 2009; Chung et al., 2008a; Kramer et al., 2000); however, studies in Australia have not focused on finding a positive association with breastfeeding duration and the BFHI (Fallon et al., 2005; Pincombe, Baghurst, Antoniou, Peat, et al., 2008). Equally significant is the fact that the BFHI is interpreted differently among health professionals in Australia. For instance, an Australian study found that a standardised approach to implementation is required or the benefits of the BFHI may be negligible (Schmied, Gribble, Sheehan, Taylor, & Dykes, 2011). Moreover, some have argued that the BFHI in the Australian environment may be a costly exercise of questionable benefit with resources better allocated to services such as postpartum support, paid maternity leave, education for general practitioners (GPs), milk banks and peer support programs (Fallon et al., 2005).

Of the two Australian studies undertaken in the area of BFHI in Australia, one focused on gathering basic data about BFHI practices and compliance to The Ten Steps within Australian maternity hospitals (Walsh, Pincombe, & Stamp, 2006) and the other examined the effect of BFHI practices on breastfeeding duration in a cohort of first-time mothers in

Adelaide (Pincombe, Baghurst, Antoniou, & et al., 2008). Walsh et al's. (2006) study involved posting a questionnaire to all Australian hospitals, listed as providing maternity care, designed to ascertain whether policies and protocols for each of The Ten Steps were in place. Whereby Pincombe et al's. (2008) study used a prospective design with a cohort of women (n=317) having their first baby in an Adelaide hospital and contacted women by phone at one week postpartum and asked them to answer questions regarding BFHI practice and complete the breastfeeding self-efficacy scale. Further, telephone interviews were conducted at six weeks, three months, and six months postpartum. This study sought to identify if the BFHI practices were related to breastfeeding duration in this cohort of women.

Further, Walsh et al's. (2006) study examined policy and practices surrounding BFHI and found that 90% of respondents had policies for eight of the ten steps. Highest rates of implementation were self-reported by the maternity managers for Steps Three and Four with 96% and 92% respectively. However, it was not clear how this was measured and the term 'implementation' was not defined. Step Three relates to antenatal education and Step Four to helping mothers breastfeed within half an hour of birth. Interestingly, Step Four relates mainly to ensuring mothers and babies have skin-to-skin contact for at least one hour after birth; but, in this study Step Four was not presented. As such, the question asked was if mother's breastfed within half an hour of birth and no mention was made of reporting skin-to-skin contact or keeping mothers and babies together until the first breastfeed. So, although the study reports high implementation rates for Step Four, it is difficult to determine what is meant by Step Four or if skin-to-skin contact was achieved.

Walsh et al. (2006) also reported that the lowest rates of implementation related to Steps One, Two, Seven and Ten. Step One reflects having a breastfeeding policy for the Ten Steps but it is difficult to know how compliance to any of the steps is achieved without a policy overarching the steps. If implementation rates for a policy on the BFHI are low then

compliance may also be low, as the BFHI is fundamentally driven by compliance to policy. It could be argued that without full compliance to Step One, a policy that supports all of The Ten Steps and is followed to develop the education plan, adherence to the remaining nine steps may be difficult and valid compliance for any of the steps negligible. Nonetheless, the researchers mention that BFHI was in its infancy at the time of the survey and, given this, it is encouraging that 90% of hospitals had an understanding of eight of The Ten Steps and efforts were being made to implement change.

Although Walsh et al. (2006) reported on policy and processes, Pincombe et al's. (2008) study is the only study in Australia that has reported the impact of BFHI practices on duration of breastfeeding in Australia. The study asked mothers questions related to their exposure to six of The Ten Steps; then added weaning data and reported findings relating to exposure to The Ten Steps and weaning. The main findings were babies that received a bottle feed or used a pacifier or nipple shield during the postpartum stay were at significantly greater risk of weaning earlier. An unexpected finding was that the only significant predictor of early weaning appeared to be women who had breastfed on demand. The lack of positive data linking breastfeeding duration with most of The Ten Steps may be an indication that socio-demographic and cultural factors are more important determinants of the duration of breastfeeding in Australia than the hospital factors that are related to The Ten Steps (Pincombe, Baghurst, Antoniou, Peat, et al., 2008).

Foundational aspects of the initiative, which is to have a breastfeeding policy (Step One) and educate all staff about the benefits of breastfeeding (Step Two), are not mentioned in the study and; therefore, are not applicable to the findings. As previously mentioned, Step One and Two are integral and influential to the progression and success of the BFHI process. Further, as Italian researchers have argued, (Cattaneo & Buzzetti, 2001) a piecemeal approach to the BFHI has less impact on outcomes and, that where BFHI is related to full compliance of The Ten Steps, superior breastfeeding outcomes are reported (Cattaneo &

Buzzetti, 2001). Further, it has been shown that without compliance to foundation aspects of the initiative it may be difficult to move forward and/or find benefit (DiGirolamo, Grummer-Strawn, & Fein, 2001; Tarrant et al., 2011). As neither Australian study was able to confirm compliance to a policy for The Ten Steps or education involving The Ten Steps, the findings are not meaningful in determining benefit of full implementation of the BFHI for breastfeeding duration rates.

Therefore, given the findings by Walsh et al. (2006) and Pincombe et al. (2008) that may indicate minimal benefit of BFHI it is possible that the international findings are not transferrable to an Australian context. Equally relevant, it could be argued that meaningful impact of the BFHI can only be reported when BFHI accreditation has been fully achieved within a facility and data collection is based on this standard. However, a dose-response relationship between the numbers of The Ten Step practices has been reported previously, whereby women experiencing fewer BFHI practices were more likely to cease breastfeeding by six weeks, suggesting a cumulative effect of the practices (DiGirolamo et al., 2001; Forster & McLachlan, 2007; Tarrant et al., 2011). Furthermore, it has been reported that full implementation of The Ten Steps was associated with improved initiation and duration of breastfeeding (Chien, Tai, & Chu, 2007). International data has indicated that when the BFHI is fully functional the most significant benefits occur (Kramer et al., 2000). Conversely, when only partial implementation of the BFHI occurs, the benefits are less obvious or negligible (Cattaneo & Buzzetti, 2001; Chien et al., 2007; Merten et al., 2005).

As there are currently only two published Australian studies surrounding compliance of BFHI practices and outcomes, there appears to be a gap in the literature regarding evidence of the potential benefit of transforming an organisation into a fully accredited BFHI facility (Pincombe, Baghurst, Antoniou, & et al., 2008). Furthermore, there are currently no pre and post-BFHI published studies that report on the difference to initiation and, more importantly, breastfeeding duration rates in Australia (Walsh et al., 2006). Thus, despite government

recommendations for facilities to achieve the BFHI and the ongoing efforts by individual facilities to undertake the costly exercise of BFHI accreditation, there exists a degree of uncertainty, largely due to lack of evidence, about the benefits of the initiative in the Australian context (Australian Institute of Family Studies, 2008; Fallon et al., 2005).

In the absence of accurate and local research to demonstrate the effectiveness of the BFHI on breastfeeding duration rates in Australia, this review has relied on international studies. While the evidence for BFHI practices is sound and embedded in The Ten Steps, evidence surrounding the effectiveness of the BFHI in Australia is urgently required in order to understand what influences duration of breastfeeding in the Australian context and improve duration rates (World Health Organisation, 1998). Further, in unison with BFHI research, clarification of factors that positively influence breastfeeding initiation is also warranted. For instance, the significant role of skin-to-skin contact, and the impact of formula supplementation, drugs in labour and caesarean birth all necessitate investigation in terms of breastfeeding implementation and duration rates.

Skin-to-skin contact—keeping mothers and babies together

As previously discussed, there is a sensitive period immediately after birth and for the following hours during which time hormonal influences for both the mother and baby optimise attachment, bonding and breastfeeding (Odent, 2006). When the mother and her newborn are not disturbed and skin-to-skin contact is uninterrupted for up to two hours, an optimal start to breastfeeding is often the result (DiFrisco et al., 2011; Nakao, Moji, Honda, & Oishi, 2008). It has been suggested that the medicalisation of birth and institutionalised care have contributed to the separation of mother and baby at this crucial time with negative effects on initiation and duration of breastfeeding (Thompson, Kildea, Barclay, & Kruske, 2011). The technocratic modern birthing environment is predominantly task centric and places value and emphasis on weighing, examining, injecting and documenting in the first

two hours after birth. These processes deflect from, and deconstruct, the birthing experience, separating mothers from their babies.

Moreover, it could be argued that midwives caring for women in this environment complicate this significant time of imprinting for women and infants with institutional focused care that does not facilitate undisturbed mother infant bonding and the natural processes of breastfeeding (Thompson, Kildea, Barclay, & Kruske, 2011). Technocratic processes have nonetheless become imbedded in the modern maternity system despite evidence that they interfere with breastfeeding. Some have argued that with the medical model of birth and breastfeeding, complicated breastfeeding techniques have become common, rather than simply keeping mothers and babies together to let instinctual behaviours dominate the breastfeeding experience (Thompson et al., 2011). This view of striving to keep women and babies together is certainly reflected in the literature. For example, Step Four, whereby the baby experiences skin-to-skin contact with mother for at least one hour following birth, is positively associated with breastfeeding success in the first month and with mothers intention to breastfeed longer (Moore & Anderson, 2007; Moore, 2005). Furthermore, research has revealed that mother-infant skin-to-skin contact lasting longer than 20 minutes after birth increases the duration of exclusive breastfeeding (Mikiel-Kostyra & Mazur, 2002). Several studies have found that mothers who breastfed within the first hour of birth were significantly more likely to be exclusively breastfeeding at four weeks and up to four months after discharge (DiFrisco et al., 2011; Nakao et al., 2008). To protect the optimal environment for breastfeeding, well mothers and babies should remain together after birth to ensure there is no disruption of the instinctual processes involved in nurturing and breastfeeding (Crenshaw, 2007; Klaus et al., 1972; Lothian, 2005).

Formula supplementation

Strong links have been found for decreased breastfeeding duration rates when breastfed babies are given formula while in hospital (Forster & McLachlan, 2007; Merten et al., 2005; Pincombe, Baghurst, Antoniou, & et al., 2008; Tarrant et al., 2011). Formula supplementation in hospital, and in the early postpartum period, has been repeatedly associated with early cessation of breastfeeding in several studies (Dennis, 2002a; Hauck, Fenwick, Dhaliwal, & Butt, 2011; Kruske, Schmied, & Cook, 2007; McAllister, Bradshaw, & Ross-Adjie, 2009; Merewood et al., 2007; Semenic, Loiselle, & Gottlieb, 2008; Spiby et al., 2009). However, the reasons for this finding are unclear although it has been postulated that maternal anxiety, lack of confidence, an unsettled baby, caesarean births and breastfeeding problems may be factors that contribute to unnecessary formula supplementation and are associated with an increased risk of early cessation of breastfeeding (Biro et al., 2011; Hauck, Fenwick, Dhaliwal, & Butt, 2011).

Formula supplementation, unlike maternal socio-demographic factors is an intervention and a risk factor that maternity facilities have considerable opportunity to influence through education and informed consent processes (Spiby et al., 2009; World Health Organisation, 2008). As a woman's risk of giving up breastfeeding increases if she supplements her infant with formula, it would seem that targeting this intervention with a consistent and evidence-based approach should be addressed by health facilities. There is a large amount of evidence of the short and long term health benefits associated with breastfeeding for both women and babies, and this has resulted in breastfeeding becoming a public health initiative. It follows then that infants who are formula fed are at high risk of impaired health outcomes. The thymus gland of the breastfed infant is twice the size of the formula fed infant, which has led researchers to believe that the thymus gland of the formula fed infant is underdeveloped (Hasselbalch, Jeppesen, Engelmann, Michaelsen, & Nielsen, 1996). As the thymus gland is largely responsible for mediating the immune system, particularly in early

life, but also life-long, it would not be unrealistic to state the immune system of the formula fed infant is impaired (Hasselbalch et al., 1996; Jackson & Nazar, 2006). If the thymus gland programs the immune system (most of this programing occurs in the early stages of life) and the immune system is impaired during this period of programming for the life span, there are likely to be life-long health implications (Jackson & Nazar, 2006). The health implications of early impairment of the immune system are only just beginning to be understood Jackson & Nazar, 2006), not only for the first year of life but for ongoing auto immune function and chronic disease into adulthood. Furthermore, the evidence is now beginning to link breastfeeding, and particularly exclusive breastfeeding, to a healthy immune system and better health outcomes life-long. This evidence should compel health professionals to discuss the risks of formula supplementation with all breastfeeding women and motivate them to ensure unnecessary supplementation does not occur as it increases the risk of the baby being fully formula fed with the associated health and immune system implications.

There are many reasons why women do not breastfeed exclusively or long term. However, health professionals striving to influence women should consider that formula supplementation is a modifiable factor. Health professionals also need to be cognisant of the consequences of formula supplementation, which is supported by evidence, to ensure women are provided with current information. Furthermore, the implications of formula feeding in relation to the future health of an infant should be provided to women but more importantly, women need to be supported should they experience breastfeeding difficulties in the early days postpartum.

Caesarean birth and drugs in labour

If maximising the normal processes of birth are likely to positively influence breastfeeding then it is not surprising to find evidence that caesarean birth is associated with decreased breastfeeding duration rates and difficultly with breastfeeding (Chien & Tai, 2007; Dewey,

Nommsen-Rivers, Heinig, & Cohen, 2003; Semenic, Loiselle, & Gottlieb, 2008). As stated earlier, prolonged separation is associated with decreased breastfeeding duration rates and mothers who have a caesarean birth are more likely to be separated from their infants for longer (Rowe-Murray & Fisher, 2002). It is also suggested that the effect of medication and sedation interrupts instinctual newborn processes and may depress the normal hormonal profile of breastfeeding in the mother such as oxytocin and prolactin production (Odent, 2006; Torvaldsen, Roberts, Simpson, Thompson, & Ellwood, 2006). Literature suggests that caesarean birth was negatively associated with breastfeeding duration rates in a large cohort of women in China (n=1520), with mothers who had a caesarean birth less likely to be breastfeeding on discharge than those who had a vaginal birth (Liana, 2008). Several other studies have reported similar findings of decreased breastfeeding duration rates associated with caesarean birth (Al-Sahab, Lanes, Feldman, & Tamim, 2010; Chien & Tai, 2007; Semenic et al., 2008).

Drugs in labour also have a negative impact on the initiation and duration of breastfeeding (Beilin & Bodian, 2005; Berg & Hung, 2011; Jordan, Emery, Bradshaw, Watkins, & Friswell, 2005; Jordan et al., 2009). Opiates may be responsible for the baby being sleepy at the breast and contributing to a decrease in instinctual responses due to depression of the central nervous system that in turn has an impact on breastfeeding establishment (Odent, 2006; Thompson et al., 2011). Epidural anaesthesia, in particular high doses of Fentanyl, has been shown to have an effect on the duration of exclusive breastfeeding and early cessation of breastfeeding (Berg & Hung, 2011).

Maternal characteristics

There is some evidence to suggest that antenatal education can have an impact on breastfeeding duration. A randomised controlled trial (RCT), which randomly assigned women (n=450) to receive antenatal education or standard care, found that education

increased exclusive breastfeeding at six weeks, three months and six months (Su, Chong, Chan, & et al., 2007). Further, in another RCT women (n=401) received individual antenatal counselling and written material (intervention) or standard care with those receiving the intervention more likely to practice exclusive or predominant breastfeeding (Mattar et al., 2007). There is also evidence to suggest that antenatal intention to breastfed long-term is a strong predictor of breastfeeding outcomes and has been found to be the case across all groups of women and is therefore an intervention worth considering, in terms of education, to enhance a women's intention to breastfeed long-term (Donath, Amir, & The Alspac Study Team, 2003).

Support

Women who experience breastfeeding difficulties in the first month postpartum are more likely to discontinue breastfeeding early (Baxter, Cooklin, & Smith, 2009; Hauck, Fenwick, Dhaliwal, & Butt, 2011; Scott, Binns, Oddy, & Graham, 2006). Support, provided by professionals, peers or continuity of support by a known care provider, is particularly important in the first month following birth (and during the postpartum period overall), and has been shown to effect breastfeeding duration (Britton et al., 2007; Currie, Day, Edwards, & Liu, 2005; Hodnett, 2008; Sikorski & Renfrew, 1999). For instance, when assistance is sought early it is strongly associated with positive breastfeeding experiences and improved duration rates (Chuang & Chang, 2010). In a review of 52 studies (56 451 mother-infant pairs) findings suggested that postpartum support increased duration of any breastfeeding and was protective for stopping breastfeeding with a positive effect on duration of exclusive breastfeeding (Renfrew, McCormick, Wade, Quinn, & Dowswell, 2012).

In the Australian context, a study explored factors associated with early weaning in a cohort of women (n=4679) and found that duration is substantially affected by outcomes in the first postpartum month and confirmed this period as an important time for support interventions to

occur (Baxter et al., 2009). Research indicates that defining the kind of support women need is important and that support is about more than providing information and education (Sheehan, Schmied, & Barclay, 2009). Further, it is argued that supportive behaviours are complex and opportunities for women to individually define what support means to them should be sought (Sheehan et al., 2010). Therefore, support interventions should ideally include an individualised approach that considers the dynamic nature of the postpartum period and a woman's individual needs and socio-cultural context, with this kind of support said to increase a women's confidence to breastfeed (Sheehan et al., 2010).

Peer support has been found to be particularly successful in terms of providing the individualised support women need, especially with vulnerable groups such as younger women (Di Meglio, McDermott, & Klein, 2012; Kaunonen, Hannula, & Tarkka, 2012). Continuity of care from a midwife that starts before discharge from hospital and continues into the postpartum period is associated with improved outcomes for women such as decreased caesarean birth rates (McLachlan et al., 2012) and individualised support such as midwifery continuity of care and has been shown to improve breastfeeding outcomes (Hodnett, 2008). Vulnerable groups are known to have lower breastfeeding rates, and several studies have indicated that the greatest improvements to breastfeeding rates may lie with increased attention to younger women, women from low income groups and women who are unsupported (Chung et al., 2008b; Dennis, 2002; Dennis, Hodnett, Gallop, & Chalmers, 2002; Hauck, Fenwick, Dhaliwal, & Butt, 2011; Renfrew et al., 2005). Therefore, support strategies that are known to have benefit for these groups, such as peer support, should be explored.

The complexities of socio-demographic and political influences on breastfeeding have been highlighted in the literature (Bosnjak et al., 2009; Dubois & Girard, 2003a; Flacking, Nyqvist, & Ewald, 2007; Forster et al., 2006; Meedya et al., 2010). A multitude of factors may influence mothers to cease breastfeeding and there is a complex relationship between

individual factors such as skill, intention and breastfeeding problems, socioeconomic status, education level, parity and maternal age, and support from health services (Australia Department of Health and Ageing, 2009; Hauck, Fenwick, Dhaliwal, Butt, & Schmied, 2011). Moreover, the links to socio-demographic factors indicate that maternal age, income and education are socio-demographic factors related to the risk of early cessation of breastfeeding that may be the least amenable to influence from health professionals (Meedya et al., 2010; Wijndaele, Lakshman, Landsbaugh, Ong, & Ogilvie, 2009). As such, these risk factors make it important to provide targeted antenatal and postnatal education and support programs for young women and women of lower socio-economic status and education level (Cooklin, Donath, & Amir, 2008; Renfrew et al., 2005).

Breastfeeding and breastfeeding exclusively for longer is associated with higher socioeconomic status in most developed nations (Dennis, 2002b) and disadvantaged populations are at higher risk of not breastfeeding long term (Renfrew et al., 2005). Hence, providing support for women after discharge from hospital, as per Step Ten, should be a priority with a particular focus for women from lower socio-economic demographic areas.

Research has also found that a woman returning to paid work outside the home has a negative effect on breastfeeding duration (Carlson-Gielen, Faden, O'Campo, Brown, & Paige, 1991; Chuang & Chang, 2010; Taveras et al., 2003). Similar results have been found in Australia leading government and support agencies to review maternity leave policy. (Australian Breastfeeding Association, 2004; Australian Health Ministers Conference, 2009; Australian Institute of Family Studies, 2008; Cooklin et al., 2008). The current policy provides up to 18 weeks paid leave for women having a baby (Productivity Commission, 2009). The reports also recommend support interventions, in the workplace, for women to continue breastfeeding and paid work outside the home (Australian Bureau of Statistics, 2006; Australian Health Ministers Conference, 2009). Of significance, countries where maternity leave is paid at 80% and prolonged to 52 weeks such as Norway, duration rates are

significantly higher than countries that don't have similar schemes such as Australia and the United States of America (USA) (Staehelin, Bertea, & Stutz, 2007).

Summary

Despite high breastfeeding initiation rates for Australia, the latest Australian government report on child health and breastfeeding recommends that more babies should be breastfed, and that they should be breastfed for longer, to improve child and maternal health (Australian Health Ministers Conference, 2009). One method to support, promote and protect breastfeeding in the hospital environment is the introduction of the BFHI. This review has discussed that internationally BFHI is of benefit to increasing breastfeeding initiation and duration rates. However, in Australia, there is no such evidence. Thus, this research aims to determine the exclusive breastfeeding rates of women at discharge, three and six months postpartum from a tertiary birthing facility prior to BFHI accreditation. Gather baseline data up to six months postpartum pre-BFHI implementation at a large tertiary hospital. It also aims to determine a baseline of the factors thought to influence breastfeeding rates at this facility.

The following chapter describes the methods that were used in the study, including the aim of this study. Additionally, the study setting, recruitment and consent procedures, research plan; design and methods of data collection, sampling, data analysis plan and ethical considerations are outlined.

CHAPTER THREE: METHODS

This chapter addresses the aims and objectives of this research, the setting for the study, and recruitment and consent procedures. Research design, methodology, data collection and sampling techniques employed for this study are also described. Finally, a general overview of the approach undertaken for data analysis is presented in addition to a discussion on the outcome measures and variables of interest.

Aims

This study aimed to determine the exclusive breastfeeding rates of women at discharge, three and six months postpartum from a tertiary birthing facility prior to BFHI accreditation in Brisbane, Queensland, Australia. The data collected is designed to provide baseline data pre-BFHI accreditation to inform policy development and program planning.

Objectives

The objectives for this research included the following:

- To determine the exclusive breastfeeding rates of women at discharge, three and six months postpartum from a tertiary facility prior to BFHI accreditation.
- To determine the factors associated with exclusive breastfeeding.
- To explore the influences surrounding a woman's decision to breastfeed.
- To identify what influences were important to women when deciding to breastfeed.
- To identify whether women perceived that the breastfeeding support they received in hospital was sufficient.
- To identify the breastfeeding support mechanisms women access during the postpartum period.

- To establish the complementary feeding practices employed at three and six months of age.

This study employed the national recommendations for data collection methods and survey design regarding the measurement of infant nutrition data (Webb et al., 2001). For instance, the 24-hour dietary recall design, validated by WHO for collection of infant nutrition data, has been used. Further, this research adopted the use of the WHO breastfeeding definitions, as provided in Table 1. The findings and subsequent discussion surrounding the research will be presented as primary and secondary outcomes.

Primary and secondary outcomes

The primary outcomes were the proportion of women who were exclusively breastfeeding at:

- discharge from hospital
- three months postpartum
- six months postpartum.

The secondary outcomes included identifying factors that may have contributed to:

- breastfeeding duration
- breastfeeding exclusivity.

Further reported are responses given by women to questions which provided specific answers on their postnatal breastfeeding experience such as support accessed, reasons for ceasing breastfeeding, and the types of supplements that were given and when they were given.

Ethics

Ethics approval was provided by the Human Research Ethics Committees of the maternity facility (HREC) and the Australian Catholic University (ACU). Mothers willing to participate in

the study were made aware that participation in the study was voluntary. Any information given to the student researcher was confidential and refusal to participate or withdraw from the study at any time would not affect services provided to women by the facility. If the woman reported any distress regarding her experience at the facility or with breastfeeding she was offered support at the Breastfeeding Support Centre located at the hospital and/or contact with the relevant manager to discuss any concerns.

The setting

The hospital is located in an inner city suburb of a major metropolitan city with the catchment area encompassing a wide range of socio-demographic profiles. The facility holds the unique position of being a collocated public and private hospital providing care for an equal number of women of each status per year; that is privately insured women (n=4958) and publicly un-insured women (n=5134) in 2010. The Neonatal Critical Care Unit (NCCU) accepts retrievals from around Australia and has a 79 cot capacity. The hospital provides a large range of services including women's and children's health and adult speciality services.

Breastfeeding rates are collected from women at discharge and entered into the obstetric database. Currently the obstetric data reflects national trends of between 80.0 and 90.0% of women exclusively breastfeeding on discharge from hospital, which is usually on day two for women who are publically un-insured and day four for women who are privately insured. This has been consistent over the past three years. However, no breastfeeding duration data for women accessing the facility is available.

Research design

This study used a prospective cohort design, starting when women were recruited prior to discharge from hospital and gathering data prospectively forward in time until six months postpartum (Thadhani & Tonelli, 2006). Cohort studies are observational; thus, the

researcher collects information on the characteristics, attributes or measurements of interest but does not manipulate them in any way (Healy & Devane, 2011). The term cohort refers to a set of people in a population sharing common attributes; in this study, women who are breastfeeding their infants. The cohort, or group of individuals with common features, are assembled and followed forward in time (Thadhani & Tonelli, 2006). Prospective cohort studies are considered the best method for determining the natural history of a condition and are used to study incidence, causes and prognosis (Thadhani & Tonelli, 2006). Cohort studies are concerned with gathering information and the distribution and inter-relationship of variables in a study sample or population (Healy & Devane, 2011). A prospective cohort was appropriate for this study as the design allowed the outcome of interest (exclusive breastfeeding) to be measured at different time points. This design also allowed for statistical analysis of interactions of limited variables that may affect the outcome. Interactions occur when the association between an exposure, such as skin-to-skin contact at birth, and an outcome; in this study exclusive breastfeeding is influenced by a third characteristic, mode of birth.

Prospective research is considered more robust than retrospective studies as recall over longer time periods cannot be reliably validated (Polit & Beck, 2008). The design enables the researcher to measure the outcome of interest prospectively, adding to reliability. In addition, variables contributing to the outcome can be measured as they occur naturally which is useful to generate links or emerging themes that may be associated with the outcomes (Parahoo, 2006; Stommel & Wills, 2004). Cohort designs are associated with potential bias and limitations. Therefore, in this case a potential limitation may be the participants lost to follow-up, who all shared a specific characteristic, which may have introduced a systemic information bias that may decrease the validity of the findings. There is also the potential for another form of bias known as measurement bias, when the exposure or event is not measured accurately and consistently between participants in the study (Healy & Devane, 2011). For example, measurement bias may occur in this study if the woman is not able to

be contacted at the three month data collection time frame and before discharge from hospital. In this case the research assistant was instructed to only collect data up to an end point of two weeks, after the three month time frame. Therefore, strategies have been employed to mitigate both forms of bias by building attrition into the sample size calculation and obtaining several points of contact for follow-up. Furthermore, guidelines were placed around content and timing of contact for all participants in an effort to maximise consistency of data collection time frames. It is also possible that cohort studies are subject to confounding bias which occurs when two factors are associated and the effect of one is attributed to the other (Healy & Devane, 2011). Confounding bias was taken into consideration in the analysis and variables which were likely to be related to the other, for example Socio-Economic Indexes for Areas (SEIFA) category and education status, have not been grouped together for regression analysis.

Power and sample size projection

The study examined a number of outcomes related to breastfeeding. A detailed description of the outcome measures are presented later in this chapter. The sample was calculated using an assumed proportion of 38.0% exclusive breastfeeding, as per a previous Infant Nutrition Study (Queensland Health: Paul et al., 2007) of exclusive breastfeeding duration at three months, with a 95.0% confidence interval and +/- error tolerance of 0.05. A sample of women cared for by private obstetricians and women cared for in the public system was used. The expected breastfeeding rate at three months was 38.0% (90.0% power and 95.0% CI = 380). Allowing for 25.0% attrition, the study sample aimed to collect data on 475 women (380 + 95 [380 x 0.25).

Table 2: Sample size

Total births 2009–10 n=10 092	
Private n=4 958 (49.13%)	Public n=5 134 (50.87%)
Study sample n=475 (including 25.0% attrition)	
Private n=233	Public n=244

Sampling

The study population was a purposive sample of mothers having birthed their babies at the facility and who meet the BFHI target group of well women and babies as per the inclusion criteria (see below). Purposive sampling is used when the cohort is chosen based on certain characteristics that will further validate the findings (Teddlie & Yu, 2007). For example, in this study the women and infants are all well and the women were all breastfeeding their infants. Purposive sampling techniques have also been referred to as non-probability sampling and involve selecting certain participants based on a specific purpose rather than randomly recruiting participants. For instance, this cohort was recruited as a purposive sample of well mothers and babies, who had made a decision to breastfed their babies and were almost equally distributed across the public and private facility as this was the population that data was collected from in relation to breastfeeding rates and the BFHI.

The participants

Inclusion criteria

In this study the women were selected based on the BFHI standard of well women and babies. Women were eligible if:

- they birthed their baby after 37 completed weeks of pregnancy
- they were breastfeeding their baby
- their baby was not admitted to NCCU at the time of recruitment
- they were well and understood English.

Exclusion criteria

Women were not eligible if:

- they had a preterm birth before 37 completed weeks at time of recruitment
- they were obstetrically unwell at time of recruitment
- the baby was unwell or admitted to NCCU at time of recruitment
- they did not intend to breastfeed
- they did not speak English.

Recruitment and consent

Funding was sourced from Golden Casket (Queensland). This enabled a research assistant (RA) to be employed to recruit eligible women for the study and to follow up at three and six months postpartum by telephone interview. The RA was a midwife and lactation consultant at the facility and therefore required minimal training other than orientation to the Procedure Manual (Appendix 1: page 123). The RA approached the team leader (TL) on the postnatal wards to obtain information about eligible women to approach for consent. Breastfeeding status of the woman was sought from the patient details (PD) list obtained from the TL. Eligible women who were inpatients on the maternity wards after the birth of their infants were invited to participate in the study. The RA explained the study to the woman and they were given the opportunity to ask questions about the study. If the woman wished to participate the consent form was signed with one witness. Telephone numbers and an email address were collected to enable contact if the woman was not reachable by phone. See the procedure manual (Appendix 1.3: page129).

The RA was experienced in data collection methods and standardised interview protocols to conduct telephone interviews. The interviews were conducted between 9 am and 4.30 pm on week days. If the participant could not be contacted a message was left (where possible) and the RA tried to contact the participant twice more. If the participant was not contactable after the third attempt she was allocated as lost to follow-up (LTFU). Extending time frames

for contact would risk the infant falling outside the relevant age category and further risk introducing measurement bias. In this study data of individual exclusive breastfeeding rates was collected at three and six months and just after the three and six months with the accepted variation being two weeks past three months and two weeks past six months. This is because there was only one person engaged to conduct the telephone interviews and women may have taken a number of weeks for women to be contacted. This timeframe is in keeping with the accepted standard introduced by Webb (2011) and is referred to in the literature as three months (or up to four months) and six months (or up to seven months) (Australian Institute of Health and Welfare, 2011; Webb et al., 2001).

Following consent

The consent details and the women's patient identification label were placed on a data collection sheet, with a date range for follow-up, and placed in plastic sleeve in a folder for later reference. All details were placed in the locked filing cabinet of the RA in a lockable office. The discharge interview was arranged at a time convenient for the participant. At conclusion of the discharge interview an approximate date and time to expect follow-up telephone interviews when the baby was three and six months of age was discussed. The participant was given a unique study number and no identifiable details were entered into an Excel Spread sheet on the password accessed computer of the RA.

National recommendations for data collection

Studies have shown accuracy of the mothers recall when the time period is shorter, is more accurate than when they are asked to recall over longer periods of time and that mothers 'round' their reports of breastfeeding duration particularly when the recall periods are long (Webb et al., 2001). For example, if a mother is asked to recall breastfeeding practices relating to three months postpartum at nine months postpartum the data is likely to be less accurate than if the mother was asked at the three month mark. The following are

recommendations to consider when obtaining infant breastfeeding data; base the indicators on questions about current practice only (in the last 24 hours), and calculate the age-specific rate at each month of age, using data only for infants at those ages. Data should be collected in the first twelve months at critical time points such as initiation and six weeks; two, three and six months and up to twelve months (Webb et al., 2001; World Health Organisation, 2008).

The tool that was used collected data on exclusive breastfeeding, predominant breastfeeding, any breastfeeding and complementary feeding and consisted of the 24-hour recall section, yes/no questions and a number of options to select with ability for the RA to enter text for qualitative responses. The 24-hour dietary recall section was replicated for each of the three time collection points; however, the survey asked questions at each time point that were applicable to that period. Women were asked to provide information about: antenatal intention to breastfeed; the support provided for breastfeeding as an inpatient, and support after discharge; access to support providers in the community postpartum; and a woman's decision to cease breastfeeding. Initiation and discharge data was gathered via face to face interview at the bedside before discharge from hospital and via telephone interview at three and six months postpartum. The survey tools are attached in Appendices: 1.5 page 132; 1.7 page 135; 1.9 page 138.

Data collection tool

This study followed the recommended guidelines for measuring indicators of breastfeeding practices in the Australian population (Webb et al., 2001). The Australian guidelines are recommendations from a national report and follow the World Health Organisation (WHO) indicators. The report recommends the use of the WHO 24-hour dietary recall tool that is used for infant nutrition surveys internationally and has been validated in Australia in the

infant nutrition study (Queensland Health: Paul et al., 2007; Webb et al., 2001; World Health Organisation, 2008). Key elements of data collection were:

- detailed information about breastfeeding status which was then categorised as either exclusive breastfeeding, predominant breastfeeding, any or partial breastfeeding, or introduction of solid foods
- collection of information to include the age of the infant at the time the feeding practice relates to the use of the 24-hour dietary recall survey design.

The 24-hour recall survey enables measurement of current breastfeeding intensity and introduction of solid foods (Webb et al., 2001; World Health Organisation, 2008). The reason for this was that recall of feeding practices in the previous 24 hours is more reliable than mothers recall over longer time periods of several months. A sample of the questions WHO recommends can be seen in Appendices: 1.5 page 132; 1.7 page 135; 1.9 page 138.

The WHO 24-hour dietary recall survey was chosen for this study because of the evidence for its use and as it has been previously validated and used for similar studies in Queensland. Therefore, this tool was a consistent and appropriate data collection method for this study (Queensland Health: Paul et al., 2007; Webb et al., 2001).

Data entry

The survey tool was developed using Remark Office software (Remark Office, 2005). Remark Office software is a windows based program that can be used to design forms for data collection. The completed forms were scanned using the Remark office software which produced a raw data report. The raw data was then exported into Microsoft Excel 2010 (Microsoft, 2010) and merged into the Statistical Package for the Social Sciences (SPSS) (version 15.0). This process was used for all three phases of the study. The SPSS database

was also populated with each individual participant's demographic, antenatal, intrapartum and postpartum data which was extracted from the obstetric data base.

Demographic data was collected from the women at their booking in visit with a midwife and entered into the obstetric database. Medical and obstetric data was obtained electronically from the hospital data system and merged into the SPSS database for statistical analysis. Data that was collected and put into the obstetric database may be subject to human error; that was considered a potential issue for accuracy of the data. Measures were taken to mediate the risk of human error and to ensure the data was regularly cleaned and validated. The data obtained from the obstetric database was compared to the financial database system to ensure details had been entered. Parts of the antenatal history were audited monthly and corrections made for variables such as insurance status, class and mode of birth and parity. Data items are cross-checked to ensure erroneous entries are corrected and postpartum data is audited as resources allow. Finally, once the obstetric data base was merged with the research data base such as SPSS, various checks for commonly made errors were undertaken and any errors found are referred to the appropriate system administrator.

Data analysis

There were two primary areas of analysis. Establishing estimates of exclusive breastfeeding at initiation, three and six month's postpartum and examining associations between exclusive breastfeeding and maternal and infant characteristics. Bivariate analysis comparing outcomes between two groups were reported as the difference in proportions with associated 95.0% confidence intervals (CI). Multivariate analysis was undertaken using StataSE (Version 10) (StataCorp., 2007) with the dependent variable exclusive breastfeeding, and the independent variables (see below), to analyse if there was a relationship to the outcome.

Variables selected for analysis

The variables selected for analysis were chosen because of evidence of an association with exclusive breastfeeding duration outcomes. Exclusive breastfeeding is the primary outcome and therefore variables with evidence to support 'exclusive breastfeeding' were chosen. For example, feeding on demand is associated with long term breastfeeding more so than exclusive breastfeeding (World Health Organisation. 1998; Abrahams, & Labbok, M. 2009). Choice of variables was also determined by available data from the questionnaire and the obstetric data base; if they were applicable to *The Ten Steps to Successful Breastfeeding* (World Health Organisation, 1998); or if an association was found in univariate analysis. These were:

- mode of birth (vaginal or caesarean): vaginal birth included assisted vaginal birth (vacuum or forceps). There was no strong evidence to suggest assisted vaginal birth contributed to the outcome of breastfeeding duration. Thus, it was categorised with vaginal birth. Caesarean was inclusive of emergency and elective caesarean births.
- skin-to-skin contact: this variable was divided into six categories indicating the amount of time the infant spent skin-to-skin with the mother after the birth. The categories were, not at all, <15 minutes, 15–30 minutes, 30–40 minutes, 45–60 minutes, >60 minutes
- health insurance status (public or private)
- marital status: this was divided into three categories defined as married or defacto, separated or divorced and single (continuous variable).

The additional co-variates of Socio-Economic Indexes for Areas (SEIFA) and maternal age were added to the three and six month analysis because of a univariate p-value of <0.25 at the three and six month data analysis. Selection of variables for logistic regression modelling assumes that the variables have a univariate test p-value <0.25. The SEIFA is a set of four indexes created from 2006 Census information. The four indexes summarise a different

aspect of the socio-economic conditions of people living in an area and include: Index of Relative Socio-economic Disadvantage; Index of Relative Socio-economic Advantage and Disadvantage; Index of Economic Resources; Index of Education and Occupation (Australian Bureau of Statistics, 2006). For each index every geographic area in Australia is given a SEIFA number that shows how disadvantaged that area is compared with other areas in Australia. Postcodes are categorised according to SEIFA score; the categories have a range of one (most disadvantaged) to five (least disadvantaged). Maternal age has been associated with breastfeeding duration outcomes and was measured as a continuous variable. Lastly, formula supplementation in hospital was added to the analysis for three and six months. The reason for this variable was because of the evidence of a strong association with breastfeeding outcomes; in particular early cessation of breastfeeding (Forster et al., 2006).

Univariate analysis of demographic factors used frequencies to arrive at percentages to describe maternal demographic data. Chi-squared test was used to explain if there was a relationship between two categorical variables. Univariate and bivariate analysis for all stages of the study used frequencies and Chi-squared tests and compared outcomes between the two groups that are reported as the difference in proportions with associated 95.0% CI, odds ratios and 90.0% power. Multivariate analysis was undertaken using StataSE (Version 10) of the dependent variable (exclusive breastfeeding) and independent variables discussed above. Logistic regression modelling was a method used for determining relationships between dependent variable (exclusive breastfeeding) and independent variables. Selection of variables for logistic regression modelling assumes that there is no relationship between the variables and the variables have a univariate test p-value <0.25. Further, variables that are clinically and intuitively relevant may be included regardless of statistical significance (Hosmer & Lemeshow, 2000). All variables met this criterion.

Storage of data.

Data collected was de-identified and kept in the password protected file that was backed up on the server computer of the RA and student researcher and shared only with the student's supervisor. Data was re-identifiable as another Excel Spread sheet was kept that enabled the study number and contact details to be aligned with the unit record number of the participants. Any hard copies of data were kept in the locked office of the student researcher and RA.

Summary

This chapter has described the methods that were used in the cohort study, including, the setting and sample size, the methodology, recruitment and consent processes, outcome measures, potential bias, data collection methods and data analysis methods. The following chapter presents the results of the study.

CHAPTER FOUR: RESULTS

This chapter will report the demographic data and characteristics of the cohort of women enrolled in the study. The results of the data collection derived from the survey that was conducted on discharge from hospital and three and six month data are presented.

Results for the responses are reported in the form of graphs identifying a percentage for the response given. For example, one of the questions asked women to identify the support providers they accessed in the community and gave a range of options to choose from such as: Breastfeeding Support Centre; Australian Breastfeeding Association; private lactation consultant; child health clinic; general practitioner; and other. There was also an option for the women to provide qualitative text in the form of further comments. Results highlighted in bold refer to significance.

Participants

Recruitment took place between the months of August and October 2011 and ongoing telephone interviews were undertaken until May 2012 when the infants of the participants were six months of age. The number of eligible women approached was 480. Of those eligible women, 475 were recruited to the study (Figure 3).One participant was excluded from the final analysis because they did not meet the eligibility criteria and was recruited in error. At three months postpartum participants were contacted by telephone and completed the survey by telephone interview. The attrition rate at the three month data collection was 15.0% with 399 participants able to complete the survey. At six months postpartum participants were again contacted by telephone to complete the survey. The attrition rate for six months was a total of 22.0% with 369 participants able to complete the six month survey. This was lower than the 25.0% attrition rate that was allowed for in the study design.

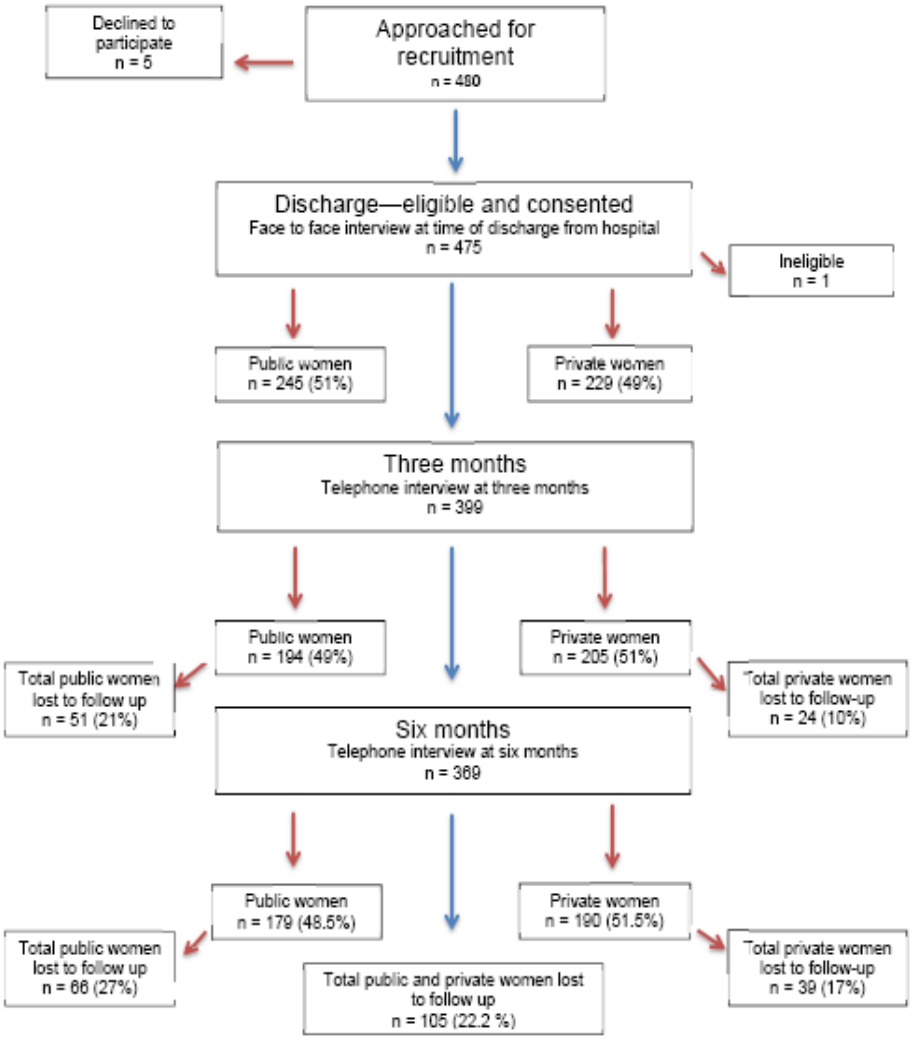

Figure 3: Participant flow

Maternal demographics

The tertiary facility provides care for women who have private health insurance (referred to as private women) and women who sought care from the public health system in Queensland (referred to as public women). The women from the private and public sector include an almost equal division for 10 000 births per annum that occur at this health care facility. The representation of insurance status for this cohort included 48.0% (n=229) of women from the private sector and 52.0% (n=245) of women from the public sector. The maternal demographics shown are included because they have been identified as important contributors in current literature around breastfeeding duration and the BFHI and of interest

in comparison with previous Australian studies on breastfeeding outcomes. Maternal characteristics of the participants that were lost to follow-up, for both time frames, were more likely to be publicly insured which may be responsible for confounding results.

Maternal age, parity and ethnicity

The age of mothers ranged from 16 to 49 years. The mean age (31.2 years) was similar to the mean age of women birthing in Australia in 2009 (30 years) (Li, McNally, Hilder, & Sullivan, 2011). The mean age of 31.2 is also reflective of the mean age of mothers birthing overall at the health care facility where this study was undertaken (Mater Health Services, 2009).

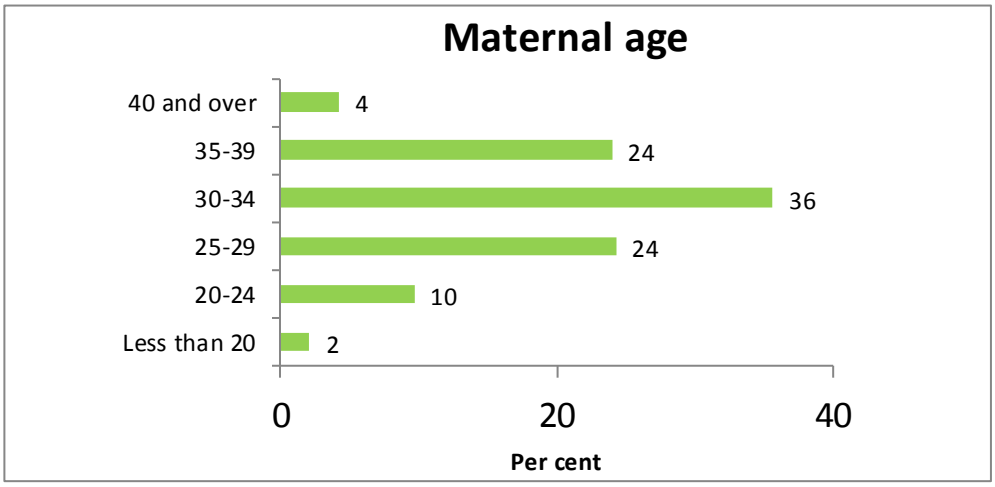

Figure 4: Women that gave birth, by maternal age

Parity was defined as the number of previous pregnancies that resulted in a birth. In this cohort 55.0% of women birthed their first baby, 29.0% of women birthed their second baby and 13.0% their third, with 3.0% of women giving birth to greater than three babies (see Figure 5). The parity data from the facility was different to that of the cohort with approximately 46.0% of women birthing at the facility having their first baby (Mater Health Services, 2009).

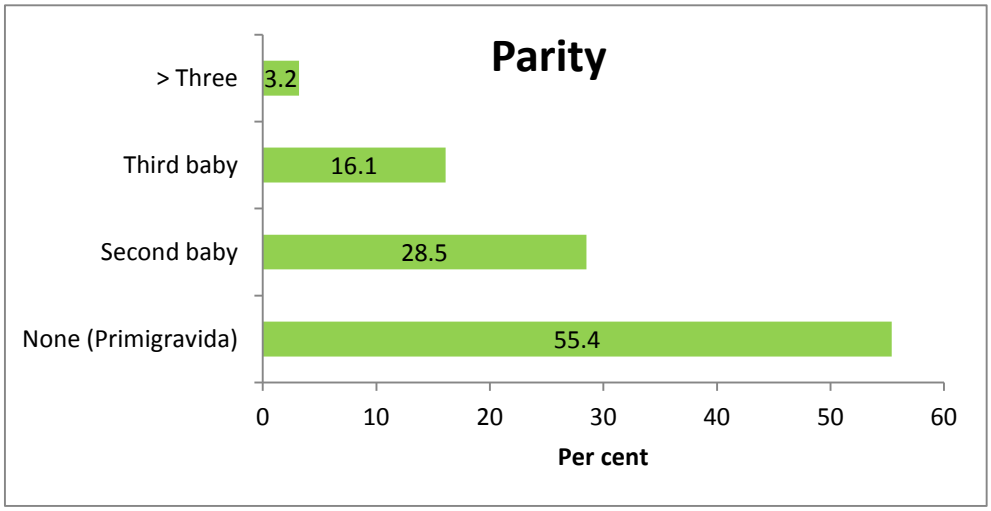

Figure 5: Number of previous births

Maternal ethnicity was self-identified during the history taking that occurred at the booking visit by the midwife. Ethnicity is documented and recorded within four categories including: Caucasian/European, Indigenous (includes: European, Aboriginal and Torres Strait Islander), Asian and other. Other includes people of Maori and Pacific Island, African and Indian decent. The ethnicity status of this cohort was 70.0% Caucasian/European, 0.4% Aboriginal (not Torres Strait Islander), 13.7% Asian and 15.8% other (see Figure 6). This data is comparable to the overall ethnicity data for the health care facility where this study was undertaken (Mater Health Services, 2009).

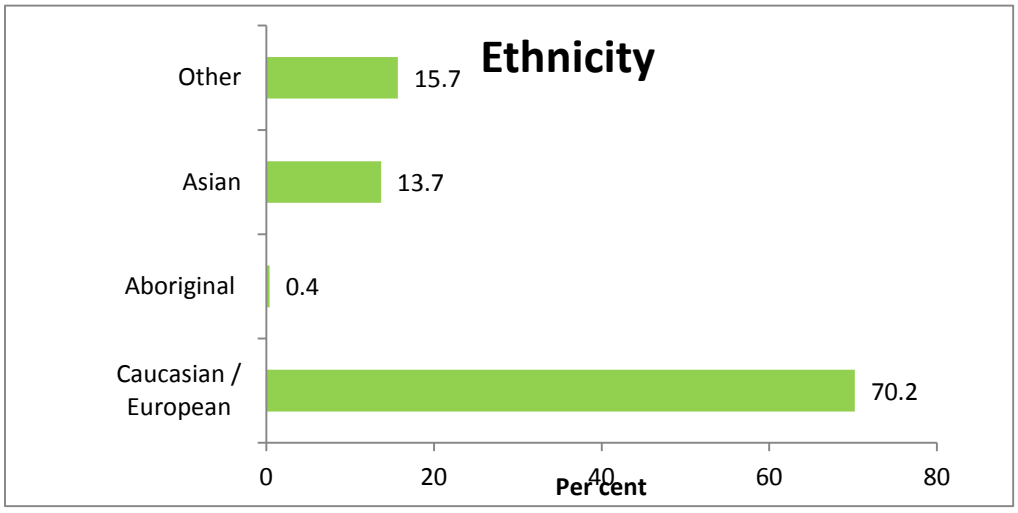

Figure 6: Women who gave birth, by ethnicity

Level of education

The cohort was representative of an educated group with 67.7% identifying as having a tertiary education (see Figure 7). The education status of the cohort does appear to have an over representation of tertiary educated women and this data is comparable to the overall level of

education data for the health care facility with current data showing that 65.0% of women have a tertiary education (Hollingshead, 2012). However, although the cohort data is representative of the facility, the high proportion of tertiary educated women is further explored below.

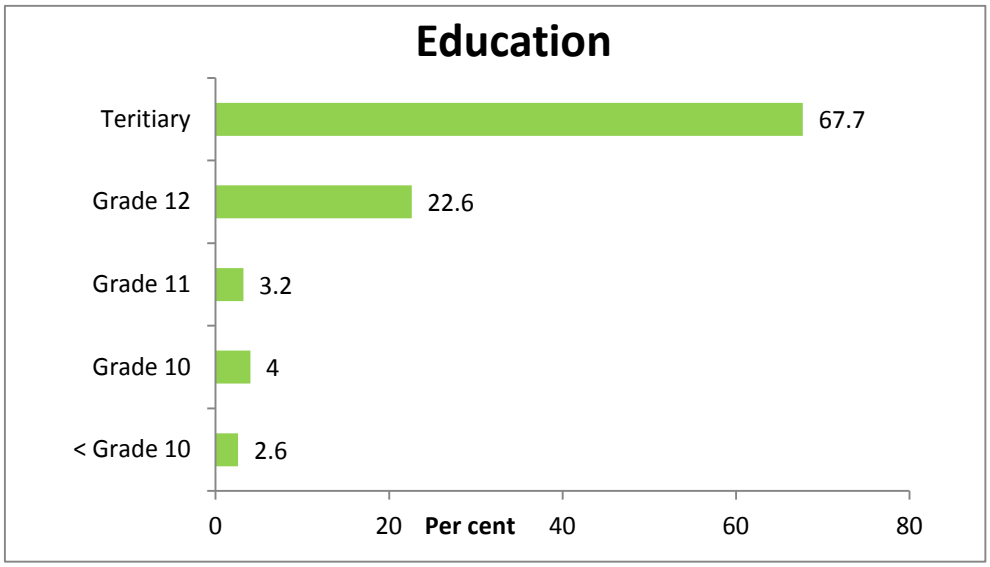

Figure 7: Women who gave birth, by level of education

Socio-Economic Indexes for Areas

The Social-Economic Indexes for Areas (SEIFA) are categories that summarise the socio-economic conditions of an area. Categories one to five represent the socio-economic status with category five representing least disadvantaged and category one most disadvantaged (Australian Bureau of Statistics, 2006).

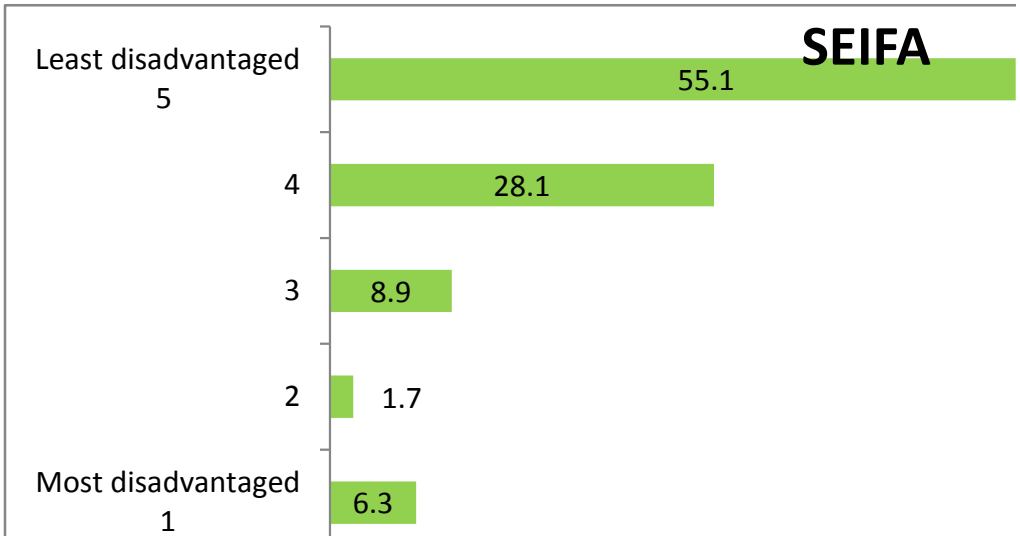

Figure 8: Women who gave birth, by SEIFA

In this cohort 83.2% of the participants fell into the least disadvantaged ranges of category four and five with the balance of the cohort (16.9%) in the most disadvantaged ranges. Figure 8 provides an outline of the SEIFA status of the women who participated in this study.

Marital status

The cohort were predominantly either married or living with their partners with 87.6% identifying as being in a married or defacto relationship, 11.2% single and 1.2% divorced or separated. Where the cohort data differs to national data for maternal demographics that have been reported, a comparison has been presented below in Figure 9.

The mean age of the cohort was consistent with national data. However, the privately insured women in the cohort were slightly older than the national mean. Additionally, there were more primagravida women in the cohort than recorded in the national data collection and also at the facility were the study was undertaken. Further, the national data showed a higher proportion of women in the least advantaged range for SEIFA (shown as >SEIFA Category Four). The cohort also showed a high proportion of women with tertiary education that was considerably higher than the national data. This difference may be attributed to the

difference in reportable categories for the facility and the national data. The facility database does not give the option of choosing diploma or certificate and asks only for information up to, and including, grade 12 and then gives an option for tertiary education. Therefore, it is unknown whether a woman with a diploma or certificate has identified as having a tertiary education or not but it is likely that this partially explains why the tertiary education category is so high. The national data is clear and states that a bachelor degree or higher is 41.2% and diploma/certificate is 35.9%. Therefore, it is possible that the facility data for tertiary (67.7%) included women that identified as tertiary but do not have a bachelor degree or higher qualification and this may account for the difference in the data between the cohort and national data. Figure 9 (below) represents the cohort and national data.

Characteristics	Cohort public 2012 (n=245) %	Cohort private 2012 (n= 229) %	Cohort (n=474) %	AIHW 2011 (n=294,540) %
Maternal age (mean)	29.4 (SD 5.76)	33.0 (SD 4.08)	31.2 (SD 5.33)	30.0
Parity				
Primipara	53.9	56.8	55.3	41.6
Multipara	46.1	43.2	44.7	55.3*
Education				
Tertiary diploma	57.1	79.0	67.7	77.1
Year 12	26.9	17.9	22.6	13.5
Year 11	5.7	0.4	3.2	9.2
Year 10 or less	10.2	2.6	6.5	2
Socio-economic indexes for areas				
1 most disadvantaged	11.0	1.3	6.3	6.5
2	1.2	2.2	1.7	6.8
3	10.2	7.4	8.9	6.7
4	26.5	29.7	28.0	9.3
5 or > least disadvantaged	51.0	59.4	55.1	42.7
Marital status				
Married/defacto	79.6	96.1	87.5	87.6
Divorced/separated	1.6	0.9	1.3	1.2
Single/never married	18.8	3.0	11.2	11.2

Figure 9: Differences in maternal demographics compared to national data
(Australian Institute of Health and Welfare, 2011)*AIHW missing data 3.7%

Smoking, drugs and alcohol

A small percentage of women (4.0%) stated they smoked cigarettes at the time of their initial booking interview and this identified women who continued to smoke during pregnancy.

There were no women in the group that were cared for by the Continuity of Care by a Health Professional (CHAMP) clinic, which addresses alcohol and drug use in pregnancy.

Mental health

At the booking interview women were asked to identify if they had ever been diagnosed with a mental health condition such as depression or anxiety. A total of 16.2% reported they had at some time been diagnosed with a mental health condition. Of the 16.2% with a diagnosed condition prior to pregnancy, 80.5% were treated for the condition. Data on women who had experienced a mental health condition during pregnancy or were being treated for a mental health illness during pregnancy is not currently retrievable from the database or reported nationally.

Number of antenatal visits

Within this cohort, 81.6 % of women had eight or more antenatal visits and 99.3% had four or above.

Antenatal complications

This cohort of women was reflective of a healthy population whereby there were low percentages of pregnancy complications reported. The highest reported complication was in the haematological category for iron deficiency anaemia with 9.7% of the women reporting iron deficiency anaemia (Hb <90 mmol).

Maternal labour and birth data

Almost half (49.2%) of the women laboured spontaneously, a further 25.9% were induced with prostaglandins and the remaining 24.9% had no labour as a caesarean birth had been performed. Forty-eight per cent of women birthed spontaneously, 38.6% of those who laboured had a caesarean birth, 11.0% had an assisted vaginal birth and 2.7% had a

forceps birth. Table 3 (below) compares the national data with the overall data of the facility and the cohort data. A reason for the difference reported may be that the national data represents a 30.0% private cohort whereas the facility and study cohort data represented a 50.0% private cohort.

Table 3: Key maternal and infant labour and birth indicators

Indicator	Definition	Cohort (n=474) (2012) %	Facility (n=8202) # (2009) %	National# (n=294,540) (2009) %
Onset of labour	Spontaneous	49.2	48.1	56.1
	Induced	25.9	26.2	25.3
	No labour—caesarean performed	24.9	25.7	18.4
Analgesia	Epidural	33.3	44.0	32.2
	Narcotics	11.6	16.4	22.0
	Nitrous oxide	39.0	48.4	50.0
Mode of birth	Caesarean birth	38.6	39.7	31.4
	Vaginal birth (non-assisted)	47.7	48.2	56.8
	Vacuum	11.0	9.6	11.7
	Forceps	2.7	1.9	5.9
Apgar at five minutes	>7	98.4	98.9	98.5

(Li et al., 2011a; Mater Health Services, 2009)

Maternal characteristics of women lost to follow-up

Maternal characteristics of those that were lost to follow-up (referred to as attrition) and those that were not lost to follow-up (referred to as participants) for both time frames have been compared. Data from both the three and six month periods found that those in the attrition group were more likely to be publicly insured, and were slightly younger; at six months the attrition group were more likely to have a lower level of education. There was no difference found with SEIFA score. Table 4 presents the data.

Table 4: Characteristics of those lost to follow-up

Characteristics	Cohort (n=474)	Participants three months (n=399) 84.2%	**Attrition three months* (n=75) %**	Participants six months (n=369) 77.8%	**Attrition six months* (n=105) %**	p value, three months	p value, six months
Insurance status							
Public	51.7	68.0	**10.8**	62.9	**13.9**	p=0.002*	p=0.009*
Private	48.3	32.0	**5.1**	37.1	**8.2**		
Mean maternal age	31.2	31.4	**29.4**	31.6	**29.5**	p=0.016*	p=0.010*
Marriage status							
Single	11.2	8.6	**16.0**	7.8	**15.2**	p=0.212	p=0.252
Married/defacto	87.6	74.3	**84.0**	69.2	**82.9**		
Divorced/sep	1.2	1.3	**0 .0**	0.8	**1.9**		
Education							
Unknown	1.0	1.1	**0.0**	1.1	**0.0**	p=0.251	p=0.003*
Year 10 or less	1.5	1.1	**2.7**	0 .8	**2.9**		
Year 10	4.0	2.7	**8.0**	2.3	**7.6**		
Year 11	3.2	2.5	**4.0**	1.9	**5.7**		
Year 12	22.6	18.6	**25.3**	15.8	**30.5**		
Tertiary	67.7	58.2	**60.0**	55.9	**53.3**		
SEIFA							
1	6.3	5.6	**4.0**	5.1	**5.7**	p=0.307	p=0.857
2	1.7	1.1	**4.0**	1.1	**2.9**		
3	8.9	7.0	**12.0**	6.8	**9.5**		
4	28.0	24.1	**25.3**	21.7	**28.6**		
5	55.1	46.4	**54.7**	43.2	**53.3**		

*Statistically significant

Infant data

Slightly more males (53.2%) than females (48.6%) were born. All babies were predominantly well at birth with only 0.4% having an Apgar of less than seven at birth. However, the inclusion criterion for the cohort was well mothers and babies at 37 weeks gestation or more; therefore, all infants were term gestation.

Resuscitation

Despite over 93.0% of infants having an Apgar of seven or above at one minute, over 38.0% were recorded in the health care facility database as having experienced some form of resuscitation at birth. Of those resuscitated, approximately 20.0% were given suction and received facial continuous positive airway pressure (CPAP). Approximately 3.0% of infants had a brief admission to Neonatal Critical Care Unit (NCCU). The admission to NCCU was recorded on the obstetric database. However, by the time the woman was approached for

recruitment her baby was with her and therefore, the admission to NCCU was likely to have been 24 hours or less.

Infant feeding at discharge

On discharge from hospital data reflecting the infant's breastfeeding status was entered into the obstetric database. Table 5 (below) lists the available terms from a drop down list and shows what data was selected for this cohort of women.

Table 5: Infant feeding status on discharge from hospital

Feeding at discharge	Frequency	Percentage
Breastfeeding	391	82.5
Breastfeeding and expressed milk	34	7.2
Expressed milk	5	1.1
Sub total	430	90.8
Breast and formula	38	8.0
Formula	3	0.6
Other/comment	3	0.6

Table 5 illustrates that 99.0% of infants were exclusively breastfed on discharge from hospital. However, it must be assumed that the category of 'breastfeeding' does not = exclusive breastfeeding as the term exclusive breastfeeding is not defined in the database. Therefore, a baby assigned to this category may have had something other than breast milk in the days preceding discharge.

Primary outcome

Exclusive breastfeeding

The primary outcome of this study was to report the exclusive breastfeeding rates at discharge from hospital and at three and six months postpartum. A total of 71.0% of infants were exclusively breastfed on discharge from hospital (infant age on discharge from hospital was between 24 hours to seven days of age). Fifty-seven per cent of infants were exclusively breastfeeding at three months and 4.6% at six months of age.

Although exclusive breastfeeding is considered superior to predominant breastfeeding in terms of health outcomes, using the combined exclusive and predominant rates of breastfeeding it can be reported that 73.0% of infants received breast milk as their main source of food at discharge, 70.0% at three months and 29.0% at six months. Figure 10 presents the combined rates of exclusive and predominant breastfeeding across the study and Table 6 presents the rates of exclusive, predominant and any breastfeeding across the study.

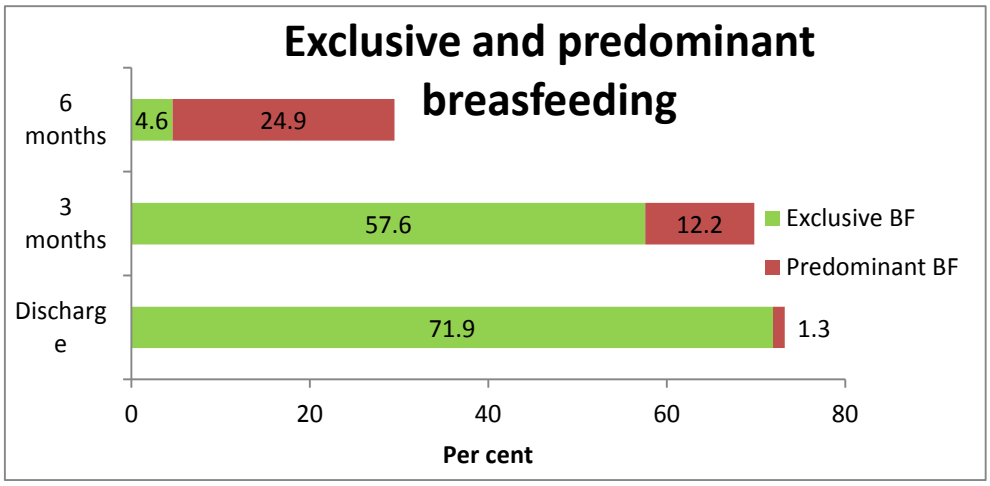

Figure 10: Exclusive and predominant breastfeeding combined rates at discharge, three and six months

Bivariate analysis—discharge phase

The relationship between exclusive breastfeeding at discharge and several independent variables was analysed. The independent variables were chosen because of current evidence of an association with breastfeeding initiation and duration outcomes and include: mode of birth (vaginal or caesarean); skin-to-skin contact at birth; insurance status (public or private); SEIFA categories (one to five); and maternal age (continuous). Formula supplementation in hospital was analysed at discharge phase and, not surprisingly, found to be positively associated with caesarean birth (OR: 0.623, CI 0.410, 0.947, p=0.026) and both were positively associated with decreased breastfeeding rates. Women who had a

caesarean birth were less likely to be exclusively breastfeeding at discharge from hospital (OR 0.603, CI 0.40, 0.90, p=0.014). See Table 7 (below).

Table 6: Bivariate analysis of association between exclusive breastfeeding at discharge

Independent variables	Category	Odds ratio	95% CI	P value
Mode of birth	**Vaginal and caesarean***	0.603	0.40, 0.90	**p=0.014***
Skin-to-skin 0#	Not at all			
Skin-to-skin 1	<15 minutes	0.93	0.43, 2.04	p=0.060
Skin-to-skin 2	15–30 minutes	1.56	0.73, 3.31	
Skin-to-skin 3	30–45 minutes	2.31	1.04, 5.11	
Skin-to-skin 4	45–60 minutes	1.88	0.81, 4.37	
Skin-to-skin 5	>60 minutes (ref)	1.99	0.91, 4.36	
Insurance status	Private and public	1.30	0.869, 1.94	p=0.201
SEIFA#	1 most disadvantaged	1.37	0.56, 3.33	p=0.482
SEIFA	2	0.41	0.10, 1.71	p=0.226
SEIFA	3	1.04	0.50, 2.15	p=0.902
SEIFA	4	1.28	0.78, 2.03	p=0.327
Maternal age	continuous	1.00	0.97, 1.04	p=0.709
Marriage Status	Married/defacto and single	1.62	0.92, 2.88	p=0.094
Formula supplementation in hospital	**Vaginal*** and caesarean	**0.623**	**0.410, 0.947***	**p=0.026***

*Statistically significant; # (SEIFA 5 obs not used); # (Skin-to-skin–0 obs not used)

There were no further statistically significant associations found in bivariate analysis for the chosen variables at discharge phase. However, skin-to-skin contact almost reached statistical significance (p=0.060) and there was a statistically significant linear trend (p=0.009) that is illustrated below (Figure 11) that shows an increasing positive association with exclusive breastfeeding with increasing skin-to-skin time. The time points of 15–30 and 35–40 and >60 were the optimum time frames.

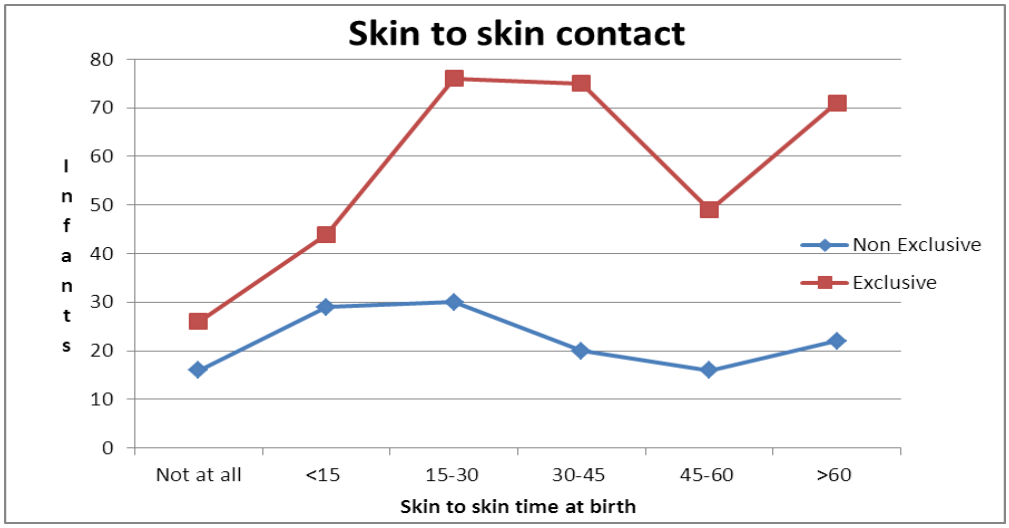

Figure 11: Trends of exclusive breastfeeding and time spent skin-to-skin at discharge phase. Infant data refers to numbers of infants.

Multivariate analysis—discharge phase

The dependent primary variable (outcome) was the length of time each woman breastfed exclusively at discharge, three and six months postpartum. Four independent variables were considered for inclusion into a regression model to identify factors that might influence exclusive breastfeeding at discharge from hospital. Selection of variables for logistic regression modelling assumes that there is no relationship between the dependant variable and the variables have a univariate test p-value <0.25.

Further, variables that are clinically and intuitively relevant may be included regardless of statistical significance (Hosmer & Lemeshow, 2000). The variables used in logistic regression meet this criterion. There were no statistically significant associations between exclusive breastfeeding after adjusting for independent variables with multiple logistic regression analysis in discharge phase of the study, as shown in Table 8. The independent variables that were included in the model were:

- mode of birth (reference category: vaginal birth—other: caesarean birth)
- skin-to-skin contact (reference category: >60 minutes—this was divided into five categories)
- insurance status (reference category: private or public)
- marriage status (reference category: married/defacto or other: single).

Table 7: Multivariate analysis of association between exclusive breastfeeding and independent variables at discharge from hospital

Independent variables	Category	Odds ratio	95% CI	p value
Mode of birth	Vaginal/caesarean	0.701	0.424, 1.15	p=0.166
Skin-to-skin 0#	Not at all			
Skin-to-skin 1	<15 minutes	0.879	0.400, 1.93	p=0.750
Skin-to-skin 2	15–30 minutes	1.38	0.639, 3.01	p=0.406
Skin-to-skin 3	30–45 minutes	1.93	0.848, 4.39	p=0.117
Skin-to-skin 4	45–60 minutes	1.49	0.602, 3.69	p=0.387
Skin-to-skin 5	>60 minutes (ref)	1.55	0.645, 3.73	p=0.326
Insurance status	Private and public	1.32	0.854, 2.04	p=0.210
Marriage status	Married/defacto and single	1.49	0.817, 2.72	p=0.193

(Skin-to-skin–0 obs not used)

Bivariate analysis—three months

Exclusive breastfeeding and cessation of breastfeeding at three months

The relationship between exclusive breastfeeding at three months and several independent variables was analysed. The independent variables were chosen because of current evidence of an association with breastfeeding initiation and duration outcomes and included: mode of birth (vaginal and caesarean); skin-to-skin contact; insurance status (public or private); maternal age; SEIFA category; and formula supplementation for early cessation of breastfeeding. Exclusive breastfeeding at three months was significantly associated with insurance status; skin to skin, SEIFA category and maternal age. Results for bivariate analysis of three month data are shown in Table 9 (below). Formula supplementation, at any time during the hospital stay, was analysed to explore any association with cessation of breastfeeding at three months postpartum and a strong positive association was found (OR: 0.388). Early cessation of breastfeeding at three months was positively associated with lack of support at three months (OR: 29.0) and exclusive breastfeeding at discharge was positively associated with exclusive breastfeeding at three months (OR: 2.66).

Table 8: Bivariate analysis of association between independent variables with exclusive breastfeeding* at three months and cessation of breastfeeding at three months**

Independent variables*	Category	Odds ratio	95% CI	p value
Mode of birth	Vaginal/caesarean	0.711	0.47, 1.06 2.111	p=0.100
Skin-to-skin 0#	Not at all			
Skin-to-skin 1	<15 minutes	0.48	0.20, 1.15	**p=0.026***
Skin-to-skin 2	15–30 minutes	0.60	0.27, 1.35	
Skin-to-skin 3	30–45 minutes	1.15	0.50, 2.62	
Skin-to-skin 4	45–60 minutes	0.78	0.32, 1.91	
Skin-to-skin 5	>60 minutes (ref)	1.30	0.56, 3.01	
Insurance Status	**Public and private**	**1.49**	**1.00, 2.23***	**p=0.046***
SEIFA#	**1 most disadvantaged**	**0.33**	**0.14, 0.77**	**p=0.011***
SEIFA	3	0.90	0.43, 1.89	p=0.791
SEIFA	4	0.88	0.55, 1.39	p=0.599
Maternal age	Continuous	1.03	0.99, 1.07	p=0.101
Marriage status	Married/defacto and single	1.48	0.80, 2.74	p=0.200
Exclusive breastfeeding at discharge	**Exclusive breastfeeding at three months**	**2.66**	**1.68, 4.20***	**p=0.001***
Formula supplementation in hospital	**Cessation of breastfeeding at three months**	**0.388**	**0.23, 0.65***	**p=0.001***
Lack of support	**Cessation of breastfeeding at three months**	**29.0**	**12.9, 65.4***	**p=0.001***

*Statistically significant; #SEIFA 2 dropped (5 obs not used); # (Skin-to-skin–0 obs not used)

A trend similar to those found in the discharge phase was also found in the three month data for skin-to-skin contact. Meaning an increased positive association with exclusive breastfeeding was found with increased time spent in skin-to-skin contact with mothers (p=0.026). Furthermore the time frames of 15–30, 35–40 and >60 were again optimum for exclusive breastfeeding. This is shown in Figure 12 below.

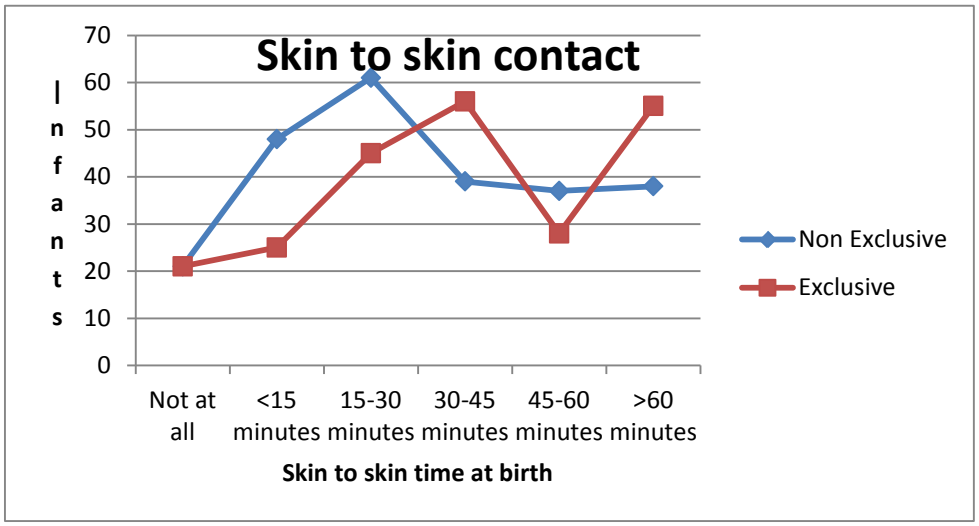

Figure 12: Trends of exclusive breastfeeding and time spend skin-to-skin at three months. Infant data refers to numbers of infants.

Multivariate analysis—three months

Multivariate analysis that looked for factors associated with the primary outcome was undertaken using multiple logistic regressions with SEIFA category and maternal age added to the variable for the analysis. The SEIFA category and maternal age were added to the analysis at three months as the bivariate p value met the criterion for multivariate analysis of < 0.25. Formula supplementation was added because of a significant positive association found for early cessation of breastfeeding as reported above in Table 9. The relationship between exclusive breastfeeding at three months was tested with:

- mode of birth (reference category: vaginal birth—other: caesarean birth)
- skin-to-skin contact (reference category: >60 minutes; this was divided into five categories)
- insurance status (reference category: private—other: public)

- SEIFA (reference category: quintile 5—most advantaged—other; this was divided into four categories)
- maternal age—continuous
- formula supplementation (early cessation—other: breastfeeding).

After controlling for the independent variables a statistically significant negative association was found for exclusive breastfeeding at three months with SEIFA Category One or most disadvantaged. A statistically significant positive association was also found for any formula supplementation in hospital and cessation of breastfeeding at three months, Table 10 (below) illustrates the findings of multivariate analysis.

Table 9: Multivariate analysis association between independent variables with exclusive breastfeeding and cessation of breastfeeding at three months

Independent variables*	Category	Odds ratio	95% CI	p value
Mode of birth	Vaginal/caesarean	0.826	0.484, 1.41	p=0.486
Skin-to-skin -0#	Not at all			
Skin-to-skin 1	<15 minutes	0.453	0.18, 1.13	p=0.090
Skin-to-skin 2	15–30 minutes	0.571	0.23, 1.36	p=0.209
Skin-to-skin 3	30–45 minutes	0.900	0.36, 2.20	p=0.819
Skin-to-skin 4	45–60 minutes	0.673	0.24, 1.82	p=0.438
Skin-to-skin 5	>60 minutes (ref)	1.142	0.43, 3.00	p=0.787
Insurance status	Private and public	1.25	0.788, 1.98	p=0.340
SEIFA#	**1 most disadvantaged**	**0.369**	**0.148, 0.920**	**p=0.032***
SEIFA	3	0.970	0.447, 2.10	p=0.940
SEIFA	4	0.942	0.581, 1.52	p=0.810
Maternal age	Continuous	1.02	0.982, 1.07	p=0.248
Formula supplementation in hospital	**Cessation of breastfeeding at three months**	**0.402**	**0.244, 0.664**	**p=0.001***

(Skin-to-skin–0 obs not used)

Bivariate analysis—six months

The relationship between exclusive breastfeeding at six months and several independent variables was analysed. Mode of birth: (vaginal or caesarean birth), skin-to-skin contact: > 60 minutes (five categories); insurance status: (private and public); SEIFA Category: (five categories); and maternal age: (continuous). Formula supplementation in hospital and exclusive breastfeeding at three months were analysed for an association with cessation of breastfeeding. Significant positive associations was found were those of formula supplementation and cessation of breastfeeding (p=0.001). Any formula supplementation in hospital is significantly positively associated with cessation of breastfeeding at six months;

further, exclusive breastfeeding at three months is significantly positively associated with continuation of breastfeeding at six months (p=0.001).

Table 10: Bivariate analysis association between independent variables with exclusive breastfeeding* and cessation of breastfeeding at six months**

Independent variables*	Category	Odds ratio	95% CI	p value
Mode of birth	Vaginal/caesarean	0.65	0.43, 0.22	p= 0.434
Skin-to-skin 0#	Not at all		0.12, 4.83	p=0.775
Skin-to-skin 1	<15 minutes	0.763	0.12, 4.83	p=0.775
Skin-to-skin 2	15–30 minutes	0.518	0.08, 3.26	p=0.484
Skin-to-skin 3	30–45 minutes	1.2	0.22, 6.30	p=0.829
Skin-to-skin 4	45–60 minutes	0.318	0.02, 3.67	p=0.359
Skin-to-skin 5	>60 minutes (ref)	0.378	0.05, 2.81	p=0.343
Insurance status	Private and public	1.06	0.401, 2.81	p=0.902
SEIFA#	1	0.94	0.11, 7.81	p=0.960
SEIFA	3	1.45	0.29, 7.04	p=0.644
SEIFA	4	1.11	0.36, 3.40	p=0.854
Maternal age	Continuous	1.03	0.93, 1.13	p=0.495
Formula supplementation in hospital	**Cessation of breastfeeding at six months**	**0.426**	**0.262, 0.694***	**p=0.001***
Exclusive breastfeeding at three months	**Continuation of breastfeeding at six months**	**25.9**	**13.8, 48.6***	**p=0.001***

(Skin-to-skin–0 obs not used) *Statistically significant.

Multivariate analysis—six months

A regression analysis to examine the association with exclusive breastfeeding at six months was not statistically viable due to the small number of women exclusively breastfeeding at that time (n=16). The assumption is that you require at least 10 cases per independent variable and this was not able to be tested.

Other responses at three and six months.

The women were asked to identify the influences that were important to them when making a decision to breastfeed their baby—women were given the option of choosing more than one answer. The three most important influences identified were family or mother/in-law (59.0%) followed by other (46.0%) and antenatal class attendance (31.0%). There was a wide range of responses given in the comments section of the survey that may reflect the category of other. For example, seven main categories were identified including: advice from Australian Breastfeeding Association (ABA); own knowledge; midwives information;

awareness of benefits; natural/breast is best; books; and doctor's advice. A summary of the decision to breastfeed is provided in Figure 13.

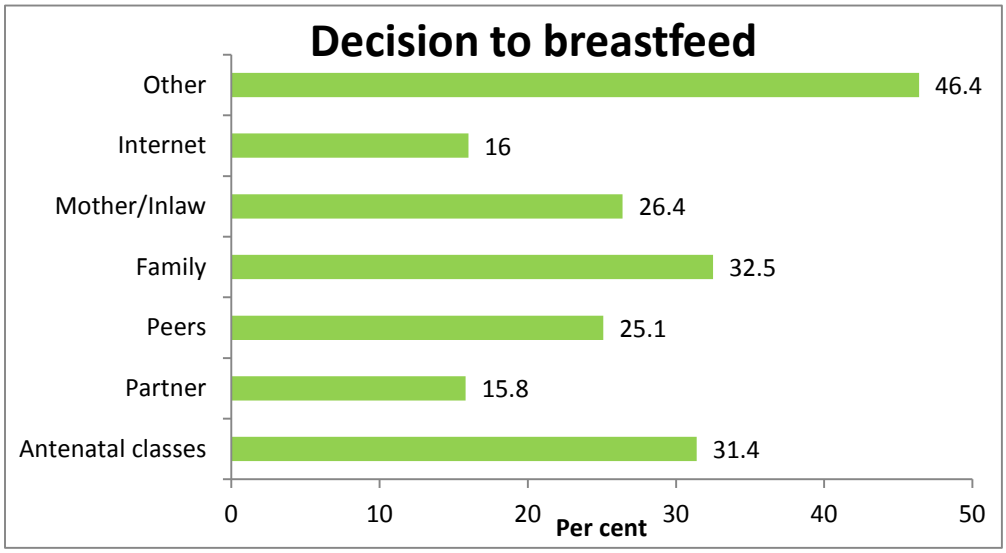

Figure 13: Influences on maternal decision to breastfeed

Women were asked if the care they received in hospital assisted them with breastfeeding and a large proportion of women (77.0%) responded positively. Further, 15.2% of women said the care partially assisted with breastfeeding and 7.8% said the care did not assist at all. Of significance, breastfeeding confidence at discharge was reasonably high with 67.0% of women confident, 28.0% partly confident and only 4.7% not at all confident. Women were asked if they accessed the breastfeeding support centre or see a lactation consultant at the facility and (19.4%) said yes they did access this service. The women that accessed the lactation service were asked if they found it helpful and (82.5%) of those women said they found it helpful.

Women who had ceased breastfeeding at three months were asked to identify the main reason for ceasing. Lack of support was identified as the main reason for cessation of breastfeeding for 58.6% of women. Figure 14 illustrates the key reasons women involved in this study provided for ceasing breastfeeding.

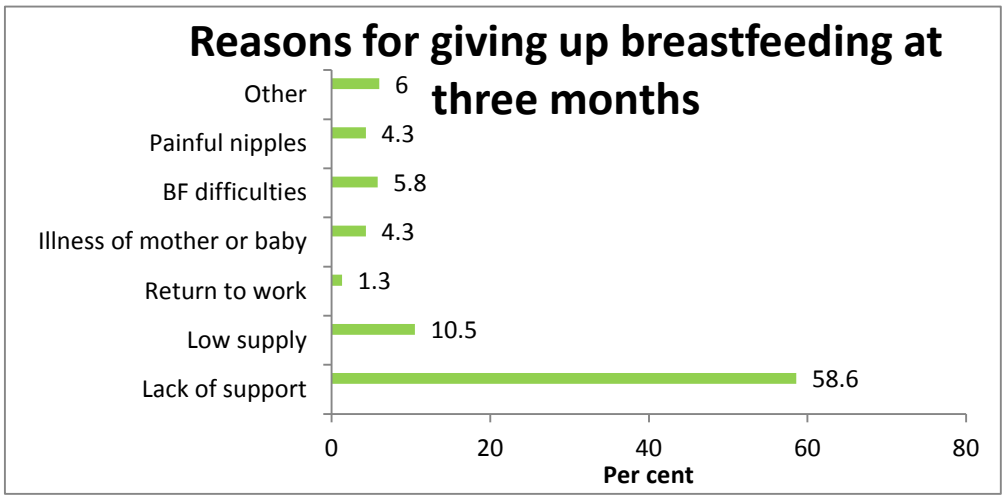

Figure 14: Maternal reasons for giving up breastfeeding at three months

Women were asked to identify the provider they chose to consult with for breastfeeding support in the community, if needed. Women identified a range of support providers with GPs and child health clinics the most popular providers accessed, as indicated in Figure 15.

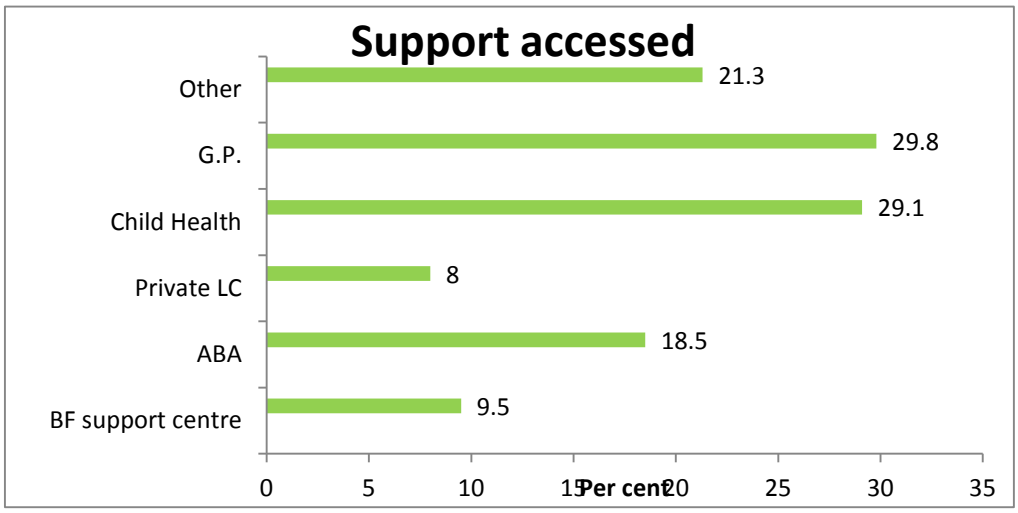

Figure 15: Support accessed in the community

During the three month telephone interview, women were asked if they were giving anything other than breast milk to their infant and, if so, could they identify these supplements. Figure 16 indicates a range of supplements that infants were receiving. Interestingly, tea was the most popular supplement given at three months of age (24.0%) and vitamins and minerals

was also popular (20.0%). This finding is noteworthy considering the infants were all well babies.

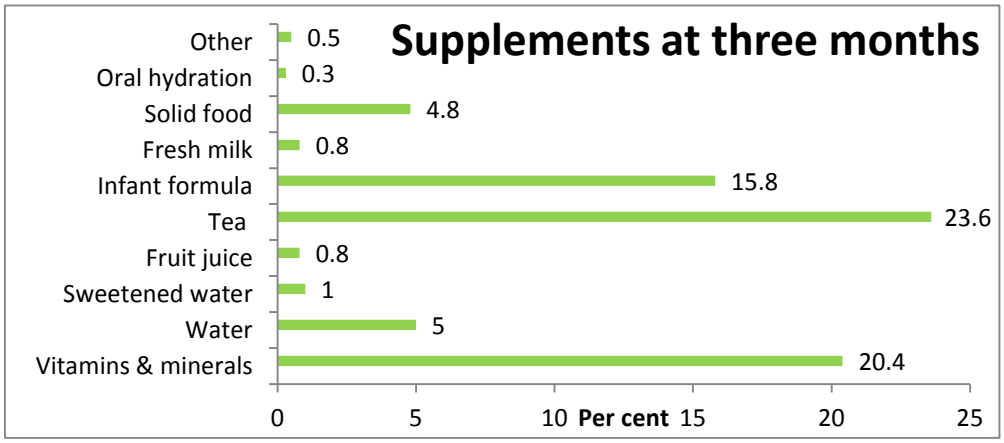

Figure 16: Supplements given to infants at three months of age

Decision making at six months

Women who had ceased breastfeeding at six months were asked to identify the main reason for ceasing. The highest response, indicated by 11.0% of women, was low supply. The second most common response from 9.0% of women was other. Comments that may be reflective of the 'other' were grouped into categories such as: return to work; breastfeeding difficulties; tongue tie; and formula was easier. Interestingly, this differed from the highest response to cessation of breastfeeding at three months which was lack of support. Of note, support did not appear to be an issue and was not a significant factor at six months postpartum.

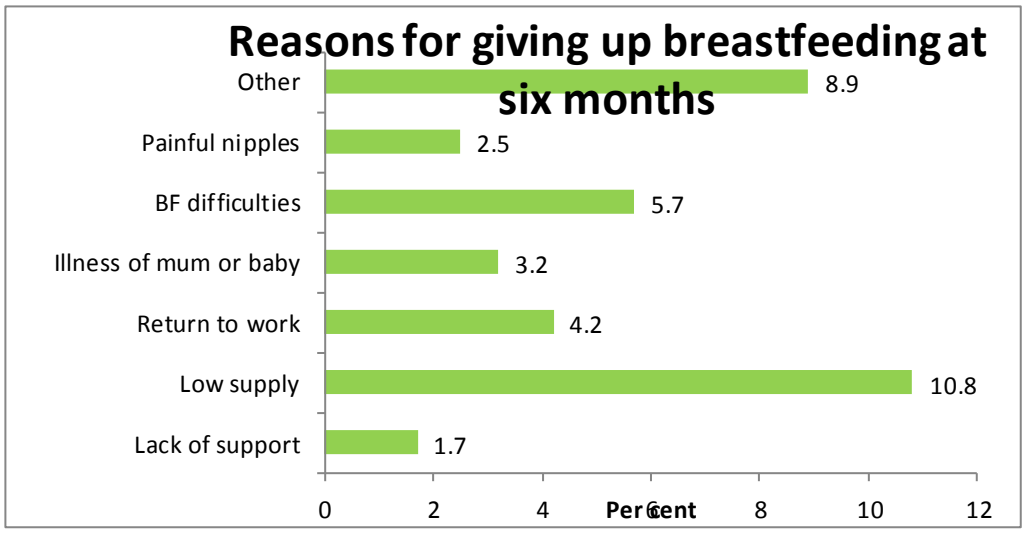

Figure 17 Reasons women gave for ceasing breastfeeding at six months

Women were asked if they were giving anything other than breast milk to their infant at six months and if so to identify these supplements. Figure 18 indicates the range of supplements the infants were receiving at six months postpartum. Tea was no longer a factor; however, 20.0% of infants were still receiving vitamins and minerals.

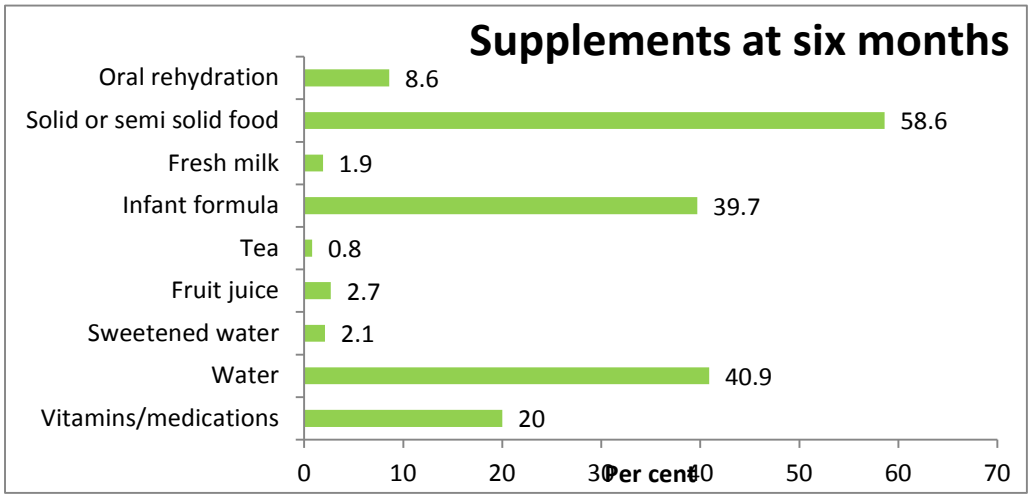

Figure 18: Supplements given to infants at six months

Summary of findings

The finding that remained significant for exclusive breastfeeding at three months and the primary outcome of interest after controlling for confounders, was SEIFA category one, or most disadvantaged, (p=0.030). This finding is not surprising and confirms previous findings

(Forster et al., 2006; Meedya et al., 2010) that may demonstrate decreased exclusive breastfeeding is related to a combination of factors that are not limited to the care provided in hospital. Additionally, lack of support was identified in women's responses as a major reason why they ceased breastfeeding; there was a positive association found in bivariate analysis for women who had ceased breastfeeding at three months and lack of support (p=0.001). Therefore, this indicates that postnatal breastfeeding support for women in the first months after birth, in particular for women from lower socio-economic demographics, is needed. The other finding of significance was the relationship between any formula supplementation in hospital and early cessation of breastfeeding at three and six months postpartum (p=0.001). Of significance, this also reflects previous research in this area (Biro et al., 2011; Forster et al., 2006; Hauck, Fenwick, Dhaliwal, & Butt, 2011). Formula supplementation of well babies is a modifiable factor and priority should be given to education and informed consent processes around supplementation of the well-baby. In particular, health professionals caring for women should be provided with education about the risks of formula supplementation for the continuation of breastfeeding. Further, women should also be aware of the well documented risks of this intervention. Investigation into why the practice of formula supplementation of the well-baby is occurring at this facility is warranted; a consent form and explanation for supplementation will assist this process. The finding of the additional supplements of tea, vitamins and minerals is significant and interesting in terms of the potential for further research in this area in order to determine the reasons women use particular supplements for the well-baby. Overall, women in this study were more likely to breastfeed long term, or more than six months, when they were exclusively breastfeeding at three months, (p=0.001).

The following chapter, Chapter Five, will present a discussion of the main findings of this study related to the current evidence and the BFHI. Recommendations are made for interventions to change practice and improve breastfeeding outcomes for women and their

infants and for further research, policy and planning and education. Chapter Five will also discuss any limitations of the study.

CHAPTER FIVE: DISCUSSION

This study aimed to determine the exclusive breastfeeding rates of women at discharge, three and six months at a tertiary hospital prior to BFHI accreditation. This chapter presents a summary of the main findings surrounding exclusive breastfeeding and what was associated with this finding at discharge, three and six months. This chapter will also discuss the relevance of the findings applicable to previous research and current literature surrounding this topic as well as how the findings relate to the BFHI. The limitations of the study and research design are discussed and the implications of the results are considered and discussed with relevance to the facility and in general.

Breastfeeding prior to discharge from hospital

The exclusive breastfeeding rate at discharge from hospital for this cohort of well women and well babies was 71.9%. This rate is significantly lower than the national average exclusive breastfeeding rate of approximately 90.0% (Australian Institute of Health and Welfare, 2011) and lower than the maternity facility reports annually which is between 80.0–90.0% (Mater Health Services, 2009). This data is concerning and may be due to a number of reasons. Firstly, the 24-hour dietary recall survey used in the cohort study is designed to capture the previous 24 hours of infant feeding practices from the mother of the infant (Webb et al., 2001). Additionally, as the survey is likely to be more accurate than data entry at the time of discharge, it could also be possible that data captured by maternity facilities is not as accurate as the dietary recall in the last 24 hours from the mother. Therefore, a false understanding of the exclusive rates of breastfeeding on discharge from this facility and/or from state and national data may be noteworthy. Thirdly, 71.9% of infants exclusively breastfeeding at discharge is below the expected exclusive rate based on recommendations from the BFHI and Queensland Health and below what was expected for the facility based on current data. Further, it was surprising that the exclusive rate on

discharge was not higher in this cohort given the sample of well women and babies, all of whom intended to breastfeed and were expected to be at less risk of receiving any formula. All of these findings may reflect current practices at a hospital that has not introduced the BFHI.

The factors that may have influenced the number of women who were exclusively breastfeeding on discharge include the higher rates of caesarean births at this institution when compared to national rates. Caesarean birth was statistically significant in relation to formula supplementation (OR: 0.603, CI: 0.40, 0.90, p=0.014) and if the baby had received formula supplements within 24 hours prior to discharge it was no longer exclusively breastfeeding. In bivariate analysis this study found a negative association with mode of birth and exclusive breastfeeding on discharge, with women having a caesarean birth being less likely to leave hospital exclusively breastfeeding than those having a vaginal birth (OR: 0.623; CI: 0.40, 0.90). The relationship between caesarean birth and formula supplementation is supported in the literature (Biro et al., 2011; Forster et al., 2006; Semenic et al., 2008) and caesarean birth has been shown to contribute to significant delay in initiation of breastfeeding and therefore increasing the likelihood that formula supplementation is introduced (Baxter et al., 2009; Rowe-Murray & Fisher, 2002). It is important to note this outcome will require a clearly defined plan for education and support for women after caesarean birth. One way to address this issue would be to implement informed consent strategies regarding supplementation of the well-baby, that are introduced both antenatally and postnatally, along with education for midwifery and medical staff which is Step Six of the BFHI process.

Skin-to-skin contact for mothers and infants has been reported as being associated with decreased problems with breastfeeding in the early postpartum period and increased breastfeeding duration (Crenshaw, 2007; Mikiel-Kostyra, Mazur, & Boltruszko, 2002; Moore, 2005). This study found a linear trend which showed that increasing skin-to-skin time

immediately after birth was related to exclusive breastfeeding at discharge (p=0.009). Although this trend was significant, an overall association was not found in regression analysis. However, an interesting finding when considering the skin-to-skin contact data occurred at the time point of 45–60 minutes. Mothers and infants who remained in skin to skin contact for this amount of time were less likely to exclusively breastfeed on discharge and at three months postpartum, than for the time frames before and after. It is difficult to know why this finding has occurred and discussion with birth suite staff has not provided any further clarification. One hypothesis is that women who have had an epidural anaesthesia are more likely to be immobile after birth for about this length of time. Babies are also more likely to be sleepy and not interested in breastfeeding leading to disruption of the first breastfeed and ongoing breastfeeding difficulties (Moore & Anderson, 2007; Torvaldsen et al., 2006).

Although epidural anaesthesia was not found to be associated with exclusive breastfeeding in this study, this may be a factor and requires further investigation. Thus, the significant trend indicates that the more time spent skin-to-skin, the more likely women are to breastfeed exclusively (Moore & Anderson, 2007). Furthermore, this highlights the importance of allowing mothers and babies to stay together after birth and it is particularly important for the baby to remain skin-to-skin until after the first successful breastfeed (Moore & Anderson, 2007). This recommendation may be difficult to achieve due to the demands and time constraints that are the reality of a busy tertiary birthing suite environment. One strategy is stopping the unnecessary administration procedure of recording the infant weight on the database before other administrative procedures are undertaken in order for the baby to be discharged to the postnatal ward. Reviewing administration procedures should be implemented as a priority as this would keep mothers and babies in skin-to-skin contact for longer and create time saving opportunities for the birth suite staff.

The preliminary bivariate analysis found exclusive breastfeeding at discharge was positively associated with exclusive breastfeeding at three months; in fact women were two and a half times more likely to be exclusively breastfeeding at three months if they left hospital exclusively breastfeeding (OR: 2.66, CI: 1.68, 4.20, p=0.001). This is an important finding prior to the implementation of the BFHI as it seems to indicate that the time before discharge from hospital when the BFHI practices, such as giving no supplements and rooming-in, are experienced may be influential for long term breastfeeding for this population of women. Therefore, full implementation of the BFHI at this facility has the potential to improve long term breastfeeding outcomes. As there were no significant variables found in the multivariate analysis at discharge, which were associated with exclusive breastfeeding in this study, it is proposed that supplementation of the baby with any formula and non-exclusive status are the most significant indicators related to ongoing breastfeeding success attributable to the in-hospital stay, in the early postpartum period for the women in this study.

Exclusive breastfeeding findings at three months

The exclusive breastfeeding rate at three months was 57.6% and this is a positive finding when compared to the state data (38.0%) and national data (48.0%) (Australian Institute of Health and Welfare, 2011; Queensland Health: Paul et al., 2007). Additionally, when considering the data collection time period for this study was less than four months this finding is particularly positive. However, it is not possible to reliably compare data between the studies due to the purposive sampling used in the cohort study that excluded women and babies that were unwell or preterm and only included women that intended to breastfeed. Also, the different survey tools that were employed across the studies and the differences in the sample population are relevant. For example, the Queensland study samples were all drawn from the public sector and the cohort study was public and privately insured women and all of these factors may make the data less generalisable. Nevertheless, given the lower than expected exclusive breastfeeding rate at discharge for the cohort (71.9%), the exclusive

breastfeeding rate at three months (57.6%) remains encouraging, though still falling short of the Queensland Health target of 60.0% of infants exclusively breastfed at three months (Queensland Health, 2003).

There were a number of associations found in preliminary analysis for exclusive breastfeeding at three months. Skin-to-skin contact was statistically significant and is a modifiable factor that is related to hospital practices (p=0.026). The study also found that privately insured women were more likely to be exclusively breastfeeding when compared to publically un-insured women (OR: 1.49, CI: 1.00, 2.23, p= 0.046). The SEIFA Category One (most disadvantaged) (OR: 0.33, CI: 0.14, 0.77, p=0.011) were less likely to be exclusively breastfeeding at discharge. Further, a positive association was found between breastfeeding cessation at three months and lack of support (OR: 29.0, CI 12.9, 65.4 p=0.001). However, after regression analysis SEIFA Category One (most disadvantaged) was the only variable that remained significantly positively associated with lower rates of exclusive breastfeeding at three months (OR: 0.369, CI 0.14, 0.92, p=0.030).

Studies have consistently found an association between socio-demographic factors and reduced breastfeeding duration (Dennis, 2002a; Flacking et al., 2007; Forster et al., 2006; Meedya et al., 2010); thus, it is not surprising to find a relationship in this study. The way forward in terms of recommendations in this area, especially in relation to the BFHI, is complex because the BFHI is not able to specifically address these factors. Empirical evidence would suggest that successful interventions for increasing breastfeeding rates in a population where the initiation rate is high, such as Australia, may be a challenge (Fallon et al., 2005). Conversely, it has been argued that where breastfeeding rates are lowest breastfeeding interventions have the potential to have the most positive effect; particularly support interventions in the early postpartum period (Britton et al., 2007; Fallon et al., 2005).

Therefore, it is possible that focusing attention on vulnerable groups who are at risk of ceasing breastfeeding early, such as those with less advantage and access to social support, has the potential to have the most effect as they are the groups with lower rates (Chung et al., 2008a; Dennis, 2002a; Forster et al., 2006). Maternal age and education were not factors that were associated with exclusive breastfeeding in this study. However, SEIFA Category One (most disadvantaged) was significant and finding interventions to address this is likely to improve breastfeeding rates for this population. Women in this study also identified that lack of support was a major reason why they ceased breastfeeding. Furthermore, evidence suggests that breastfeeding rates have been improved for vulnerable groups with programs that offer continuity of support, social support that addresses social needs such as support from a woman's own family and peer support (Dennis et al., 2002; Hoddinott, Lee, & Pill, 2006; Renfrew et al., 2012; Semenic et al., 2008). Thus, interventions for improving breastfeeding outcomes should focus on these factors and this is arguably where full implementation of the BFHI has the potential to have a positive effect. The BFHI and The Ten Steps are used as a template for each organisation to develop appropriate interventions that will improve breastfeeding rates. For this facility it is recommended that interventions are incorporated into The Ten Steps template to create meaningful change that is relevant to this population of women. For example, continuity of support programs and peer support could be incorporated into Step Ten that addresses support for women.

One way to achieve this outcome is to introduce postpartum breastfeeding groups that are inclusive of family and social support persons. Influencing family members may also be facilitated through Step Three, which is about offering appropriate and relevant antenatal education. This would provide an opportunity to further address social support by developing programs that focus on the woman's partner and family/mother into the antenatal education curriculum. Support programs that are socially relevant to the women such as peer support and antenatal classes that include the women, mother and wider social networks should be implemented at this facility as a priority to address low breastfeeding rates.

A significant finding at three months was that of formula supplementation in hospital and early cessation of breastfeeding. Formula supplementation of the newborn is well documented in the literature as a risk for early cessation (Biro et al., 2011; Dennis, 2002a; Forster et al., 2006; Kruske et al., 2007; McAllister et al., 2009; Meedya et al., 2010; Merten & Ackermann-Liebrich, 2004; Semenic et al., 2008; Spiby et al., 2009; Tarrant et al., 2011). In this study supplementation was significantly associated with early cessation at three months and remained so after adjustment for possible confounders. Unlike the maternal demographic factor of SEIFA Category One (most disadvantaged), formula supplementation is potentially modifiable though education, support and informed consent processes both antenatally and while the mother is in hospital. Again, the BFHI provides the template to address this factor. For instance, Step Six addresses formula supplementation and informed consent interventions, Step One allows the facility to develop a policy around formula supplementation and Step Two addresses staff education around formula supplementation. Further, Step Three allows for antenatal education around formula supplementation and Step Five addresses education around hand expressing that may mitigate the risk of formula supplementation. Hence, it is clear that when engaged appropriately the BFHI is a mechanism that could be an effective tool to facilitate interventions regarding formula supplementation of the well-baby, as was found previously in a study around BFHI (Radford & Southall, 2001).

This cohort of women provided the facility with the information to target interventions based on these findings and processes to mitigate the risk of formula supplementation should be implemented as a priority. A combination of interventions that address support for vulnerable groups, as discussed, and formula supplementation interventions are likely to make a difference to long term breastfeeding outcomes for this population. As formula supplementation and risk of early cessation of breastfeeding is not an isolated research finding, this recommendation is also likely to be applicable to the general population, and

attention should be given to this highly modifiable factor that evidence overwhelmingly suggests has an impact on long term breastfeeding duration rates.

There appears to not only be a biophysical disadvantage to supplementing with formula such as decreased milk supply; it is also possible that there is a complex psychological impact of formula supplementation that perpetuates further use. Formula is an intervention and as such it is possible that giving formula once is similar to the cascade of intervention that can be seen in maternity care. The literature indicates that giving formula is associated with a threefold increase in early cessation of breastfeeding (Biro et al., 2011; Dennis, 2002a). Of note, this study found a similar positive association with women 60.0% more likely to have ceased breastfeeding at three months if formula supplementation was introduced in hospital (Biro et al., 2011).

Health care professionals need to be aware of the effect of formula supplementation on the duration of breastfeeding and this should be addressed as a matter of priority through education and informed consent processes. Women experiencing breastfeeding difficulties in the early postpartum period, who aim to continue breastfeeding, should be encouraged to avoid formula supplementation where possible. Additionally, women should be given advice and support about expressing and giving expressed breast milk instead of formula supplementation of the well-baby.

Exclusive breastfeeding findings at six months

Bivariate analysis at six months found no significant associations for exclusive breastfeeding though the sample was small (n=16) and this should be considered. Nevertheless, similarly to three months, there was a positive association found with formula supplementation in hospital and cessation of breastfeeding at six months (OR: 0.426, CI: 0.262, 0.694, p=0.001). There was also a positive association found between exclusive breastfeeding at

three months and continuation of breastfeeding at six months (OR: 25.9, CI: 13.8, 48.6, p=0.001). In fact, women who were exclusively breastfeeding at three months were 25 times more likely to still be breastfeeding at six months than women who were not exclusively breastfeeding at three months. The link between exclusive breastfeeding at discharge from hospital and long term breastfeeding rates has been found previously (Spiby et al., 2009) and for this cohort of women it is one of the most significant findings.

There is a relationship between breastfeeding more often and breastfeeding longer and the opposite is also true. Giving formula appears to decrease the duration of breastfeeding for reasons that are likely to be complex but are consistently shown in the evidence. Perhaps, the hormones important to breastfeeding including oxytocin (the hormone of love and connection) and prolactin (the mothering hormone) are significant in motivating the mother. Interference of this hormonal profile with any formula may disrupt the impact of instinctual processes (Crenshaw, 2007; Odent, 2006).

The biophysical processes of breastfeeding, such as the disruption of the breast milk supply that using formula produces, are also likely to be a factor (World Health Organisation, 1998). Further research is needed in this area to better understand the complexities of this disruption to the breastfeeding mother-infant dyad as this study duplicates a compelling link (Spiby et al., 2009). Of particular relevance, the argument that establishing breastfeeding correctly and providing support for women with breastfeeding difficulties in the early days is of utmost importance for long term breastfeeding outcomes (Britton et al., 2007). Multivariate analysis was not possible due to the small number of women in the final stage of this research. However, the consistency with which the link between supplementation with formula and negative breastfeeding outcomes is evident in this study and in the literature, is compelling evidence.

Secondary findings

At discharge from hospital the combined rate of exclusive breastfeeding (71.9%) and predominant breastfeeding (2.0%) was 73.9%. At three months the combined rate was 69.0%. This is an interesting finding. Firstly, the combined rate of 73.9% at discharge is low considering the inclusion criteria of well women, with well babies, who want to breastfeed. Conversely, the combined rate of 69.0% at three months (only 4.0% less than discharge) could be considered a positive finding. Suggesting that if a woman discharges from hospital exclusively breastfeeding or predominantly breastfeeding they were more likely to continue to do so at three months. This summation is made because there was only a 4.0% drop in the combined breastfeeding rate during that time. Once more this is an indication that the time before discharge from hospital has a strong impact on long term breastfeeding outcomes. Thus, the appropriate employment of the BFHI has the capacity to have positive impact at this facility.

Decision to breastfeed

Women reported that when they made their decision to breastfeed their family was the most important influence on them. A woman's social support network, such as their partner and mother can be a strong influence on their decision to breastfed or continuing to breastfeed (Ekström, Widström, & Nissen, 2003). Education in the antenatal period is often able to target the women's partner and this provides an ideal time to influence those who are in the best position to support the breastfeeding mother. A woman's mother may also be very influential, particularly in the postpartum period, and education that is inclusive of, and relevant to, the grandmother of the breastfed infant is something that is not often delivered but may have a positive impact on influencing women's decisions and thus increasing breastfeeding duration (Ekström et al., 2003). Therefore, education that targets the women's mother should be explored at this facility.

Decision to cease breastfeeding

Lack of support was one of the major reasons indicated by women for ceasing to breastfeed their infants by three months. Additionally, this study found a positive association between women that had ceased breastfeeding at three months and those who said they didn't receive enough support (OR: 29.0, CI: 13.9, 48.6, p=0.001). The literature is clear about support interventions and their relationship with breastfeeding outcomes. In particular, support in the first four weeks after birth is associated with better long term breastfeeding outcomes (Britton et al., 2007; Currie et al., 2005) and should; therefore, be available for women. This study has highlighted that if women are exclusively breastfeeding their infant at three months they are likely to continue to breastfeed overall for longer, contributing to their infants, and their own, long term health. Thus, supporting women to overcome breastfeeding problems in the first months after birth, and to try and ensure they overcome these problems without the use of formula where at all possible, is important for long term breastfeeding outcomes. Discharge from hospital exclusively breastfeeding and support in the first weeks were important for long term breastfeeding in this study and strategies that target these areas are strongly encouraged at this facility.

Unexpected findings

Supplements

A surprising finding at three months was that 23.0% of women were giving tea as a supplement to breast milk. It is difficult to know why tea was given to infants at this age, particularly as the survey did not ask for clarification about what kind of tea was being given. It is possible that tea is given for calming reasons such as infant colic and a search of the internet found that camomile tea is advocated for infant colic and for soothing infants to sleep (Louise, 2011).

Resuscitation

Despite over 93.0% of infants having an Apgar of more than seven at one minute, over 38.0% were recorded in the health care facility database as having resuscitation at birth. Of those resuscitated, approximately 20.0% were given suction and received facial continuous positive airway pressure (CPAP) by face mask. This was a noteworthy finding and a factor worth considering in terms of the facilities practice surrounding resuscitation of the well term newborn. Resuscitation separates mothers and infants and this will have an impact on skin-to-skin contact and breastfeeding. It is possible that there are data entry issues and a recommendation is to audit the data entry processes, around resuscitation, to confirm accuracy. Depending on the findings of the audit, further education around infant resuscitation may be required to mitigate unnecessary mother and infant separation.

Limitations

The study had a number of limitations including the differences in some maternal characterises such as tertiary education, insurance status in the attrition group, parity, and purposive sampling all of which possibly reduced generalisability and introduced bias. Further, it is difficult to randomise breastfeeding and for this reason few level one studies exist with regard to breastfeeding and outcomes. This study did; however, employ a relevant methodology for the primary aim of finding if the BFHI improves breastfeeding duration for a cohort of women that meet that criterion.

The women in this study were more likely to be in the SEIFA categories of four and five (to be tertiary educated and having their first baby) than the rates reported in the national data. However, all other maternal characteristics of women in this study were found to be comparable to the facility data for women of low risk status, with the exception of parity. Therefore, this study is generalisable to the population of women attending the facility (Mater Health Services, 2009). Women who were lost to follow-up (LTFU) were more likely to be

publically un-insured than the women who were not LTFU. At six months the difference was 13.9% public LTFU and 8.2% private LTFU and this may have had an impact on the findings.

Conclusion

This chapter has reported the most significant findings from the research and related these findings to the literature presented in Chapter Two. The key findings indicated that women from area's identifiable as SEIFA score 5 are less likely to breastfeed exclusively long term. This key finding should be explored in terms of the support services needed for this demographic. Support is provided in the hospital but ongoing support in the community to assist women to continue breastfeeding is necessary. The findings are significant to the implementation of BFHI because they provide objective data for consideration by the organisation and identify areas for additional research. The following chapter will summarise the main aims and objectives and the findings of the study. Further recommendations for future research, policy and planning and education will be made.

CHAPTER SIX: SUMMARY, RECOMMENDATIONS AND CONCLUSIONS

Summary

This study aimed to determine the exclusive breastfeeding rates of women at discharge, three and six months postpartum from a tertiary birthing facility prior to BFHI accreditation in Brisbane, Queensland, Australia. Further, this study aimed to reveal variables that contributed to the outcome. The objectives for this research were to:

- determine exclusive breastfeeding rates of women at discharge, three and six months post-partum at a tertiary facility prior to BFHI accreditation
- determine factors associated with exclusive breastfeeding
- explore influences surrounding a women's decision to breastfeed
- identify what influences were important to women when deciding to breastfeed
- identify whether women perceived that the breastfeeding support they received in hospital was sufficient
- identify breastfeeding support mechanisms that women access during the postpartum period
- establish complementary feeding practices employed at three and six months of age.

The finding that remained significant for exclusive breastfeeding at three months after controlling for confounders was the SEIFA Category One (most disadvantaged) (OR: 0.369, CI 0.14, 0.92, p=0.030). Additionally, lack of support was identified in women's responses as a major reason why they ceased breastfeeding (OR: 29.0 CI 13.8, 48.6, p=0.001). The other finding of significance was the relationship between formula supplementation in hospital and early cessation of breastfeeding at three and six months postpartum (p=0.001), which supports previous research in this area (Biro et al., 2011; Forster et al., 2006). Women who

were exclusively breastfeeding at three months were more likely (OR: 2.66, 1.68, 4.20, p=0.001) to continue breastfeeding to six months than those who were not exclusively breastfeeding. The finding of the use of tea, vitamins and minerals is a significant and interesting one and perhaps further research in this area is required to determine the reasons women use these particular supplements for the well-baby.

A noteworthy finding was that the exclusive and predominant rate combined at discharge of 73.0% only decreased by 4.0% to 69.0% at three months. This finding indicates that the influence of the very early postpartum period, before women leave hospital and directly afterwards has significant impact on exclusive breastfeeding outcomes and long term breastfeeding rates. Therefore, it is possible that the introduction of the BFHI may positively influence breastfeeding rates for the population of women birthing at this facility and attention should be given to those factors that help women to exclusively breastfeed in the early postpartum period.

Recommendations

1. Further research

1.1. Further research is needed in the area of early mother and infant separation. In particular an observational study may be appropriate to understand the relationship between amount of time spent in skin-to-skin contact and exclusive breastfeeding in consideration of birthing interventions and what is taking place during the immediate postpartum period for the mother and baby.

1.2. A subsequent study collecting data on exclusive breastfeeding rates at the same time post-BFHI implementation should be conducted at this facility.

1.3. Further research surrounding how to individualise breastfeeding support for disadvantaged groups is required.

1.4. An observational study to identify the reasons for supplements such as tea and vitamins is warranted.

2. Policy development and implementation

2.1. Healthy mothers and babies should be kept in skin-to-skin contact until after the first successful breastfeed.

2.2. Women having a caesarean birth should be given the opportunity to have skin-to-skin contact with their well babies until after the first successful breastfeed and also informed of the risk of formula supplementation.

2.3. Well breastfed babies are not given formula supplements unless there is a medical indication.

2.4. Informed consent for formula supplementation of the well breastfed baby is mandatory across both the public and private sectors.

3. Provision of education

3.1. Education is provided to all health professionals supporting breastfeeding about the risk of formula supplementation.

3.2. Education that is inclusive of the women's social networks and aimed at the grandmother of the breastfeed baby is implemented in the antenatal and postpartum periods.

3.3. Resuscitation of well babies is reviewed with a view to providing an education plan if required.

4. Planning

4.1. Support in the early postpartum period is accessible for all women but particularly for those from disadvantaged groups free of charge via the breastfeeding support centre.

4.2. Peer support programs are implemented at this facility.

4.3. Postpartum support classes inclusive of the women's family and social networks are implemented.

4.4. Auditing of administration and resuscitation processes of well babies.

4.5. A definition of exclusive breastfeeding added to the obstetric database.

Conclusion

This study has provided important data with which to implement interventions to support women to breastfeed their babies long term. The research has also highlighted that events during the early postpartum period (before discharge, particularly formula supplementation, have an impact on long term breastfeeding outcomes and full implementation of the BFHI may increase long term breastfeeding rates for this population. The question of the benefit of the BFHI for exclusive breastfeeding and long term breastfeeding duration remains unanswered until post-BFHI data collection. However, this data provides the pre-BFHI rates with which to compare post-BFHI rates. The Ten Steps provide an ideal template for this facility to individualise and incorporate breastfeeding interventions that address the findings of this study and are applicable to the population. Finally, further research should focus on interventions for those who are at risk of early cessation of breastfeeding as shown in this study and the benefits of the BFHI for increasing breastfeeding duration for this population.

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APPENDIX 1: PROCEDURE MANUAL

1.1: Patient information flyer

Research project—Breastfeeding initiation and duration rates of women birthing at Mater Mothers' Hospitals

Mater Mothers' Hospitals are committed to protecting, promoting and supporting breastfeeding. Current research is very clear in relating breastfeeding to better health outcomes for both mothers and babies.

At Mater Mothers' Hospitals, approximately 80.0–90.0% of women go home from hospital breastfeeding their babies. The breastfeeding rate in Queensland drops sharply to 38.1% at three months and 9.5% at six months. As health outcomes are related to the duration of breastfeeding, we are committed to finding ways of helping mothers to breastfeed their babies for longer. At present, the Queensland Health target is that 50.0% of babies should be exclusively breastfed up to six months of age for better health outcomes.

Mater Mothers' Hospitals are currently conducting a research project on breastfeeding initiation and duration rates. Women birthing at Mater Mothers' Hospitals may be eligible to participate in this research project. Participation will involve women being interviewed at discharge and again at three and six months, by telephone, to gather breastfeeding data.

As you have just birthed your baby, we want to make you aware that you may be approached to participate in this research during your stay, by a recruitment officer. A full information and consent package will be available. Should you decide not to participate in this research, your decision will not affect any aspect of the care you receive at Mater Mothers' Hospitals.

Michelle Kelly
Principal investigator.
Telephone: 07 3163 1047

1.2: Patient information sheet

Project team contact:

Michelle Kelly	**Student researcher, Mater Mothers' Hospitals** **07 3163 1047**
Sue Kildea	**Professor of Midwifery, Mater Mothers' Hospitals** **07 3163 6335**

We would like to invite you to participate in research about breastfeeding rates at Mater Mothers' Hospitals. The project has been approved by Mater Health Services' Human Research Ethics Committee (# 1620M) and also has Australian Catholic University (ACU) ethics approval (Q2011-42).

What is the purpose of this project?

Mater Mothers' Hospitals are interested in helping mother's breastfeed their babies for longer. One of the ways to do this is to support new mothers to breastfeed their babies in hospital. The aim of this project is to identify how many women, who plan to breastfeed their babies, are still breastfeeding at three and six months after birth.

What information will the project collect, and why?

We will ask you about how you are feeding your baby and, in particular if you are breastfeeding, what you have offered your baby to drink in the previous 24 hour period. This means we may ask if your baby has received breast milk **or** breast milk and another fluid or medication. The project aims to collect infant nutrition information at the time of your discharge from hospital and when your baby is three and six months of age.

How is the project being conducted?

To help us improve our service, and specifically, to help and support women to breastfeed, we are collecting information and feedback from women who have had their babies at Mater Mothers' Hospitals. If you do choose to be involved you will be interviewed, before discharge from hospital, by a research midwife. The interview will take approximately 10 minutes. You will be asked a series of questions about how you are feeding your baby at this interview and then we will phone you when your baby is three months and six months old to ask a similar series of questions about how you are feeding your baby at that time. If you choose to take part in the research project, we will ask you to sign a consent form. With your permission, the research team would also like to access your medical notes for information relevant to the study. For example, what type of birth you had and if you had

any problems during pregnancy or birth. All such information will be kept confidential—you will not be identified and any such information will not be able to be traced back to you.

What is the benefit of this project?

For you personally, there may not be much benefit. The benefit of participation in this project is to improve the information we have about breastfeeding and infant nutrition and in turn to improve the services we offer women around breastfeeding support. You will have the opportunity to comment and provide feedback about your breastfeeding experience.

Are there any costs?

There will be no additional costs to you. If you decide to participate in the project, the first interview will take place before you leave hospital and follow-up will be by telephone interview at our expense. There will be an investment of your time of approximately 10 minutes per interview. Three interviews means your time investment may be up to 30 minutes overall.

If I take part, will I receive feedback about the results when the project has ended?

The information collected for this project will be part of a thesis and subsequent publication, and a report to Mater's Executive to inform the future development of services. If you are interested in the final results of this research, you can request to be sent a summary of the report by providing your name and address on the consent form.

What are the alternatives to participating?

If you choose to not be involved in giving feedback you will not be disadvantaged. The staff will provide you with the same care and support, either way.

Do you have any questions?

The project team are available to respond to any questions you may have about the study. Please do not hesitate to contact us on the number below. If you have any complaints or concerns about the way the project is being conducted, you may contact the Mater Research Ethics Coordinator on 07 3163 1585. The Research Ethics Coordinator may choose to contact the Patient Representative or Hospital Ethicist.

What if I do not want to participate?

You are free to decide whether or not you would like to take part. If you do agree to take part you are also free to change your mind at any time **without giving a reason**. Whatever decision you make, we will respect that it is

the right one for you. If you decide not to take part this will not affect the care and support you receive from the Mater Mothers' Hospitals.

If you have any further questions please contact:

Michelle Kelly—Project coordinator	07 3163 1047
Sue Kildea—Project supervisor	07 3163 6335

1.3: Consent form

Study identification number……..

CONSENT FORM
Breastfeeding rates of women at discharge, three and six months of age
Evaluation of breastfeeding initiation and duration rates

Project team contact:

Michelle Kelly—Project coordinator	07 3163 1047
Sue Kildea—Project supervisor	07 3163 6335

I have:

- read and understood the information sheet or have had it explained to me
- had any questions or queries answered to my satisfaction
- understood that the evaluation is for the purpose of research, not treatment
- understood that I may complete the questionnaire and/or interview in an appropriate setting of my choice
- been informed that the confidentiality of the information collected about me will be maintained and safeguarded
- been assured that I am free to withdraw from the project at any time without comment or penalty
- agreed to participate in the project
- understood that I will be interviewed at three different time points, at discharge from hospital and when my baby is three and six months of age, and consent to all three interviews
- agreed for the research team to access my medical notes for information relevant to the study providing all such information is kept confidential, and cannot be traced back to me.

Participant

Name (please print clearly): ……

Signature: ……..Date ……..

Witness (Researcher)

Signature: ……Name: ……..Date ……..

Contact details for follow up:

Home phone……

Mobile ……

Alternative mobile ……

Alternative land line number (or relative if moving)……

Email address……

I would like to receive a copy of the final report: Yes ☐ No ☐

Address ……

This study has been approved by Mater Health Services' Human Research Ethics Committee and participants may contact the Mater Research Ethics Coordinator on 07 3163 1585, should they have any complaints about the conduct of the research or wish to raise any concerns. The Research Ethics Coordinator may contact the patient representative or hospital ethicist at their discretion.

1.4: Discharge: recruitment and initial interview process

1. Daily check of patient details (PD) list on postnatal wards via the team leader (TL).
2. Daily check study potentials—tray available on each postnatal floor for list of names of eligible participants.
3. Triage to study if woman meets criteria.
4. Approach woman with ***participant information sheet*** and offer to answer any questions she may have. Make a time to return for a decision to consent—usually four to six hours or before end of shift.
5. If the woman consents to participate in the trial, answer any further questions and obtain consent via ***participant consent form.***
6. Conduct interview as per ***discharge interview template*** on receipt of consent if appropriate or make a time, before discharge, to return and conduct interview.
7. Keep paper work in individual files.
8. Allocate study identification number and write this on the consent form and other relevant paperwork—this will be coded as follows:
    a. for discharge interviews as 1:1, 1:2, 1:3 etc
    b. for three months interviews as 2:1, 2:2, 2:3 etc
    c. for six months interviews 3:1, 3:2, 3:3 etc.
9. Enter details of each woman, including study identification number into ***telephone recruitment database***—keep statistics of women that have declined or are ineligible.
10. Inform woman of an approximate date and time for three and six month follow up interview via telephone.
11. Ensure telephone land line, mobile number and email address are collected, where available, and include at least one other contact number of a relative or friend, where available.
12. Ensure that each woman is aware of the importance of the timing of the three and six month telephone interviews. Provide details of follow up phone calls.
13. Send email confirming participation in this trial and remind each woman that they will be sent an email, approximately one week prior to their three and six month scheduled interview, as a reminder.
14. Maintain Excel Spread sheet of date and time of initiation interview for each women and date and time of scheduled follow up interviews at three and six months.
15. File de-identified interviews in locked filing cabinet.

1.5: Discharge interview template

Please indicate your level of agreement or satisfaction with the following statements by shading the number on the scale provided.

Please fill in marks like this: ●

Not like this: ⊘ ⊗ ✔

24 hour recall	

	Can you tell me how old your child is today? **(exact date of birth, if possible)**	

1. What people, information or sources were most important to you in deciding how you would feed your baby? More than one answer is acceptable.

Antenatal classes	Partner	Peers	Family	Mother/ Mother in-law	Internet	Other
O	O	O	O	O	O	O
Comments:						

2. Since this time yesterday has your baby been breastfeed?

Yes O No O

If yes, was this (name) main source of food?

Yes O No O

3. Since this time yesterday did your baby receive any of the following?

a)	Vitamins, mineral supplements, medicine	Yes	O	No	O
b)	Plain water	Yes	O	No	O
c)	Sweetened or flavoured water	Yes	O	No	O
d)	Fruit juice	Yes	O	No	O
e)	Tea or infusion	Yes	O	No	O
f)	Infant formula	Yes	O	No	O
g)	Tinned, powdered or fresh milk	Yes	O	No	O
h)	Solid or semi-solid food	Yes	O	No	O
i)	Oral rehydration salts (ORS) solution	Yes	O	No	O
j)	Other (specify: _____)	Yes	O	No	O

4. **Since this time yesterday did your baby drink anything from a bottle with a nipple or teat?**

Yes O No O

5. **Did the care you received in hospital on the postnatal ward after the birth of your baby assist you with breastfeeding?**

Yes O No O Partly O

6. **Did you access the Breastfeeding Support Centre or see a lactation consultant while you were on the postnatal ward?**

Yes O No O

7. **If you answered yes to question 6, please advise if the Breastfeeding Support Centre or lactation consultant was helpful?**

Yes O No O Partly O

8. **Have you been given any information on the following support services for when you leave hospital with your baby?**

Breastfeeding Support Centre	Australian Breastfeeding Association	Private LCs	Child Health Clinic	GP	Other
O	O	O	O	O	O

9. **Do you feel confident about breastfeeding your baby now?**

Yes O No O Partly O

Comments:	

1.6: Three months interview process

1. Using the ***three months interview template*** and study allocation data base—phone woman at three months postpartum and conduct interview. Complete three months interview template while conducting the interview.
2. If at any time the woman should require further counselling because of concerns about breastfeeding, refer women to Australian Breastfeeding Association on telephone 1800 686 2 686 or to Mater's Breastfeeding Support Centre on telephone 07 3163 8200, if ongoing lactation advice is required.
3. Schedule date for follow-up interview at six months; will be indicated on the database.
4. Inform woman of date of six month telephone interview and reinforce the importance of conducting the interview at the six month mark.
5. Update database with details.
6. File de-identified interviews in locked filing cabinet.

1.7: Three months interview template

24 hour recall	

	Can you tell me how old your child is today? (exact date of birth, if possible)	

1. Since this time yesterday has your child been breastfeed?

Yes O No O

If yes, was this your child's main source of food?

Yes O No O

2. Since this time yesterday did your child receive any of the following?

a)	Vitamins, mineral supplements, medicine	Yes	O	No	O
b)	Plain water	Yes	O	No	O
c)	Sweetened or flavoured water	Yes	O	No	O
d)	Fruit juice	Yes	O	No	O
e)	Tea or infusion	Yes	O	No	O
f)	Infant formula	Yes	O	No	O
g)	Tinned, powdered or fresh milk	Yes	O	No	O
h)	Solid or semi-solid food	Yes	O	No	O
i)	Oral rehydration salts (ORS) solution	Yes	O	No	O
j)	Other (specify: _____)	Yes	O	No	O

3. Since this time yesterday did your child drink anything from a bottle with a nipple or teat?

Yes O No O

5. If you required support where did you access this?

Breastfeeding Support Centre	Australian Breastfeeding Association	Private LCs	Child Health Clinic	GP	Other
O	O	O	O	O	O

6. If you are no longer breastfeeding what influenced your decision to stop (tick more than one response, if applicable)?

Lack of support	low supply	Return to work	Illness of mother or baby	Breastfeeding difficulties	Painful nipples	Other **please state below**
O	O	O	O	O	O	O

Comments:	

1.8: Six months interview and process

1. Using the ***six months interview template*** and study allocation data base—phone woman at six months postpartum and conduct interview. Complete six months interview template while conducting the interview.
2. Inform the woman that this interview completes the study and thank her for her participation.
3. Result of the study may become available in 2012.
4. If women is interested in obtaining results ask them to call the principal investigator, Michelle Kelly on telephone 07 3163 1047.
5. If at any time the woman should require further counselling because of concerns about breastfeeding, refer women to Australian Breastfeeding Association on telephone 1800 686 2 686 or to Mater's Breastfeeding Support Centre on telephone 07 3163 8200, if ongoing lactation advice is required.
6. Update database with details.
7. File de-identified interviews in locked filing cabinet.

1.9: Six months interview template

24 hour recall	

	Can you tell me how old your child is today? (exact date of birth, if possible)	

1. Since this time yesterday has your child been breastfed?

Yes O No O

If yes was this (name) main source of food?

Yes O No O

2. Since this time yesterday did your child receive any of the following?

a)	Vitamins, mineral supplements, medicine	Yes	O	No	O
b)	Plain water	Yes	O	No	O
c)	Sweetened or flavoured water	Yes	O	No	O
d)	Fruit juice	Yes	O	No	O
e)	Tea or infusion	Yes	O	No	O
f)	Infant formula	Yes	O	No	O
g)	Tinned, powdered or fresh milk	Yes	O	No	O
h)	Solid or semi-solid food	Yes	O	No	O
i)	Oral rehydration salts (ORS) solution	Yes	O	No	O
j)	Other (specify: _____)	Yes	O	No	O

3. Since this time yesterday did your child drink anything from a bottle with a nipple or teat?

Yes O No O

5. If you are still breastfeeding your child how long do you intend to continue?

One month	Three months	Six months	Twelve months	As long as it suites my baby and I	Other
O	O	O	O	O	O

6. If no longer breastfeeding what influenced your decision to stop (tick more than one if applicable)?

Lack of support	Perceived low supply	Return to work	Illness of mother or baby	Breastfeeding difficulties	Painful nipples	Other
O	O	O	O	O	O	O

7. Further comments about your infant feeding experience.

1.10: Breastfeeding definitions

Exclusive breastfeeding	The infant has received only breast milk from the mother or from a wet nurse or expressed breast milk, and no other liquids or solids with the exception of drops or syrups consisting of medicines, vitamins and minerals.
Predominant breastfeeding	The infants predominate source of nourishment has been breast milk, including EBM or from a wet nurse. However, the infant may also have received other liquids such as water, water-based drinks, fruit juice, ORS, ritual fluids, and drops or syrups consisting of medicines, vitamins and minerals
Partial (any) breastfeeding	The infant is receiving some breastfeeds but has also been given other food, or food based fluids, such as artificial baby milk or weaning foods.
Artificial feeding	Infant is fed only on artificial baby milk (formula).
Complementary feeding	The child receives both breast milk and solid (semi-solid or soft) foods.

APPENDIX 2: ETHICS APPROVAL

2.1: Mater Health Services Human Ethics Research Committee

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MATER HEALTH SERVICES HUMAN RESEARCH ETHICS COMMITTEE

29th March 2011

Ms Michelle Kelly
Mater Mothers Hospital

Dear Ms Kelly

Re: Protocol *Ref №. 1620M* **Breastfeeding initiation and duration rates of women prior to implementation of the Baby Friendly Health Initiative (BFHI) in a large Maternity Hospital in Australia**

I write to advise that the Mater Health Services Human Research Ethics Committee considers the above study to meet the requirements of the *National Statement on Ethical Conduct in Human Research* (2007) and has granted ethical approval for your research proposal. Please accept our very best wishes for the success of this study. *In all future correspondence with the Committee please quote the Mater reference number.*

Documents reviewed and approved include:

- Mater Ethics Application Form
- Information Sheet
- Consent Form
- Flyer
- Questionnaire
- Costing / Budget
- Staff Information Sheet
- Protocol

This approval is valid until **29th March 2014**. Please note the following conditions of approval.

- Any departure from the protocol detailed in your proposal must be reported immediately to the Committee.
- When you propose a change to an approved protocol, which you consider to be minor, you are required to submit a written request for approval to the Chairperson, through the Secretary. Such requests will be considered on a case by case basis and interim approval may be granted subject to ratification at the next meeting of the Committee.
- Where substantial changes to any approved protocol are proposed, you are required to submit a full, new proposal for consideration by the Human Research Ethics Committee.
- You are required to advise the Research Ethics Coordinator immediately of any complaints made, or expressions of concern raised, in relation to the study, or if any serious or unexpected adverse events occur.
- Under the *NHMRC National Statement on Ethical Conduct in Research Involving Humans*, research ethics committees are responsible for monitoring approved research to ensure continued compliance with ethical standards, and to determine the method of monitoring appropriate to each project. You are required to provide written reports on the progress of the approved project annually, the first report being due on **29th March 2012** and finally on completion of the project. *(The Progress Report is located at http://www.mater.org.au/Home/Research/Human-Research-Ethics-*

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Raymond Terrace, South Brisbane
Queensland 4101 Australia
Phone +61 7 3163 8111
www.mater.org.au

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Committee.aspx *or can be accessed through the Mater Intranet, Applications, Research Register then under the project name or alternately can be emailed to you).* Please inform the Committee of publications, presentations at Conferences, education and quality improvement outcomes from this study. The Committee may also choose to conduct an interim audit of your research.

- Please be aware that all study procedures including follow up of participants and data analysis should be completed within the approval time frame or an extension should be requested.

Please contact the Executive Director in the participating hospital/hospitals prior to commencing of the study. To access medical records, for the purpose of this study, please provide a copy of this approval letter to the Corporate Health Information Manager. I would also be grateful if you could confirm the date of commencement. (All correspondence should be directed to the Mater Research Ethics Coordinator.)

Yours sincerely

Dr Andrew Crowden
Chairperson
Mater Health Services Human Research Ethics Committee

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2.2: Australian Catholic University Human Research Ethics Committee

From: Kylie Pashley
Sent: 06 June 2011 09:47
To: Sue Kildea; 'Kelly, Michelle'
Subject: Q2011-42 Ethics Approval
Dear Sue and Michelle,

The Australian Catholic University Human Research Ethics Committee has reviewed the ethics application number Q2011-42 *Breastfeeding initiation and duration rates of women prior to implementation of the Baby Friendly Health Initiative (BFHI) in a large Maternity Hospital in Australia.* In all future correspondence with the Committee please quote the ACU reference number.

The Chair of the Expedited Review Panel has considered your application and any subsequent response to queries raised and has granted ethics approval. The approved period of data collection is **6 June 2011 to 30 November 2011**.

Please note the following conditions of approval.

1. Any departure from the protocol detailed in your proposal must be reported immediately to the Committee.
2. When you propose a change to an approved protocol, which you consider to be minor, you are required to submit a modification form for approval to the Chairperson, through the appropriate Research Ethics Officer. Where substantive changes to any approved protocols are proposed, you are required to submit a full, new proposal for consideration by the ACU HREC.
3. You are required to notify the Research Ethics Officer of any serious adverse events or complaints.
4. Under the NHMRC National Statement on Ethics Conduct in Research Involving Humans (http://www.nhmrc.gov.au/publications/synopses/e72syn.htm) research ethics committees are responsible for monitoring approved research to ensure continued compliance with ethical standards. You are required to provide a written report on the progress of the approved project annually. The proforma report is available from http://www.acu.edu.au/about_acu/research/for_researchers/research_ethics/ and download 'Progress/Final/Extension Report Form for Research Projects'.
5. The Committee may choose to conduct an interim audit of your research.
6. The decision is subject to ratification at the next available committee meeting. You will only be contacted again in relation to this matter if the Committee raises any additional questions or concerns in regard to the clearance.

I have attached an electronic copy of the Approval Form.

We wish you well in this research project.

Kind Regards,

Kylie Pashley
Ethics Officer l Research Services Office
Office of the Deputy Vice Chancellor (Research)
Australian Catholic University
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