

**Measuring the Development and Well-being Longitudinal Outcomes  
of Children from Birth to Two Years following Increased Public  
Health Nurse Interventions**

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## Candidate Thesis Declaration

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## Summary

While there is extensive national and international literature promoting increased nurse home visiting and interventions to antenatal and postnatal mothers, previous literature has focused mainly on nurse teaching programmes, adequately staffed home visiting programmes and maternal outcomes. Despite the indication that increased public health nurse (PHN) home visits and increased referral rates to other professionals and support services have a positive influence on mothers and their children, previous research is dated and there is a significant lack of research on early childhood outcomes.

The purpose of this quantitative prospective cohort study was to measure the development and well-being longitudinal outcomes of a sample of 154 children, from birth to two years of age, following increased PHN home visits within the first six weeks following hospital discharge and increased PHN interventions in the form of referrals accepted by respondents to other professionals and support services over the same two year period. Data were recorded and compared to respondents who received routine PHN care over four assessments. The principal measure used in this study was the Development Assessment of Young Children to measure child cognitive development, communication skills, social and emotional development, physical development and skills in adaptive behaviour. This study included a further seven measures to capture pertinent child, maternal and paternal variables.

The first wave of data was gathered by the researcher within 3 - 6 weeks of birth, wave two when the infant was aged 4 - 7.5 months, wave three at 9 - 14 months and wave four at 23 - 24 months. Analysis was based on descriptive and exploratory testing, t-testing, cross-tabulation and repeated measures ANOVA from wave one to wave four.

Respondent mothers ranged in age from 19 to 47 years with a mean age of 33 years. The majority of mothers reported good health, however when their children were 2 years old, a number of mothers experienced deterioration in physical (12%) and mental (15%) health. Up to 70% of mothers had a third level education and were employed in a professional capacity. The majority of respondents were able to manage on their income in the early postpartum period, however they were noted to struggle financially when their child was aged two years. Gestational age of infants ranged from 33 to 42 weeks, 3% were born prematurely and 2.4% were reported to have complex needs. Birth weight ranged from 2.8 to 4.5 kg with a mean birth weight of 3.5 kg. The majority of children, 73%, lived with married parents in their own home.

Statistical analysis supported the first study hypothesis, showing increased PHN home visits received by 76% (n=115) of the sample had a significant positive effect on child development

and well-being outcomes. Analysis also upheld the second study hypothesis, supporting the significant positive effect of increased PHN referral rates over four timelines to other professionals and support services. Combining the influence of both increased PHN home visits and increased referral rates the study revealed a statistically significant improvement in child outcomes.

Findings in this study have implications for PHN practice at a national level, suggesting that current guidelines limiting the number of core visits to postnatal mothers should be revised to ensure each mother is supported to enable her child to reach their full cognitive, communication, social, emotional and physical potential.

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## Glossary of Terms

|         |  |
|---------|--|
| BLS     | British Longitudinal Standards                                 |
| CDH     | Congenital Dislocation of Hips                                 |
| CI      | Confidence Interval  |
| CRC     | Convention on the Rights of the Child                          |
| CSO     | Central Statistics Office                                      |
| DAYC    | Development Assessment of Young Children                       |
| DoC&YA  | Department of Children & Youth Affairs                         |
| DoH     | Department of Health   |
| DoHC    | Department of Health & Children                                |
| ESRI    | Economic & Social Research Institute                           |
| FNP     | Family Nurse Partnership                                       |
| GP      | General Practitioner   |
| GUI     | Growing Up in Ireland National Longitudinal Study of Children  |
| HSE     | Health Service Executive                                       |
| HV      | Health Visitor   |
| IQR     | Interquartile Range  |
| Kg      | Kilogram(s)  |
| MECSH   | Maternal and Early Childhood Sustained Home Visiting Programme |
| MOS SSS | Medical Outcomes Study Social Support Survey                   |
| PHN     | Public Health Nurse  |
| PSI     | Parent Stress Index  |
| ROI     | Republic of Ireland  |
| SD      | Standard Deviation   |
| SF 36   | Short Form 36  |

|              |  |
|--------------|--|
| SIDS         | Sudden Infant Death Syndrome                               |
| SMS          | Short Message Service                                      |
| SUF          | Service Utilisation Form                                   |
| TCD          | Trinity College Dublin                                     |
| USA          | United States of America                                   |
| WHO QOL-BREF | World Health Organisation Quality of Life Abbreviated Form |
| WHO          | World Health Organisation                                  |

# Chapter One: Introduction

## 1.1 Introduction

The focus of this study was to measure the development and well-being longitudinal outcomes of children from birth to two years following increased public health nurse (PHN) home visits and interventions. Data collection for this quantitative study took place from the 6<sup>th</sup> of June 2011 to the 11<sup>th</sup> of April 2014 to identify the influence, if any, on five key areas of child development. It took into account the number of PHN home visits in the first six weeks following childbirth and the frequency of PHN referrals accepted by respondent mothers and their children to other healthcare professionals and support services.

Ireland has thirty-two counties, six of which are Northern Ireland where health care is provided by the National Health Service, the remaining twenty-six are the Republic of Ireland where health care is provided by the Health Service Executive (HSE). The Irish healthcare system is governed by the Department of Health and Children and is divided into four geographical HSE areas which were established under the Health Act 2004 as a single system. The four HSE areas are; HSE Dublin Mid-Leinster, HSE Dublin North East, HSE South and HSE West. The collective Health Service Executive which encompasses all four regions is responsible for providing both high quality social and healthcare services to all citizens of Ireland countrywide. These services are provided by local health offices, community based services and hospital based programmes. PHNs have statutory responsibility for the management and delivery of both health and social services in the Republic of Ireland (Purcell 2011). This was an Irish study undertaken in two of the four HSE areas in the Republic of Ireland.

The HSE is divided into four regions as seen in Appendix 1.

- I. The HSE Dublin Mid-Leinster consists of a large portion of the east of the Republic of Ireland. These areas include South Dublin, Kildare, Offaly, Laois, Longford, Westmeath and Wicklow.
- II. The HSE Dublin North East consists of the remainder of the east and midlands of Ireland with Cavan, Louth, Meath, Monaghan and North Dublin making up this area.
- III. The HSE South is based in the most southern part of the country and takes in both sections of the southeast and southwest. This area includes Kerry, Cork, Carlow, Kilkenny, Waterford, Wexford and South Tipperary.



- IV. The fourth HSE area is the HSE West. This area consists of the remaining counties of the Republic of Ireland and extends down the west coast of the country from Donegal to Limerick. Other counties included in this area are Galway, Mayo, Roscommon, Clare, Leitrim Roscommon, Sligo and North Tipperary.

Ireland is a continuously evolving multicultural nation with over 500,000 non-Irish nationals from 199 different countries living in Ireland in 2011 (Cullen 2011). This has resulted in a greater number of both positive and negative factors which impact on maternal and child health outcomes. There is greater genetic variation in the current Irish population, as a result which influences the necessity for effective health and developmental screening of mothers and children by PHNs. The average age of married mothers giving birth in the Republic of Ireland between 2010 and 2012 was 33.4 years and those outside of marriage was 28.5 years. As a nation we have the highest reported birth rate of the twenty-seven European Countries with 76,600 births in 2010 (Economic & Social Research Institute ESRI 2013). While the birth rate is rising, the number of teenage pregnancies in Ireland has been declining from 1,720 in 2011 to 1,639 in 2012 with the largest proportion of teenage births to mothers aged 18 and 19 years (Kelleher 2012).

### **1.2 Definition of a “child”**

Within the literature “a child” means “a person under the age of 18 years, excluding a person who is or has been married” (Department of Children and Youth Affairs DoCYA 2011, p. 8). Birth to eight years of age is termed “early childhood” and incorporates birth to two years as examined in this study (Fauth & Thompson 2009, p. 10). Early childhood is described as a time of rapid growth and development, a time during which the base is set for future development and well-being in later life (DoHC 2000, Fauth & Thompson 2009, Hearzman *et al.* 2011). Childhood varies across different cultures and is greatly influenced by the dominant belief system and the “social construct” in which the child grows up (Rutter & Rutter 1993, Smith *et al.* 2003, p. 57).

### **1.3 Definition of a “parent”**

For the purposes of this study a parent is defined as male or female adult aged 18 years or over who is the mother, father or legal guardian of an infant or child.

## 1.4 Child development and well-being

“The developing child is a never ending source of wonder and the sources of that wonder, are many and varied” (Rutter & Rutter 1993, p. 1). Psychological growth is debated in the literature as to whether child development is continuous or a discontinuous process. It is often viewed as a series of developmentally distinct stages which occur at predetermined stages of development which all children progress through in order to reach maturity which emphasises the continuous aspect of child development (Rutter & Rutter 1993, Smith *et al.* 2003, Bee & Boyd 2007). Five psychological perspectives mainly describe the stages of development that children progress through to reach maturity. They are the behavioural perspective, cognitive perspective, biological perspective, psychoanalytic perspective and subjective perspective (Rutter & Rutter 1993). Psychologists Watson and Skinner proposed that human nature is impressionable and early influences play a major role in child development and well-being (Smith *et al.* 2003). Behaviourism is viewed in terms of changes caused by environmental influences, John Watson and the work of B. F. Skinner believed that by manipulating the child’s environment that they “could be trained to be or do anything” (Bee & Boyd 2007, p. 4). The cognitive perspective refers to the child’s mental process and their level of understanding (Smith *et al.* 2003). The biological perspective refers how behaviour and memory is altered by brain activity and this affects the neurological process of the brain and nervous system (Smith *et al.* 2003). Sigmund Freud’s psychoanalytic perspective believed that a child’s behaviour originates from unconscious beliefs, desires or fears of which the child is unaware. The subjective perspective holds that we unravel a person’s own interpretation of a situation and how it will be influenced by their cultural beliefs and historical background. “The subjective perspective contends that human behaviour is a function of the perceived world, not the objective world” (Smith *et al.* 2003, p. 13). While the behavioural, cognitive, psychoanalytic and subjective perspectives offer different explanations for the same phenomenon “such as perception, the unconscious and attributions” they are different from the biological perspective which utilises concepts from both physiology and biology such as neurotransmitters and the effect of hormones on child growth and development (Smith *et al.* 2003, p. 14). Psychoanalytic theorists believe that the quality and nature of the child’s relationship with its carers is central to their whole development and well-being (Bee & Boyd, 2007).

Jean Piaget, a pioneer of child development, believed that children seek to understand and adapt to the world around them by developing a set of theories of how the world operates (Bee & Boyd 2007). He helped to shape the thinking as to what occurs during cognitive child development through his observations of child development at different ages. The positive or

negative progression of child developmental can be viewed as a consequence of external environmental factors “acting on” a child’s development to trigger the child’s internal characteristics (Daniel *et al.* 1999, p. 3). Parental sensitivity to the child’s needs, in particular, is of major importance to ensure age appropriate progression of the following five areas of child development. The five areas are cognitive, communication, social-emotional, physical and adaptive behaviour.

Rutter & Rutter (1993) argued that genetic factors exert a major influence on child development and behaviour. Together the influence of environment was recognised giving rise to behaviourism. Over time, the prominence of genetics diminished and increased emphasis was placed on the “whole child” perspective (DoHC 2000, p. 24). Concern arose relating to the need to improve the development and well-being of children identified as socially disadvantaged (Smith *et al.* 2003, Iwaniec 2006, Buckley *et al.* 2006). Currently both nature (environment) and nurture (parenting) are seen to continually guide child development and well-being (Smith *et al.* 2003, Berger 2005, Iwaniec 2006).

In meeting a child’s need the quality and nature of the child’s relationship with his / her carer is central to their development and well-being (Bee & Boyd 2007). The mother-child relationship is seen to significantly influence family interactions which in turn shape child development in areas such as cognitive development, communication skills, social-emotional development and adaptive behaviour (Barnard 1989, Voress & Maddox 1998, Reinsnyder *et al.* 2005). It is throughout this series of developmental stages that “the foundations are laid” for future development and well-being as children achieve and build upon development and well-being outcomes (DoHC 2000, p. 25).

A child’s cognitive perspective refers to their mental processes, their level of understanding, reasoning, problem-solving skills and ability to communicate their needs (Smith *et al.* 2003). As described in Table 1.1 from birth to 3 months, infants are alert to their surroundings and will observe and explore sounds and the contents of their environment within their reach. From 3 months onwards, their understanding and engagement with their surroundings increases. Furthermore, infants will play with and seek out toys and companions to play with as their development continues. From the age of 18 months, they develop a greater concept of verbal instructions, are more independent and content to play alone.

Child communication skills are closely linked to child cognitive development. From birth to 3 months, infants spend large quantities of time in a quiet, restful alert state which allows time for increased eye contact and bonding with the primary caregiver (Wolff 1987, Nixon *et al.* 2013). From 3 - 6 months, they become more active. They interact by using facial

expressions, vocalisations such as cooing and turn taking to communicate with others. Whereas, from 6 - 9 months, they can associate words with objects and from 9 months onwards exhibit more meaningful gestures.

It is suggested that cognitive, communication and emotional development are interlinked as cognitive understanding is a prerequisite for emotional response and emotional understanding is a requirement for effective communication. Child social-emotional development involves “the acquisition of skills” that facilitate a child to “engage competently with others in social interactions” and is “facilitated by the emotional care a child receives from their parents or caregiver” (Iwaniec 2006, p. 211, Williams *et al.* 2013, p 52). Child social-emotional development is embedded in the child’s social system including immediate family, peer group, wider community and culture. Social-emotional skills grow and develop as a child builds trust in a parent to be available in times of distress. As profiled in Table 1.1, the infant’s interactions with others is professionally assessed. The level of interaction increasing with age from birth to 3 months, the infant ceases crying when spoken to or comforted, can smile and can follow faces. From 9 months onwards, the infant shows increased preferences toward particular adults most especially the mother or primary caregiver.

The most progressive of the five areas of child development is their physical development. This is a time of rapid progress for a growing infant. Children typically progress in a similar manner; they roll over, sit up, stand holding on, crawl, walk with assistance and walk independently. However, children will progress through different stages at different rates (Smith *et al.* 2013). Height and weight are the most reliable measures of physical development (Williams *et al.* 2013). The infant’s length is seen to extend by 50% within 9 months and weight by 300% within 12 months of birth (Nixon *et al.* 2013). These reliable indicators of child development require close monitoring in the early months of life to ensure children of low birth weight or premature birth do not fall behind their peers. Table 1.1 highlights the varying degrees of physical development, for example from 9 months onwards infants display more physical independence whereby they are able to crawl and retrieve objects outside their immediate surroundings without help. By the age of 24 months, children are much more independent, they are able to stand, walk, run and kick a ball. The developing child needs to adapt to their surroundings, regulate their emotions and learn to communicate effectively with others. Healthy early child-carer attachment promotes a sense of security and teaches a child to self-regulate emotional experiences (Nixon *et al.* 2013). Also, supported adaptive behaviour allows a young child to feel comfortable in the home, school or other environment enhancing social competence (Nixon *et al.* 2013). Good

adaptive skills allow a child to adapt to their physical environment, emotional environment and communicative environment preventing experiences such as frustration or tantrums. As set out in Table 1.1, infants demonstrate enjoyment at bath times and will conversely show displeasure with certain other activities such as nappy changes. From 9 months onwards, the child's adaptive skills progress towards self-feeding and self-care at the age of 2 years.

**Table 1.1 Child Development Milestones from Birth to Two Years**

|                          | <b>Cognitive</b>                     | <b>Communication</b>                | <b>Social<br/>Emotional</b>                         | <b>Physical</b>                 | <b>Adaptive</b>                   |
|--------------------------|--------------------------------------|-------------------------------------|---|---------------------------------|-----------------------------------|
| <b>Birth to 3 Months</b> | Looks back and forth between objects | Early eye contact                   | Alert and smiling                                   | Brings hand to mouth            | Begins to develop a social smile  |
|                          | Looks towards noise                  | Follows moving objects              | Imitates some movements                             | Grasps objects                  | Enjoys bath and displays pleasure |
|                          | Mouths toys                          | Makes noises other than crying      | Looks at adult faces                                | Lifts and rotates head          | Expressions of displeasure        |
|                          | Repeats arm and leg movements        | Smiles at familiar voices           | Stops crying when spoken to                         | Stretches legs                  | Sucking reflex                    |
|                          | Watches objects move slowly          | Startles at loud noises             | Turns towards person                                | Walking reflex                  | Rooting reflex                    |
|                          | <b>Cognitive</b>                     | <b>Communication</b>                | <b>Social<br/>Emotional</b>                         | <b>Physical</b>                 | <b>Adaptive</b>                   |
| <b>3 to 9 Months</b>     | Bangs toys                           | Displays tuneful babbling           | Interacts with others                               | Holds head erect                | Chewing reflex                    |
|                          | Drops toy without watching result    | Explores with hands and mouth       | Plays alone for short periods                       | Holds small objects             | Definite likes and dislikes       |
|                          | Finds partially hidden objects       | Laughs out loud                     | Responds to own name                                | Picks up objects                | Explores the environment          |
|                          | Shakes a toy                         | Looks at speaker                    | Smiles at own reflection                            | Pulls self to standing          | Pulls off own socks               |
|                          |                                      | Responds to sounds by making sounds | Expresses physical states e.g. tiredness and hunger | Transfers objects between hands | Skilled to pick up cup and drink  |

|                        | <b>Cognitive</b>                   | <b>Communication</b>                               | <b>Social<br/>Emotional</b>                         | <b>Physical</b>                 | <b>Adaptive</b>                        |
|------------------------|------------------------------------|--|---|---------------------------------|--|
| <b>9 to 18 Months</b>  | Explores objects in different ways | Becomes more expressive                            | Cries when parent leaves the room                   | Begins to crawl                 | Co-operates with dressing              |
|                        | Gives a toy to someone to wind up  | Imitates sounds and facial expressions             | May be fearful in some situations                   | Claps hands                     | Feeding self i.e. finger food          |
|                        | Imitates gestures                  | Finds objects when hidden                          | Prefers mother or main caregiver over others        | Crude finger / thumb grasp      | Recognises familiar objects and people |
|                        | Plays with 3-4 toys                | Points to objects and pictures                     | Shows preference for particular people              | Pulls self to standing          | Sips liquids with a straw              |
|                        | Rolls wheeled toys                 | Understands simple commands                        | Shy or anxious with strangers                       | Sits alone briefly              | Struggles to reach objects             |
|                        | <b>Cognitive</b>                   | <b>Communication</b>                               | <b>Social<br/>Emotional</b>                         | <b>Physical</b>                 | <b>Adaptive</b>                        |
| <b>18 to 24 months</b> | Begins to sort by shape and colour | Asks for drink, food and toilet                    | Brings toy to share with caregiver                  | Enjoys pushing and pulling toys | Begins to show defiant behaviour       |
|                        | Builds 3 – 4 blocks                | Uses two and three word sentences                  | Has temper tantrums                                 | Walks with adult                | Begins to use a fork                   |
|                        | Understands simple commands        | Follows moving objects                             | Helps to put things away                            | Squats to play                  | Brushes teeth with assistance          |
|                        | Uses intelligible words            | Repeats words                                      | More aware of his / herself as distinct from others | Starts and stops in walking     | Removes loose clothing                 |
|                        | Walks up stairs with one hand held | Responds to yes and no by nodding and shaking head | Watches others play                                 | Runs and kicks a ball           | Tries to wash own hands and face       |

## 1.5 Child well-being construct

Child well-being is identified “as a multidimensional construct that incorporates a holistic and dynamic view of child development and concentrates on the aspects of children’s lives, competencies and experiences that are needed to promote their health and happiness in the future” (Fauth & Thompson 2009, p. 10). In the past well-being was examined using the biomedical model often with a negative focus such as “failure to thrive”, “risk” and “mortality” (Faughey 1997, p. 66, Iwaniec 2004, p. 7 & 137). It is imperative to also include positive factors that go beyond survival, to promote optimal child physical development, mental health and well-being (DoCYA 2013). These specific factors vary from one child to another and often develop in conjunction with each child’s own development.

Child well-being is identified “as a dynamic state, enhanced through the fulfilment of personal and social goals” (Statham & Chase 2010, p. 2). Childhood development is multidimensional involving cognitive, communication, physical, adaptive, social and emotional developmental aspects which should focus on children’s young lives and also consider their future lives. Childhood well-being is closely related to positive family relationships (Brooks 2013). It can be conceptualised from both a developmental perspective and a children’s rights perspective.

Subjective well-being can be viewed as a domain of psychological development. However, research into child well-being is not limited to any single profession or domain. Issues have arisen due to the interchangeable use of phrases such as well-being, life satisfaction and quality of life by some authors. Other authors have emphasised their understanding of these terms to be vastly different. This issue combined with the widespread research into child well-being in areas such as economics, psychology, health and sociology has contributed to an increased level of “conceptual confusion” in relation to our understanding of child well-being (Hanafin & Brooks 2005, p. 4). Statham and Chase (2010, p. 6) argued that all child well-being indicators are important concepts but “the differences between them are rarely articulated and they do not form a cohesive mix”. Various attempts have been made to measure childhood well-being in areas such as physical health that include nutrition, sleep, height, weight, child safety, accident prevention and at times may involve measures of psychological or emotional health. No agreement has been reached as to how best to measure these factors (Shore & Murphy 2013). Previous researchers adopted various approaches such as interviews, standard tests for specific purposes and questions from larger data sets in their studies, however all measures used had their limitations. This is endorsed in the literature review by Statham & Chase (2010, p. 6) which showed that child

well-being can be viewed under different lenses including “assessing need, reducing levels of poverty, improving quality of life, reducing social exclusion or from a children’s rights perspective”

Children have rights and are recognised as “rights holders” (Convention on the Rights of the Child 2006, p. 2). They are entitled to be recognised as active members of families and communities where their welfare and well-being is protected by “physical nurturance, emotional care and sensitive guidance” (Convention on the Rights of the Child 2006, p. 3). To promote childhood development and well-being all young children should be afforded the space and freedom for social play, they should be allowed to explore their surroundings and be given the opportunity to further their education. The UN Convention on the Rights of the Child recognises that as children grow and develop their needs change. Some children are considered vulnerable and the importance of promoting their rights by supporting parents and carers in the early years of childhood and beyond is well documented throughout the literature (Gilligan 1991, Buckley 2002, Buckley *et al.* 2006, DoHC 2014).

## **1.6 International policy relevant to measuring child development and well-being outcomes**

An infant’s early experiences and environment have a significant influence on later life trajectories of health, development and well-being. The support each child receives from its parents and primary caregivers impact in all areas of their development and future well-being. To ensure early childhood interventions exist to enhance childhood and adult outcomes the Canadian Paediatric Society called on the government to measure and monitor the developmental progress of children in Canada, whose development like other countries, can vary widely among various communities and demographic groups. The Canadian Paediatric Society called for the collection of data on early child development, its determinants such as parental poverty, unemployment, and long-term child outcomes for lower socioeconomic families with a view to ensuring timely intervention (Hearzman *et al.* 2011).

Internationally, using objective assessment measures has been widely promoted, to identify early childhood concerns. Early child development incorporates physical, socio- emotional, cognitive, communication and motor development from birth to 8 years of age. In 2016, evidence was provided to the World Health Organisation (WHO) of the effect on children’s lives who were found to be at risk of not reaching their development and well-being potential. This involved the lack of effective interventions for those children’s outcomes, the potential



cost of their delivery, and the potential dangers of not intervening. Early child development is a priority and an area of opportunity for the WHO to improve the experiences of children in their formative early years. This is considered necessary to protect children from maltreatment and abuse and maximize their developmental and early childhood outcomes. The WHO in conjunction with its partners in 2017-2018 are working together to produce a common policy framework on nurturing which is expected to be available for presentation at the World Health Assembly in May 2018 (WHO 2016).

Identifying and preventing early developmental delay is vital through a process of early prevention and package of care. The process adopted for Health Visiting in the UK is like that used by health care professionals in other countries. It is one of identifying presenting problem, assessment, providing a package of care and anticipating the outcomes. The UK Child Health Programme, Department of Health is based on the National Institute for Health and Clinical Excellence (NICE) clinical guidelines. This includes areas such “as antenatal and postnatal mental health, obesity, postnatal care, identifying child maltreatment, maternal and child nutrition, promoting physical activity for children and young people, weight management after and during pregnancy, social and emotional well-being: Early years” (Cowley 2013, p. 237).

The UK has looked at the possibility of implementing the Maternal and Early Childhood Sustained Home Visiting Programme (MECSH) which was piloted in a disadvantaged suburb in Sydney, Australia. The Family Nurse Partnership programme which is an intensive home visiting programme targeting social disadvantaged families complements the Health Visiting programme in the UK and is similar to the MECSH programme except that the Australian MECSH programme is available to multiparous women and not just first-time mothers. Cowley *et al.* (2012) suggests the implementation of the Australian MECSH programme to support families in the UK would require further research. This would be necessary to identify the required skill mix, educational needs and funding to suit the complexity of involving different non-government organisations in promoting child health development and well-being.

The United Nations Convention on the Rights of the Child (UNCRC) supports that all children should be given the opportunity to develop to their full potential. The primary policy adopted to promote the protection of children’s health, development and well-being is the UN Convention on the Rights of the Child (UNCRC). The UNCRC is the principal legal

framework for the work of the WHO across different countries and regions in promoting optimum child health and development (WHO 2016).

### **1.7 Irish policy context for the PHN**

By ratifying the UN Convention on the Rights of the Child in September 1992, Ireland accepted its international obligations towards promoting the development and well-being of children. In the Republic of Ireland, the PHNs role in working with children is underpinned by legislative responsibilities under the Child Care Act (DoH 1991). PHNs have a duty in line with other healthcare professionals to identify vulnerable children in need of care and protection. The main role of the PHN is to provide vulnerable children and their parents with home visits, interventions and referral to other professionals, supports and services where necessary. Their role is to prevent home situations and family circumstances deteriorating (Kelly 1995, Denyer *et al.* 1999). Protecting children from harm is enshrined in Irish Policy and Legislation which is led by Tusla, the Child and Family Agency which is supported by the Department of Children and Youth Affairs, Department of Justice and Equality and the Department of Communication, Energy and Natural Environment. The main aims to protect all children growing up in Ireland are; that they feel safe and secure in the family home; they are protected from all types of abuse and neglect; that they are not exposed to bullying or discrimination and are protected against crime, poverty and social exclusion, as outlined in the departmental policy document, Better Outcomes Brighter Futures 2014-2020, (DoHC 2014). This new policy document aims to support that each child from birth is afforded the opportunity to reach their full potential in learning and development throughout their life.

Strengthening Families for Life: Final Report of the Commission on the Family (1998) details Irish policy in relation to supporting families with young children. This policy recommended an increase in family support to promote the health and welfare of Irish children; supporting families in the choices they make in relation to caring for their children, educating parents, providing practical help, identifying the needs of families in vulnerable situations and outlining the benefits of providing interventions at an early stage (Commission on the Family 1998). This is in keeping with the national PHN service to children and families in the Republic of Ireland where PHNs identify parent and child needs and provide appropriate and early interventions (Denyer *et al.* 1999, Mulcahy 2004, Denyer 2005).

Best Health for Children: Developing a Partnership with Families (Denyer *et al.* 1999) was developed in 1999 as a blueprint for PHNs outlining their surveillance / monitoring role of child health, development and well-being from birth to five years (O'Dowd 2013). This statutory national child health surveillance programme became available to all Irish children and PHNs were trained as experts in assessing a broad range of child health and development outcomes to meet the document's aims (Denyer 2006). In 2004, a review group was established to improve and standardise the national surveillance programme provided by doctors and PHNs to parents and children (Denyer 2006). The Best Health for Children: Developing a Partnership with Families programme was revised in light of research findings at that time and a national training programme entitled Best Health for Children Revisited was developed in 2004. The main recommendations to arise from Best Health for Children Revisited included: observations of child behaviour and development could be better utilised, greater emphasis was required in relation to maintaining reports of parental concern, standardised tools and equipment to measure child outcomes should become routine practice and GPs and PHNs should work in partnership with parents to achieve the best possible outcomes for children (Denyer 2005). One of the main areas whereby this revised document greatly benefited a better understanding among GPs and PHNs was through the establishment of joint training programmes for both GPs and PHNs in relation to child development trajectories, appropriate documentation and early intervention (Denyer 2006).

The National Children's Strategy (DoHC 2000) set out a ten year plan for children in Ireland in the context of "the whole child perspective". This strategy was based on the ecological theory of human development (Bronfenbrenner 1977) which places the child and the environment in which they grow up at the centre of policy development and support service provision (DoHC 2000, p. 24, Hanafin *et al.* 2009). Ten years on, this strategy document has been evaluated and findings suggest that of 136 actions listed "60 have been achieved, 53 have made some progress, 13 have not been achieved and 10 cannot be assessed" (Children's Rights Alliance 2011, p. 2). It found that the outcomes in relation to positive health changes were not demonstrated (Children's Rights Alliance 2011). The National Children's Strategy (DoHC 2000) has been updated in the national policy framework for children and young people 2014-2020 'Better Outcomes, Brighter Futures' which provides a national framework incorporating a holistic approach towards the best method of achieving optimum health and development outcomes and brighter futures for children and their families. The document supports the inclusion of both statutory and non-statutory organisations that support the development and well-being of children and young people.

The policy document details important information on childhood and children's lives obtained from the Growing Up in Ireland National Longitudinal Study of Children (GUI) which provides details on child development and well-being in Ireland from the age of 9 months onwards and that of their parents.

Growing Up in Ireland National Longitudinal Study of Children (GUI) which involved interviewing up to 20,000 families from across the Republic of Ireland at different stages of their development draws on Bronfenbrenner's theory (1977) of human development (Williams *et al.* 2013). The GUI study involves two cohorts of children, with the 9-year-old cohort consisting of 8,568 children and their families commencing between September 2007 and March 2008. The infant cohort of 11,134 infants aged 9 months old and their families were first interviewed between September 2008 and March 2009. The study is ongoing and is being undertaken by researchers from both the Economic and Social Research Network (ESRI) and Trinity College Dublin (TCD). The objectives of this study are to describe the lives of Irish children by examining the impact of early childhood experiences and environmental factors on later outcomes. The main aim of this study is to aid in the development of legislation, further policy documents and effective policies for the provision of future services that relate to child growth and development using evidence based data. The GUI study aims to provide an image of the typical normal life of a child growing up in Ireland in the 21<sup>st</sup> century. The researchers measure the children at different stages of development to capture experiences and other factors that may influence their future lives whilst being cognisant of the views of children on their life experiences. This study continues to provide large quantities of data on the participant families and their children with regard to how various factors and experiences impact on children's lives from the antenatal period through to their adolescent years for example parental support, child physical and mental well-being, child education, child protection, parental employment and education.

In conjunction with the Growing Up in Ireland National Longitudinal Study of Children (GUI) the State of the Nation's Children (DoCYA 2012) has published its fourth Irish report in 2012 answering key research questions on children and childhood in Ireland. The report provides the most up-to-date information on child well-being indicators in Ireland. It charted changes that occur in children's lives over time, allowing comparison with child development and well-being indicators relative to other countries. The report stems from the objectives of the National Children's Strategy (DoHC 2000) which is rooted in the UN Convention on the Rights of the Child (DoCYA 2012, Fitzgerald 2004).

For PHNs, the key themes emerging from Irish policy is the need for emphasis on promotion of positive child development, improved child well-being, the importance of early intervention, the need for prevention and health promotion programmes for parents, the benefit of nursing support, multidisciplinary and interdisciplinary collaboration, interagency referral, professional guidance, professional training and information-sharing (State of the Nation's Children DoCYA 2012). Throughout the literature, PHN communication and referral to other professionals has been identified as a challenge mainly due to a lack of understanding relating to each other's roles (Faughey 1997). In order to address this Buckley *et al.* (2006) calls for a standardised method of child assessment and the use of agreed terminology. In a study of the role of the public health nurse in 2004, PHNs in the Galway community care area indicated that systems in place at that time were not structured in a manner that fostered good communication in relation to referrals to other professionals and GPs. They welcomed the introduction of primary community care teams as they identified the benefits of working together in a formal and informal setting as reducing the amount of time that may be wasted in trying to communicate with other professionals (Begley *et al.* 2004).

### **1.8 Development of primary community care teams in Ireland**

The Primary Care Strategy, A New Direction (DoHC 2001 a) set out guidelines for developing primary community care teams in each of the four Health Service Executive (HSE) areas. It proposed a new model of integrated healthcare and social care that would involve General Practitioners (GPs) and multidisciplinary team members working together from a single location. Team members were to include health professionals such as physiotherapists, occupational therapists, social workers, mental health teams, dieticians, PHNs, specialist nurses such as diabetic nurses, lactation consultants, wound care nurses, elderly community care nurses and administrative staff. What commenced as pilot sites have not been fully implemented in all four HSE areas. GPs, for example, continue to work from their own premises and physiotherapists, occupational therapists and social workers operate from separate buildings to PHNs and community nurses. These findings are not unexpected as Begley *et al.* (2005) reported that to fully implement primary community care teams would take years. Although, implementing primary community care teams has been piecemeal, where it has been achieved, advantages of different professionals working together as part of multidisciplinary, interagency teams has been identified. These include good working relationships and a significant positive impact on ensuring child development and well-being

concerns can be listened to and addressed (Buckley 2002, Buckley *et al.* 2006, Giltenane *et al.* 2015). PHNs recognise the importance of working collectively as part of a multidisciplinary primary community care team to achieve common goals and prevent a fragmented service (Cooper *et al.* 2003, Buckley *et al.* 2006).

## **1.9 Public health nursing in Ireland**

Public health involves “organised social and political effort and health promotion for the benefit of populations, families and individuals” (Mason & Clarke 2001, p. 7). The admission criteria to postgraduate PHN training in Ireland changed following the publication of the Commission on Nursing Report (1998) whereby midwifery qualification is no longer a mandatory requirement for entry to the course. The establishment of maternal and child health modules exploring the role of the PHN in supporting the health and well-being of mothers and children in the antenatal and postnatal periods has replaced the necessity for midwifery qualifications that existed prior to the 1998 report (NMBI 2017). The current modules ensure that all graduates have equal training with regard to child health, development and well-being from birth to adolescence regardless of prior experience or education. The Register of Nurses and Midwives in Ireland incorporates 10 divisions which include general trained nurses, midwives and specialist trained nurses such as children’s nurses, intellectual disability nurses and public health nurses. Being a registered general nurse is the current requirement in place for admission to postgraduate PHN courses in Ireland. There is no literature based evidence or anecdotal accounts to suggest differences to maternal and child outcomes as a result of increased levels of nursing education in any particular nursing discipline prior to entry to these postgraduate public health nursing courses (Philpott 2017). It is worth noting that given the remit of public health nursing, the requirement for general trained nursing registration is a limitation due to the vast array of clinical knowledge possessed by other nursing disciplines such as paediatric trained nurses. This may impact on the interventions that nurses would instinctively choose when presented with child development issues in the community. Future research into the differences that prior education and experience have on PHN practice would be beneficial.

PHNs have a broad scope to their role where they provide health surveillance, health promotion and nursing healthcare to geographically defined caseloads. These interventions encompass promoting the health of individuals of all age groups from neonate to end of life. Maternal health, child health and child protection form part of this role (Begley *et al.* 2004).

Visiting mothers and their infants at home is an ideal opportunity for public health nurses to guide the parent-child interactive process, ensuring parents respond to cues from their child by receiving information accurately and modifying behaviour appropriately.

In 1966, the Department of Health issued a circular (27/66) outlining the training and principle duties of PHNs in the Republic of Ireland (DoH 1966). This document remained unchanged for nearly forty years until it was reviewed and updated in the year 2000 (DoHC 2000a). The statutory directives in the document outline the role and function of Irish PHNs which include the management and provision of healthcare and social-care interventions to individuals of all age groups (DoH 1966, Candell & McCarthy-Haslam 1997, DoHC 2000 a, Begley *et al.* 2004).

PHNs in the Republic of Ireland offer an age specific child development, well-being and health surveillance programme to all children from birth to five years incorporating assessments:

- within 3 - 5 days of birth
- 3 months
- 7 - 9 months
- 18 - 24 months
- 3.25 - 3.5 years

Accurate assessment of maternal and child care-needs through this programme is vital in determining the level of interventions necessary for each individual family (Denyer *et al.* 1999, Denyer 2005, Appleton & Cowley 2008). A lack of research into the process employed by PHNs in assessing family and child care-needs has been highlighted by Appleton and Cowley (2008) in relation to Health Visitors in the United Kingdom who work in a similar capacity to Irish PHNs. Looking at maternal reports, they found that Health Visitors provide extra support and interventions based on the outcome of their assessments. Horwath (2005) offers a word of caution in relation to the dangers of attributing the responsibility for rearing children to mothers alone and highlights the importance of identifying and acknowledging the contribution fathers play in promoting their child's development and well-being. However, although researching the role of fathers in meeting a child's needs is a critically under researched area, it was not an objective of this study. The purpose of this research was to

measure the development and well-being longitudinal outcomes of children from birth to two years following increased public health nurse (PHN) home visits and increased PHN interventions.

### **1.9.1 Public health nurse interventions**

Snyder *et al.* (1996) argue that the definition of a nursing intervention is not a single or stand-alone action performed by a nurse but incorporates a number of nursing attributes such as protocols, procedures and techniques to perform a specific action. Henry & Mead (1997) suggest that there is a need for further work to refine and standardise terms such as assessment and intervention that nurses and PHNs use to influence service delivery. Kemp *et al.* (2005, p. 256) described the PHN's role as "reactive" to parental problems and a child's needs following assessment. O'Shea (2006) defined intervention as "an action which results in a change, therefore an outcome is the result of the intervention" (O'Shea 2006, p. 11). Greene (2009) proposed that the term intervention be challenged as she saw its meaning as to "come between". She questions if professionals intervene in the lives of vulnerable parents and children or if they support them in the difficulties they encounter? It is important to look back at the work of Snyder *et al.* (1996) who offered a word of caution in relation to using a diversity of definitions on nursing interventions which they proposed led to confusion and fragmentation. They saw the array of definitions as a barrier to understanding the actions nurses take to promote child health, development and well-being along with that of individuals and families.

In Minnesota, PHN's researching the public health nursing intervention model, known as the Wheel of Interventions adopted the definition of intervention as devised by O'Shea (2006) "actions taken on behalf of individuals, families, systems and communities to improve or protect health status" (Rippke *et al.* 2001, p. 1). The Institute of Community Health Nursing in Ireland adopted the Minnesota model when revising the role of the Irish PHN. This working group found that Irish PHNs undertake similar actions to support their clients and subsequently published The Irish Intervention Wheel which provided insight into the central role of PHNs in Irish practice (McDonald *et al.* 2013). The resultant list of seventeen population-based nursing interventions in areas of community based outreach, parental support, collaboration with other professionals and policy development helped to develop a common language for PHN home and community interventions (McDonald *et al.* 2013). As part of this study the researcher adopted the same definition of an 'intervention' as that in line with O'Shea (2006) and the definition used for intervention in both Minnesota and adopted for public health nurses by the Institute of Community Health Nursing in Ireland.



### **1.9.2 Routine public health nursing care compared to increased interventions**

Families are considered low priority or low risk when public health nurses do not have additional concerns in relation to family health or well-being (Bowns *et al.* 2000). Routine public health nursing care in the postpartum period is identified as care provided to low risk mothers describing only normative and adaptive needs (Bowns *et al.* 2000). Routine care is designed to meet the physical and social-emotional needs of this patient group (Cowley *et al.* 2004). It does not include increased home visits, increased supports or increased services from PHNs.

For the purpose of this research study, the author measured increased interventions as a numerical excess from the routine care model. Increased interventions by PHNs include increased home visits to meet maternal or infant needs, to augment parenting skills and in some instances to monitor children with below average weight (Faughey 1997, Mulcahy 2004). Increased PHN home visits refers to the number of extra visits to the child's family home during the duration of the study.

The terms used to describe the Irish PHN's role in relation to child development and well-being incorporate surveillance, monitoring, assessment and screening from birth to five years (Denyer *et al.* 1999, Denyer 2005). Child surveillance is reported as a longitudinal, continuous process which is flexible and should occur at every child assessment (Denyer *et al.* 1999, Denyer 2005, American Academy of Pediatrics 2006). Surveillance is conceptualised as the process of identifying children where there may be concerns of developmental delay by "making accurate and informative observations of children, sharing opinions and concerns with other relevant professionals, identifying positive and protective features and documenting the procedure and findings" (Glascoe & Dworkin 1995, p. 829). It is a broad concept that requires accurate PHN assessment to detect child developmental difficulties at the earliest possible time to ensure better child outcomes (Dworkin 1989, Appleton & Cowley 2008). Surveillance is similar to monitoring as it closely observes child development and well-being by listening to parental concerns (Denyer 2005).

Monitoring, also known as "tracking" (Marks *et al.* 2011, p. 854), can be continuous or periodic, structured or informal and "may or may not involve such processes as screening, surveillance or assessment" (Dworkin 1989, p. 1001). Screening is a much broader concept. It involves reviewing the entire population especially those at greatest risk, according to a set of predefined criteria, to determine the prevalence of a frequently occurring condition of significant morbidity or mortality. Screening is used to detect conditions that could impact on

a child's development or well-being, such as childhood deafness, learning disability or speech and language delay (Dworkin 1989). Child assessment by PHNs involves detailed investigation, for example in cases of failure to thrive or delayed developmental milestones (Dworkin 1989, Appleton & Cowley 2008).

### **1.9.3 The influence of public health nursing home visits**

There is extensive national and international literature promoting nurse home-visiting services as a means of improving maternal and child outcomes through assessment of child and family needs and providing appropriate interventions (Appleton 1994, Appleton 1995, Kelly 1995, Appleton 1996, Hanafin 1997, Old's *et al.* 1997, Kitzman *et al.* 1997, Hanafin 1998, Olds *et al.* 2000, Kitzman *et al.* 2000, McNaughton 2000, Olds *et al.* 2004, McNaughton 2004, Mulcahy 2004, Kabakian-Khasholian *et al.* 2006). Benefits include positive outcomes on maternal attitudes toward child rearing, mothers reporting fewer health worries, fewer subsequent pregnancies, longer duration between the first and second pregnancy and fewer months receiving social welfare. Advantages to the child included higher intellectual functioning, improved receptive vocabulary scores and higher levels of achievement in arithmetic at age 6 years (Gutelius *et al.* 1977, Barkauskas 1983, Olds *et al.* 1997, Olds *et al.* 2004). Though many of these studies were limited by small sample sizes and lacked a theoretical framework, increased nurse and PHN home-visiting were shown to improve both maternal and child outcomes. The majority of evaluation studies and randomised controlled trials on family nursing interventions for parents of young children share a common focus on prevention, whether it is prevention of low birth weight, child abuse or childhood learning delays (Sweet & Appelbaum 2004, Old's *et al.* 1997, Old's *et al.* 2004).

In the Republic of Ireland, PHNs monitor and promote child development and well-being up to school going age and play a vital role in assessing and supporting families (Kelly 1995, Hanafin 1998, Denyer *et al.* 1999, Mulcahy 2004, Denyer 2005). Through their work PHNs have a high level of contact with parents of young children experiencing a variety of difficulties and requiring increased interventions (Kelly 1995, Hanafin 1998, Denyer *et al.* 1999, Mulcahy 2004, Browne *et al.* 2010). PHNs approach their work by contextualising and identifying parental and child care-needs to provide early and increased intervention for families experiencing difficulties. Such appropriately placed interventions prevent circumstances progressing negatively or deteriorating (Browne *et al.* 2010). As members of primary community care teams, PHNs have the opportunity to address concerns for parents

of young children through a number of approaches (Mulcahy 2004, Begley *et al.* 2005, Browne *et al.* 2010, McDonald 2013). These includes referral to other primary community care team members, appropriate supports and services, increased home visits and the provision of increased PHN support.

### **1.10 The role of the researcher**

The author of this study is a PHN, of 16 years standing, working in a generalist role in community clinical practice. PHNs play a vital role in assessing and supporting families in the community and are the only professionals who have a mandatory requirement to visit families in the home (Kelly 1995, Hanafin 1998, Denyer *et al.* 1999, Denyer 2005, Mulcahy 2004). This facilitates a multiphase monitoring service to all children from birth to five years. Following assessment of maternal and child care-needs PHNs, through the child health surveillance programme, determine the level of interventions necessary for each child and family (Denyer *et al.* 1999, Denyer 2005, Appleton & Cowley 2008). As a PHN, the remit of the author's clinical practice incorporates participation in the national child health surveillance programme, monitoring the development and well-being of children from birth to five years.

The importance of prior knowledge and experience in measuring child developmental needs is highlighted by Voress and Maddox (1998). They strongly advised researchers in the areas are trained in undertaking such detailed assessments as those unfamiliar with measuring child development and well-being risk not reflecting the true outcomes of this client group.

### **1.11 Rationale and importance of the study**

Outcomes can be a result of multidisciplinary input and it has been argued that each healthcare discipline should be able to effectively measure only those client outcomes directly influenced by their own interventions (O'Shea 2006). It is vital that PHNs can describe their contribution to client care outcomes. Snyder *et al.* (1996) called for one definition of nursing intervention to allow easy clarification and labelling of nursing actions and continual testing or statistical measurement to determine their effectiveness in preventing or resolving health and social problems.

By measuring child development and well-being outcomes from birth to two years following increased PHN home visits and increased PHN interventions, this study aims to contribute to issues as identified in previous literature. O'Dowd (2013) reports a deficit of national data in Ireland on child development and well-being outcomes from the age of eighteen months to two years. Moreover, few studies have focused on how PHNs actually support families and provide interventions to parents of young children in varying home circumstances (Browne *et al.* 2010). Gaps identified in the literature which support the need for this study indicate that further nursing research should be directed by middle-range practice theory where studies are powered to clearly explain nursing interventions and use valid and reliable measures in culturally diverse samples (McNaughton 2004). The literature also suggests that measuring child development and well-being outcomes should be conducted at specified follow-up periods to assess if achievements have been lost, sustained or augmented (MacLeod & Nelson 2000, McNaughton 2004, Browne *et al.* 2010). This is supported by the Department of Health and Children where the National Children's Strategy and Better Outcomes Brighter Futures identified a need to adopt a greater understanding and knowledge of child development and well-being to identify the series of development stages that children go through as they progress to maturity (DoHC 2000, DoHC 2014).

Begley *et al.* (2004) examined the role of the PHN in the Galway Community Care Area and developed the Community Client Need Classification System to assist Irish PHNs in measuring the specific needs of their clients. Begley *et al.* (2004) recommended that PHNs research their area of practice in order to "develop community health services" (Begley *et al.* 2004, p.106). Christie and Bunting (2011) undertook a study on the frequency of home visits by Health Visitors to low risk first-time mothers in Northern Ireland and highlighted that the impact of routine Health Visitor interventions on postnatal mothers has not been appropriately evaluated (Christie & Bunting 2011). To demonstrate their influence on parents' and children's' lives and to provide policy makers with evidence of their work, public health nurses need to articulate the nature of their interventions (Appleton & Clemerson 1999, Besner 2006).

## **1.12 Research purpose**

The purpose of this research was to measure the development and well-being longitudinal outcomes of children from birth to two years following increased PHN interventions.

This purpose was addressed through four objectives:

- i. Measurement of longitudinal child development and well-being outcomes in a cohort of children from birth to two years.
- ii. Comparison of child development and well-being outcomes between families who received increased PHN interventions and those who received routine PHN care.
- iii. Measurement of development and well-being outcomes of study group within 3 - 6 weeks of birth for wave 1, at age 4 - 7.5 months for wave 2, at age 9 - 14 months for wave 3 and 23 - 24 months for wave 4.
- iv. Comparison of baseline and follow-up primary and secondary outcomes for study mothers and children.

A null hypothesis, claims that there is no relationship between variables. The hypothesis in this study was stated as a null hypothesis (that is there is no difference) and statistical tests were used to disprove this as it was expected that findings would show a difference.

### **1.13 Conclusion**

The focus of this quantitative prospective cohort study was to measure longitudinal child development and well-being outcomes from within 3-6 weeks of birth up to the age of 2 years located in the HSE South and HSE West. In this chapter, the study was contextualised in relation to PHN nursing surveillance and the influence of policy on child outcomes under consideration. The role of the researcher, as well as the rationale for this study were outlined.

In chapter two, both Irish and international literature pertinent to the study will be profiled. The influence of public health nursing interventions on both maternal and child outcomes will be examined in conjunction with the child health surveillance role of Irish PHNs in monitoring child development and well-being from birth to two years. The theoretical framework that guided this study will also be explored.

In chapter three, the methodological process, selection process for measures and outcome measures, application for ethical approval, piloting the research, participant recruitment and data collection will be discussed.

In chapter four, a description of the study sample and outcome data of the Service Utilisation Form and Development Assessment of Young Children will be presented.

In chapter five, maternal variables based on the Service Utilisation Form, Short Form 36 Health Survey, WHO Quality of Life – BREF, Parent Stress Index and Medical Outcomes Study Social Support Survey will be outlined.

Chapter six will describe the effect of increased PHN home visits and increased PHN referrals accepted by respondents to other professionals and support services compared to outcomes of the routine care group.

Chapter seven presents the purpose of the study, summary of the main study findings, discussion of findings, links to the theoretical frameworks underpinning the research, strengths and limitations and clinical and research recommendations.

## **Chapter Two: Literature Review**

### **2.1 Introduction**

In the previous chapter the role of the Irish PHN, along with the chosen methodology and the context of the study within Irish childcare policy was outlined.

In this chapter, Irish and international literature relating to mother and child outcomes following public health nursing home visits and interventions will be examined. The broad role of PHNs in the context of their employing agency the Health Service Executive (HSE) will be identified. Literature pertaining to PHN interventions in Ireland and their role in monitoring the development and well-being of children from birth to two years will be outlined. The theoretical framework employed in this study to identify the influences of public health nursing interventions on child development and well-being outcomes will be demonstrated.

### **2.2 Literature search method**

Literature was reviewed in relation to the development and well-being outcomes of children from birth to two years following public health nursing interventions. These included peer-reviewed articles written in the English language on public health nursing, public health nursing interventions, comparisons between the role of PHNs in Ireland and internationally, the stages of child development 0 - 23 months and markers of child well-being in Ireland, United Kingdom, United States of America, Canada, Australia and Nordic countries. Sociology, psychology and nursing books on child development and well-being outcomes were sourced. National and international child and primary care strategies, policy documents pertaining to child health, development and well-being and HSE guidelines on the PHNs role in monitoring child development and well-being from birth to five years were reviewed.

A review of the literature to identify previous studies using standardised instruments to measure child development and well-being outcomes and the effectiveness of PHN interventions was conducted. Computer searches were performed on the following databases:

Academic Search Complete, The Central Statistics Office Cochrane Collaboration, Cumulative Index of Nursing and Allied Health Literature (CINAHL), ERIC, Government

Publications, Institute of Community Health Publications Institute of Public Health, LENUS, Maternity & Infant Care, MIDIRS, OVID, PsychArticles, PsycInfo, PubMed, Science Direct, Stella Search Wiley on-line, TRIP and Web of Science. Due to the challenge in finding a similar study, the search was not confined to specific years, clinical setting, community setting, and postnatal care or by exclusion criteria. Search terms were based on the research question. A selection of search terms is listed in Table 2.1.

**Table 2-1: Search Terms**

| <b>Search Topic</b>   | <b>Search Terms</b>  |
|-----------------------|--|
| Public health nursing | Community health nurse / nursing<br>Family nurse / nursing / practitioners<br>Health visitor<br>Home health nurse / nursing<br>Public health nurse / nursing<br>Rural health nurse / nursing |
| Family                | Baby / babies<br>Child / children<br>Mother / Father<br>Parent / parents   |
| Home visiting         | Child health surveillance<br>Home visit / visiting / visitation<br>Postpartum / postnatal / childbirth   |
| Intervention          | Health advertising / promotion<br>Health safety<br>Nurse / nursing assessment<br>Nurse / nursing care<br>Nurse / nursing evaluation<br>Nurse / nursing support                               |



| <b>Search Topic</b> | <b>Search Terms</b>   |
|---------------------|---|
| Age                 | Birth<br>3 months<br>7 months<br>9 months<br>23 months  |
| Child outcomes      | Adaptive behaviour skills<br>Cognitive development<br>Communication skills<br>Emotional development<br>Physical development<br>Social development |

A literature review was carried out to identify similar studies undertaken. No previous studies could be located measuring child outcomes in the five areas of milestone development; cognitive, communication, social-emotional, adaptive behaviour and physical development, taking into account increased PHN home visits in the first six weeks following hospital discharge and / or increased PHN interventions. As the literature search did not identify a previous study, no specific outcome values were available for comparison. In view of the paucity of available literature on the research question, studies as outlined in this literature review provide an introduction and overview of the nature and effectiveness of public health nursing home visiting and interventions on maternal and child outcomes.

### **2.3 History of the public health nursing service: international context**

In London, Florence Nightingale set up the first district nursing service in 1859. This service enabled nurses to care for the needs of the sick in the community in their immediate geographical vicinity. In North America the first community nursing service was founded in the late 1800s. The role of the district nurse at that time was to attend to the unmet needs of the sick in their community. District nurses became known as PHNs when Lillian Wald coined the phrase following the establishment of the Henry Street Settlement in New York in 1893. During the 1900's, PHNs were known as baby welfare nurses due to the high incidence of infant mortality in urban areas. At that time district nurses visited sick infants

and educated mothers on infant care. They focused on teaching parents of young children, promoting health and preventing childhood illness. Gradually their role expanded to include prenatal care up to school going age. Today PHNs are strategically placed to teach mothers to care for both themselves and their infants.

Historically, studies from 1963 - 1983 evaluating the effects of home visiting by PHNs on maternal and child health focused on the teaching process. These studies varied in their research design from experimental to quasi-experimental and varied in their sample sizes. Although these studies may be viewed as dated in terms of scientific literature, they greatly contribute to knowledge of the historic basis and efficacy of early PHN programmes (Cowley 2013). Findings from these earlier studies will be discussed in this section.

In 1963, Shyne *et al.* demonstrated the effectiveness of home visits by PHNs to women from early pregnancy to the postnatal period in New York. A random sample of 225 expectant mothers was selected from a possible sample size of 8,000 women who were registered in the regional prenatal clinic over a period of 18 months. Participants in their study had limited education, lived on low incomes and had little economic security. Outcomes were based on the assessment and professional judgement of the PHN. In a randomised sample, using an experimental design, they reported positive outcomes in areas such as maternal health, being prepared for childbirth and improved nutritional status. Shyne *et al.* (1963) showed evidence of the benefits of home visiting by PHNs who provided health guidance and health promotion programmes to pregnant women and their families.

In 1972, McNeil and Holland, in Seattle-Kings County Health Department, recruited a random sample of 189 mothers of new infants out of possible sample size of 420 mothers referred to the service. They aimed to compare the effectiveness and cost benefit of PHN teaching in group settings. The study participants were randomly assigned to the experimental or control group depending on the date on which the referral was received. The experimental group received home visits and completed a questionnaire. The control group were required to attend group sessions, they did not receive any home visits and completed the same questionnaire as the experimental group. Their sample was primarily Caucasian, middle class, well-educated mothers receiving PHN postpartum care when their infants were one month old. The study sample at time of study completion was 107 mothers, divided into 56 in the experimental group and 51 participants in the control group. There was a loss of follow up of over 43% of the original sample due to a number of factors such as some mothers not being able to attend group sessions as required or being able to complete the necessary questionnaire at the correct time interval. The researchers examined the individual characteristics that influence a mother's knowledge of infant care. Selected

variables were age, level of education, income, marital status, number of older children, ethnicity and area of residence. Using a pre-designed measurement instrument of a mother's knowledge of the appropriate use of health services for childhood illness or injury, a measurement instrument adapted for the study, they measured "mothers intended actions for childhood symptoms" (McNeil & Holland 1972, p. 1631). The study reported group teaching to be more effective in creating awareness among mothers of the appropriate use of healthcare services. Home visits by the PHNs were found to be a less effective means of educating mothers. However, the study lacked clear teaching guidelines for PHNs on the content of teaching sessions. Furthermore, the provision of home support visits to the control group over the study period was not taken into account.

In addition, a similar study by Yauger (1972) in Dayton, Minnesota examined the effectiveness of routine family-centred care by PHNs in the prenatal and postpartum period. A questionnaire was developed for the study to measure the participants' state of health along with their knowledge of health and health-related behaviour. Outcome measures were selected in the belief that routine PHN home visits could improve a participant's knowledge of normal compared to abnormal health behaviours.

The study sample comprised of 64 mothers in the prenatal period who had at least two children under 5 years of age. The experimental group received at least four home visits from their PHN while the control group received no home visit. The content of PHN home visits and nature of PHN interventions were not specified. No significant differences in state of health or health-related behaviour were found between multiparous mothers in the prenatal and postnatal period. Attrition rates made it difficult for the researchers to demonstrate positive changes.

Research on PHN interventions following home visits improved from the late 1970's to the mid-1980's. Gutelius *et al.* (1977) in Washington D.C. demonstrated positive outcomes in a longitudinal study assessing multidisciplinary interventions. Gutelius and colleagues collected data on over three hundred variables assessing multidisciplinary input. The study group comprised of young, unmarried, first-time mothers aged between 15 and 18 years, from lower socioeconomic groups who received increased support over a three year period. Data were collected on maternal and environmental outcomes. They demonstrated positive outcomes in children's eating habits, development, improved parenting skills and parents returning to further studies. Positive outcomes were mainly environmental and educational, for example mothers in the experimental group took their babies of 6 months to outdoor activities and engaged in using crayons and reading stories daily when their children were 2

years old. Their results demonstrate that interventions by health professionals including PHNs can have a positive influence on maternal attitudes towards child rearing.

The single longitudinal study identified by this literature review, Gutelius *et al.* (1977), demonstrated the most positive child development outcomes and showed the importance of a longitudinal design in studying the effectiveness of interventions by health care professionals.

In the 1980's, Anderson Hall in South Carolina, United States of America, used a maternal-infant bonding framework to measure maternal attachment and understanding of her infant in the early days following childbirth. The sample consisted of 30 married, first-time mothers. Fifteen participants were assigned to an experimental group and 15 to a control group. A significant difference was found in favour of the experimental group who engaged in a teaching programme derived from a measure used previously to measure mothers understanding of their new-born babies. One month following the teaching programme, findings suggested that a PHN-led home teaching programme, two to four days post hospital discharge, could promote healthy mother-infant attachment, greater emotional development and benefit children in later years.

Barkauskas (1983), in the Midwestern United States, was one of the first researchers to document the nature of routine PHN interventions provided in the home. She compared 67 first-time mother-infant pairs in receipt of PHN postpartum home visits to 43 first-time mother-infant pairs who were not seen by their PHN. Barkauskas reported the most significant influence of the PHN visit was on mother and child health needs, the use of health promotion for child care, feeding and utilisation of health services. She also emphasised the teaching aspect of the PHNs' health promotion role and showed that mothers who received PHN home visits were more likely to appropriately report health concerns.

Participants in studies from the late 1980's to early 1990's were mainly young, unmarried mothers from lower socioeconomic minority groups. Research on PHN home visits was undertaken over the short term and most commonly from the prenatal to the postnatal period. The majority of previous research measured maternal or child outcomes at a single time point. Despite varied methodological design, findings from earlier studies generally demonstrate that the PHN service produces positive maternal and child outcomes (Combs-Orme *et al.* 1985, Cowley 2013).

### **2.3.1 Outcomes of home visitation-centred randomised control trials on maternal and child health**

Home visitation services by nurses have been widely promoted in the United States of America from the late 1990's to mid-2000's as a means of preventing a range of health and developmental problems in children from vulnerable families. Olds *et al.* (1997) examined 400 first-time mothers in a randomised controlled trial looking at the long-term effects of prenatal and early childhood home visitations on a woman's life course and the incidence of child abuse and neglect. Three hundred and twenty-four from the original sample participated in a follow-up study when their child was 15 years old. This follow-up study showed that nursing home visitation could reduce the number of subsequent unplanned pregnancies, the incidence of child abuse and neglect and the rates of criminal behaviour for low income, single mothers for up to 15 years after the birth of their first child.

Kitzman *et al.* (2000) undertook a three year follow-up randomised controlled trial commencing in June 1990 at an obstetric clinic in Memphis, Tennessee. The sample consisted of 743 single, unemployed, first-time mothers of twenty nine weeks gestation with a low level of education. Five hundred and fifteen participants received free transport to antenatal clinics and child developmental screening along with referral to health and support services considered necessary for the child at six, twelve and twenty four months. A subset of two hundred and twenty eight participants also received an average of seven nurse home visits during pregnancy, one visit in hospital following childbirth and an average of twenty six home visits up to the child's second birthday. Participants in the second group demonstrated positive outcomes including fewer subsequent pregnancies, a longer period between the first and second pregnancy and a shorter period on social welfare. In addition, the children who received nurse home visits demonstrated higher intellectual functioning, improved vocabulary scores and higher levels of achievement in maths. These findings were similar to those of Olds *et al.* (1997 & 2004) who found home-based nursing prenatal and infancy programmes improved the lives of women and children up to age 6 years.

Home visiting programmes can differ in their goals, level of nursing staff and sample groups, making it difficult to generalise one programme from another (Gomby 2005). Yet these studies highlight the importance of a longitudinal design in demonstrating the progression of child development and well-being outcomes in later years following home visiting nursing programmes.

## 2.4 The evolution of public health nursing in Ireland

In 1815, 723 dispensaries were established across the island of Ireland to provide free medical care to low income individuals. Midwives were appointed as auxiliaries to the dispensary doctors in 1905. Further expansions were seen following the Health Act of 1953 which established community nursing services. An Bord Altranais, the statutory body for nursing in Ireland, was founded in 1951.

In 1958, the Department of Health published circular 18/58. This was followed by circular 27/66 in 1966 (Department of Health DoH 1966, Western Health Board 1997). Circular 27/66 set down specific guidelines to promote the development of the public health nursing service. It defined the role and function of the PHN and set out clear boundaries in relation to the public health nursing service in the community.

Some years later in 1985, the Institute of Public Health Nursing was established. Its founder Rev. Patrick Burke, surveyed the workload of PHNs in 1986 to quantify what they did on a daily basis. He noted that most time was spent working with children and older people with only 0.3% attributed to their health promotion role (Western Health Board 1997).

It was not until the year 2000 that circular 27/66 was updated and replaced by circular 41/2000 (DoHC 2000a). Circular 41/2000 identified the PHN as an autonomous practitioner, co-ordinating community care services and focusing on a preventative health promotion role which encompasses community primary health care. Circular 41/2000 (DoHC 2000a) outlined the generalist role of the PHN including monitoring the development and well-being of children, maternal antenatal and postnatal care, services to older, chronically ill or dependent individuals and provision of services to those with disabilities.

Historically, PHNs had a curative only role which evolved over time with a greater emphasis on population health, health promotion and disease prevention for community population groups (Cawley & Mannix McNamara 2011). Today, the role of PHNs is one of assessment through health history, physical examination and assessment of child development and well-being. Circular 41/2000 states “the PHN will be expected to provide a broad based integrated prevention, education and health promotion service and to act as a co-ordinator in the delivery of a range of services in the community” (DOHC 2000a, p. 2).

Modern day PHNs offer child health developmental checks to all children at specific time points from birth to five years. These incorporate a visit shortly after birth, at 3 months, between 7 and 9 months, between 18 and 24 months and from 3.25 to 3.5 years (Denyer *et al.* 1999, Denyer 2005). The development and well-being needs of children are the central

focus of this child health surveillance programme which is based on Best Health for Children and Best Health for Children Revisited (Denyer *et al.* 1999, Denyer 2005) and supported by the National Children's Strategy along with the more recent Children's Strategy, Better Outcomes Brighter Futures 2014 – 2020 (DoHC 2000, DoHC 2014). Following school entry children are monitored by school based PHNs up to the end of their primary school years (Denyer *et al.* 1999).

PHNs in the Republic of Ireland work in a generalist capacity as members of primary community care teams with a broad job description. They work with individual families and manage geographically defined areas, incorporating both clinical and health promotion roles (Candell & McCarthy-Haslam 1997, Hanafin 1997, Leahy-Warren 1998, Hanafin 2013). PHNs work with various client groups in the community and through their work identify mother and child care-needs taking into account locally available resources, supports and services (Hanafin 1997, Hanafin 1998, Begley *et al.* 2004, Hanafin 2013). Through their work they support parents in identifying community resources and options available to meet their expressed needs and wants (Mattson Bryan & Wirth, 1995). They can refer directly to any member of the primary community care team except mental health services where referrals are made through the area medical officer or GP. Referral to other multidisciplinary team members can include GPs, physiotherapists, social workers, occupational therapists, speech and language therapists, area medical officers, dieticians, diabetic nurse specialists and other specialist nurses. Early referral to primary community care team members has been identified as an important role of the PHN in providing services to the community (Mattson Bryan & Wirth 1995, DoHC 2001a, Hanafin & Cowley 2003, Marks *et al.* 2011).

PHNs, as multidisciplinary team members, plan, develop and provide interventions, support and services to the community with a view to promoting positive health outcomes (McMurray 1993, American Public Health Association 1996, Minnesota Department of Health 2003, Davies *et al.* 2003). This role of the PHN in the detection of problems in the early years of life is vital to a child's development and well-being as evidenced by national and international literature (Denyer *et al.* 1999, Davies *et al.* 2003, Begley *et al.* 2004, Mulcahy 2004, Denyer 2005, Appleton & Cowley 2008, Hanafin *et al.* 2009, Clancy *et al.* 2013).

## **2.5 Comparison of international public health nursing approaches to child development and well-being**

Comparison of an Irish PHNs work to that of Health Visitors and PHNs in other European countries is an important but difficult task given the lack of national and international

literature on the role of the PHN. One of the greatest challenges in comparing the role and work of Irish PHNs with their international counterparts is the various nursing models, different titles, lack of shared terminology. A postal survey undertaken in 31 countries identified a generalist and specialised model of nursing care in the community which incorporated up to 23 different titles (Whyte 2000, Nic Philibin *et al.* 2010). Some studies have been completed in Scandinavia, the United States of America and Northern Ireland. However, an important factor to consider is that in Finland, Norway, Ireland and Western Europe monitoring the development and well-being of children from birth to five years is mainly undertaken by nurses whereas, in the United States of America this work is carried out by doctors (Clancy *et al.* 2013).

In Finland, the aim of child health examinations is to promote healthy growth and development of children and support the well-being of the whole family. Childhood obesity is a concern similar to that of Ireland where 30% girls and 22% of boys aged nine years old in the lower socioeconomic groups were either obese or overweight. In Finland, female employment figures are high but most mothers following childbirth tend to take parental leave for anything up to three years. Family income levels are comparable high with lower income levels and poverty affecting mostly single parents with children under three years. "Public health nurses are the key actors in the child health clinics and school health care". They are identified as independent experts in promoting child health and well-being (Poutiainen *et al.* 2013, p. 227). There concerns about child health and development were based on PHN intuition, a subjective assessment based on education, experience and awareness of the resources and supports that are available to enhance child development and well-being (Appleton 1994, Ling & Luker 2000). PHNs undertake at least fifteen regular health and development examinations during the first six years of the child's life. Attendance at child development and well-being clinics are high and estimated to be in the region of 99.5%. Due to a lack of available research data on PHN concerns at child health examinations. Poutiainen *et al.* (2013) investigated the association of the child's gender, the mother's employment record, adequacy of parental income with the PHN's concerns in relation to physical health, psychosocial health, development and well-being of children at child health examinations. Information on child health, child development, child well-being and background characteristics including family environment, health history, illness, family income and maternal employment were collected on 6506 children where 3397 children were below school going age.

The children were assessed by their PHN at six months, one, three and five years of age as well as children in 1<sup>st</sup>, 5<sup>th</sup> and 8<sup>th</sup> grade. The assessment was made on a scale of no, mild or



clear concern. The study found that PHNs were most concerned about school aged children. The physical health of one year olds was of concern in 10% of cases. No difference was noted between boys and girls with respect to physical health in those under school age. The PHNs were concerned about the psychosocial development of 24% of boys and 19% of girls in families that reported insufficient income. Concerns relating to psychosocial development were more likely to arise in school aged children compared to those under school age. They also made a note of concern in relation to parent-child interaction for 4% of children under school age. They found that the family's financial situation and employment influenced child health and well-being. Findings in Ireland are similar to those of Finland, in that children as young as 3 years of age have been found to be overweight (Layte & McCrory 2011). Consistent poverty for single parent households with children in Ireland in 2011 was high at 16.4% (DoCYA 2012). It is well documented that early childhood years can directly or indirectly affect health and well-being in later life and the conditions in which children are living are closely linked to a family's financial situation. The main recommendation from Poutiainen *et al.* (2013) called for increased support for children of single parents and the families with greatest needs. They proposed that: "the family and the way it functions have a key role for the health, development and well-being of children" (Poutiainen *et al.* 2013, p. 225).

Comparing PHN models in Ireland with those in Norway, Clancy *et al.* (2013) found that the countries differ geographically and economically, yet are similar in population size and face similar public health challenges. PHNs in Ireland and Norway both manage a geographical area and provide a child health surveillance service in the home, health clinic and schools. PHNs in Norway and Ireland both adopt a health promotion and disease prevention role from birth to adolescence through child health clinics and school health services by teaching and promoting healthy lifestyle to the entire family. PHNs in Ireland identify the need for child and family support at the earliest stage and target support and services to those in greatest need (Mulcahy 2004). Irish guidelines advise five core PHN visits up to five years of age (Denyer *et al.* 1999, Denyer 2005). Figures for clinic appointment attendance average 82% - 84.4% (Department of Children and Youth Affairs, DoCYA 2012).

In Northern Ireland, Christie and Bunting (2011) noted a significant lack of previous research on the impact of increased home visits to first-time mothers. This prompted a cluster randomised trial involving 80 Health Visitors and 431 participant mothers. Mothers in the intervention group were offered up to six home visits, two to eight weeks postpartum, compared to a single planned visit to the control group. The outcomes measured were parenting, well-being of participant mothers and use of emergency medical services at eight

weeks and seven months postpartum. The primary measure used to assess maternal well-being was the Edinburgh Postnatal Depression Scale. The intervention group showed higher levels of service satisfaction at eight weeks and seven months postpartum and required less emergency medical services for their babies. No statistical difference was found between groups in relation to parenting outcomes.

In the UK, the Family Nurse Partnership (FNP) contribute to the Health Visitor (HV) Implementation Plan (Cowley *et al.* 2012). The FNP National Unit has developed several programmes from information gathered during planning projects to help enhance the Health Visitor role in the UK. Through this evidence based programme, intensive support is provided to the most vulnerable of families such as first-time mothers or young parents. Young parents are often amongst those who need additional help and support so as to give their children the best possible start in life (Cowley *et al.* 2012). This programme is delivered by specially trained Family Nurses, working intensively with vulnerable families, to support them in caring properly for their children and especially in helping them to deal with child emotional and behaviours problems (Cowley *et al.* 2012).

The Health Visitor service and the wider children's public health service commences during pregnancy and child monitoring continues until the age of 5 years. Currently in the UK, health visitation occurs within the first 10-14 days of an infant's life. This is the only home visit that an infant will receive as part of the routine care model in the UK. The infant will have other clinic based appointments at one month, 6-8 weeks, 9-12 months, 2-2.5 years and 3-3.5 years (Department of Health 2011). The first visit by the Health Visitor occurs within 10-14 days of birth and usually encompasses all areas of concern for a new parent or those caring for a newborn infant. The area of family adjustment to a new infant and any other health issues are explored. The infant is weighed, its length and head circumference are measured and a thorough examination of the infant is undertaken. As part of the six to eight weeks postnatal follow up, the Health Visitor may visit the family home or meet in a clinic setting. He/she may also arrange for infants to be weighed regularly if issues with thriving are identified. In such instances the infant will be weighed once a week until eight weeks old, once a month up to the age of six months and two monthly up to the age of one year.

By comparison in New Zealand, PHNs are known as Plunket nurses. The child development assessment programme in place in New Zealand is underpinned by the Well Child Framework which is a universal model of child health and development assessment. This framework and model allows for 8 core child health development assessments. They are based on assessment of need and are provided especially where families and children are

deemed to be vulnerable, such as first time mothers or young parents. Such families can receive up to 16 additional support contacts from their Plunket nurse.

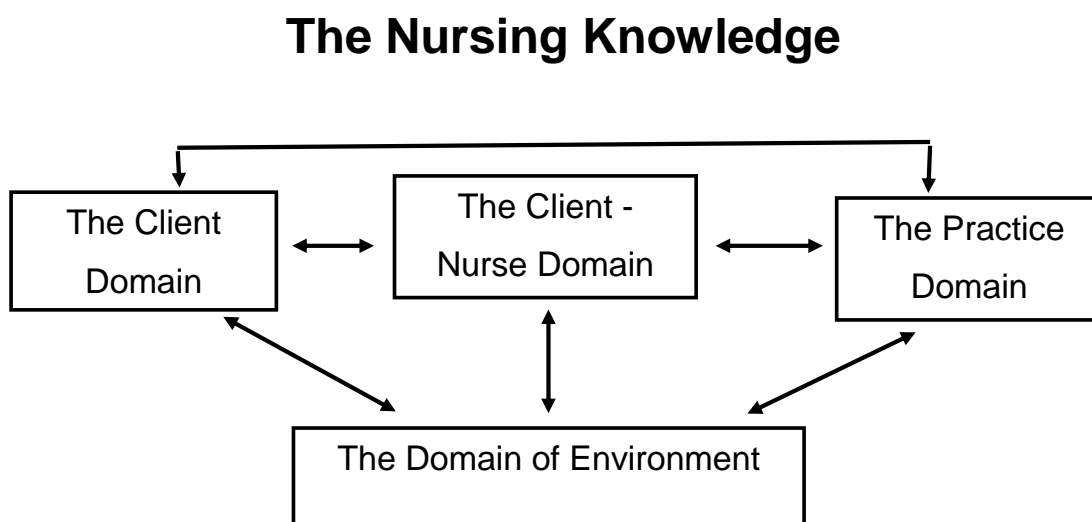
The Maternal Early Childhood Sustained Home-Visiting (MECSH) programme is based in Australia. It is designed to enhance maternal and child outcomes by providing antepartum services in addition to the traditional postpartum care. MECSH primarily targets disadvantaged, pregnant women at risk for adverse maternal and/or child health and development outcomes (Cowley *et al.* 2012). Registered nurses conduct a minimum of 25 home visits, from pregnancy and up to the child's second birthday. The programme is developed to help promote children's development and involves monthly home visits. The MECSH programme has five core elements which centres on supporting all aspects of the family in order to help improve child outcomes. This programme centres on supporting maternal mental and physical health as well as interfamilial relationships through encouraging self-improvement ideas and goal setting for themselves as well as their child. This improves family functioning and child development as a whole. Another important aspect of the MESCH programme is through promoting maternal and child health and wellbeing, good parent-infant interaction, access to primary health care, family health and development education programmes. The MESCH nurses receive support from other professionals and refer parents and families to those professionals within the maternal, child, and family health services system which is a multidisciplinary approach to family healthcare.

While there are many similarities between the different health care systems, there are also many differences that exist between these countries. The visit schedules as well as the number of mandatory or core child health visits that occur vary considerably. In the UK there are 6 core visits which is similar to the 5 visits that occur in Ireland, while New Zealand and Australia have 8 and 25 mandatory visits respectively. The timing of the visit schedule for the UK differ from that of the Irish system but the areas of child development are measured in a similar manner. One considerable difference that exists between the jurisdictions is that in the UK, parents are asked to register with their local Sure Start centre. These centres allow new mothers to meet other mums and partake in any activities that the centre has to offer. These centres are often attached to the local child health clinic and offer child play and music sessions, as well as baby massage classes for participating families. Despite the differences that exist in community nursing between the various countries all nurses are required to meet specific educational requirements for registration in their specific role.

## 2.6 Nursing science

PHNs are identified as members of the nursing profession with an educational background in public health and nursing science, focusing on community population-level outcomes. Figure 2-1 demonstrates “the four spheres of the empirical world in which nursing-relevant phenomena could be located”. By structuring the nursing knowledge system, Kim (1998) provides a clear composition of how nursing knowledge is disseminated to the mother and infant whether it is in the family home, health centre, community or through community health services (Kim 1998, p. 369).

The typology of four domains was proposed as a conceptual “map” relevant to community nursing to support further research. The typology identifies areas in which nursing relevant knowledge is necessary, it also opens the debate around gaps in the nursing knowledge system that require further research to promote the continuation of evidence based nursing practice.

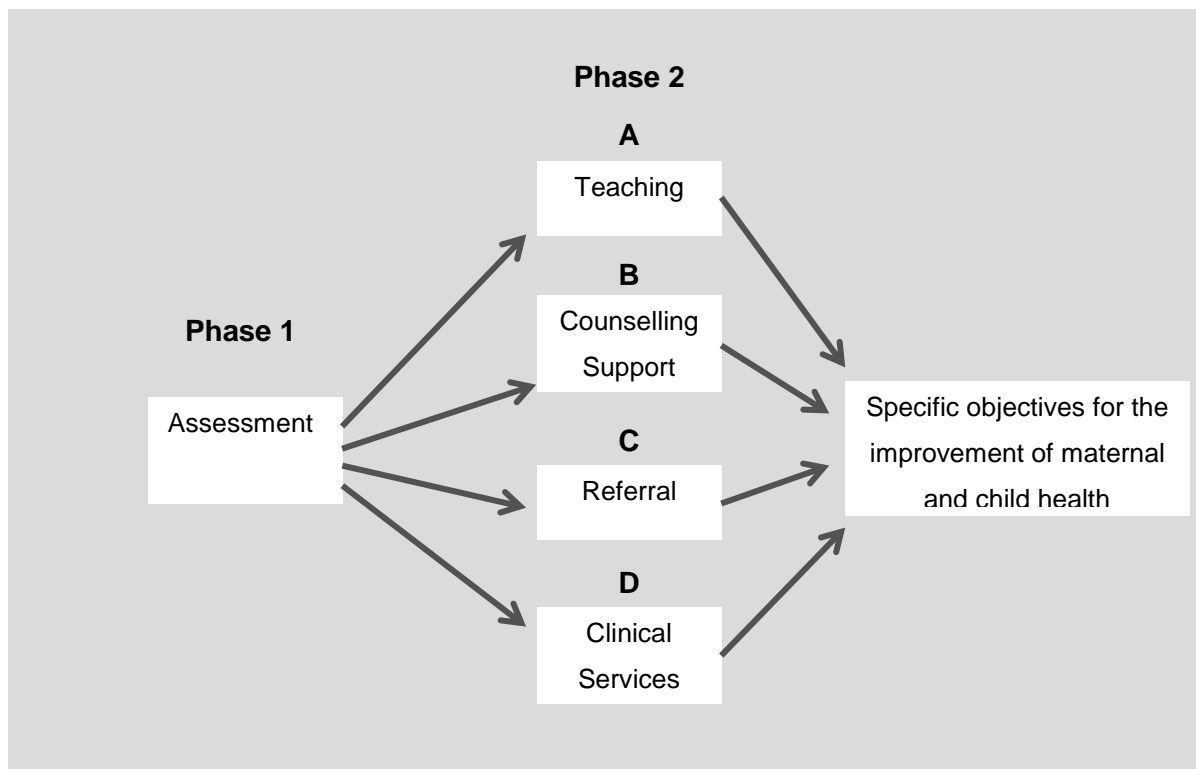


**Figure 2-1: A Typology for the Nursing Knowledge System**

**(Kim 1998, p. 369).**

Combs-Orme *et al.* (1985) developed a theoretical framework to categorise public health nursing services. This detailed PHN interventions and potential mother and child outcomes following public health nursing interventions. Figure 2-2 demonstrates this process. The first phase includes assessment of maternal health, child development and child well-being. The

second phase provides interventions based on the results of the needs assessment such as teaching (health promotion), counselling support (listening to parental concerns) and referral to community supports, services or other members of the primary community care team. The specific objective of PHN interventions is to improve maternal health, ensure timely child development and achieve child well-being outcomes (Combs-Orme *et al.* 1985).



**Figure 2-2: A Theoretical Framework for Public Health Nursing in Maternal and Child Health**

**(Combs-Orme *et al.* 1985, p. 492).**

While Combs-Orme theoretical framework is important in categorising the broad role of the PHN, it does not provide an understanding of the nurse-client relationship. Interaction theory addresses this shortfall. Peplau (1997) describes the nurse-client relationship as progressing through four overlapping stages of orientation, identification, exploitation and resolution. The Coombs-Orme theoretical framework also fails to explain child development and well-being from a holistic and child-centred viewpoint. The ecological theory of human development by Bronfenbrenner (1977) in which the child is embedded better addresses this key issue (Hanafin *et al.* 2009).

### **2.6.1 Measuring child development and well-being over the first two years of life**

The importance of measuring the development and well-being longitudinal outcomes of children from birth to two years is well supported in the literature (Broderick 1993, Byrd 1995, DoHC 2000, Glascoe 2001, Hanafin & Cowley 2005, Kertoy *et al.* 2012, Clancy *et al.* 2013). Some developmental psychologists suggest that children “go through the same stages in the same order” (Smith *et al.* 2003, p. 68). Although this theory maintains that child development is nonlinear, there are assumptions that if a child is not attaining milestones at one developmental assessment, delays will inevitably result at later developmental assessments. Given the debate on this issue Darrah *et al.* (2003) cautions against such assumptions suggesting different domains of child development progress at varying rates and calls for a better understanding of the trajectory of child development and well-being.

Environmental factors can influence how quickly or how slowly a child achieves their developmental milestones. However, it cannot alter the order in which the stages occur. For example, a child cannot progress to a later stage of development before firstly going through the earlier stages. If a child is not exposed to verbal communication prior to the age of 6 - 7 years, it is unlikely that the child will develop a proper command of fluent speech and language in later years. Critical periods in psychological development are recognised as sensitive periods. The first year of a child's life, in particular, is recognised as a sensitive period for attachment to the mother or carer (Anderson Hall 1980). What the child experiences during critical sensitive periods shapes their future emotional development in a way which may be difficult to alter at a later stage (Anderson Hall 1980, Denyer *et al.* 1999, Glascoe 2001, Smith *et al.* 2003). Literature suggests the critical stages of psychological development are not as clearly documented as those of physical development.

Erikson's psychological theory based on trust as opposed to mistrust, contributed to knowledge on the importance of a trusting and bonding relationship between an infant and its caregiver. He developed eight stages of psychosocial development over a person's lifespan. By comparison Sigmund Freud's theory on infant development, proposed that an infant's future personality is formed by the age of five years. These two theorists have much in common with Bolby's attachment theory which is based on the importance of a bonding, trusting relationship between the primary caregiver and the child. In conjunction with the work of Erikson and Freud, Bolby identified the importance of nurturing and trust in the early formative years of life. Similarly, he proposed that poor attachment can lead to situations of mistrust, frustrations and not feeling safe which may have a negative impact on child development and well-being (Bolby 1953, Smith *et al.* 2003).

One of the main difficulties whilst undertaking child development research is attempting to decipher environmental influences from genetic influences. This is most concerning when interpreting raw data scores on outcome measures. Darrah *et al.* (2003, p. 97 & p. 108) examined 102 “typically developing” 23 month old Canadian children, assessing child development in gross motor, fine motor and communication skills. They noted development was “characterised by variability rather than stability” and cautioned researchers in relation to interpreting results from measures in the absence of parental collateral information and professional assessment of a child’s abilities.

In support of this, Rutter & Rutter (1993) and Glascoe (2001) cautioned professionals to avoid rushed decisions when children score below a cut-off point in screening instruments at one developmental assessment. They noted that scores frequently improve at later developmental assessments. This is most critical when monitoring growing children to ensure the results of measures are interpreted correctly, ensuring those who may constitute an at-risk group and could require intervention services at a later stage are correctly identified (Darrah *et al.* 2003).

The importance of a parent’s contribution through questionnaire assessment to predict impairment of child development and well-being is well debated (Glascoe & Dworkin 1995, Rydz *et al.* 2006, Schonwald *et al.* 2009). Dworkin (1989) advised caution in use of parental report when monitoring child development and well-being. He noted that parents worry about their child’s behaviour and development, often over-representing perceived deficits. Six years later, Glascoe & Dworkin (1995, p. 831) found parental input to be “better current and future predictors of developmental and behavioural problems than others”. This highlights the fluid nature of parental input and the importance of asking the correct question regarding child development and well-being if using parental information (Dworkin 1989, Denyer 2005, Nicholl & Tracey 2007, Marks *et al.* 2011).

In addition, Rydz *et al.* (2006) assessed 317 normally developing children in Quebec, Canada to determine the feasibility of using parental questionnaires to measure child development. They demonstrated that children with developmental delay were not accurately identified by the Ages and Stages Questionnaire (Squires & Bricker 2009) despite additional information from participating paediatricians. When a subset of the sample was further assessed by the Battelle Developmental Inventory (Williams 2008) and the Child Development Inventory (MacArthur-Bates 1997), these too were found to be insufficient to identify developmental delay. Rydz *et al.* (2006) came to the important conclusion that parent-reported questionnaires were an effective and feasible means of measuring child development and well-being in a Paediatric clinic. They proposed that Paediatricians

consider replacing time intensive screening tests with parent questionnaires. In promoting child well-being, Glascoe (2001) recommended future research focus on longitudinal monitoring of children with screening scores below the cut-off point at one measurement timeline, to determine if they are likely to improve at a later measurement, if they continue to perform below average or if they are likely to develop a disability.

Given the continued debate on selecting measures Schonwald *et al.* (2009) reported that it is unlikely randomised controlled trials will identify a single tool that will effectively screen child development and well-being outcomes. They suggest sharing the cumulative experiences of practitioners across various regions and practices with varying tools could transform child developmental and well-being screening “into an evidence based practice” (Schonwald *et al.* 2009, p. 668).

### **2.6.2 Indicators of child development and well-being**

The majority of well-being indicators take a broad and comprehensive view of children and young people’s lives. Promoting child development and well-being has been advocated by the National Children’s Strategy (DoHC 2000) This document proposed the development of a set of ‘child well-being’ indicators to improve quality of life for Irish children. This strategy document has been updated with Better Outcomes Brighter Futures 2014-2020 which supports the provision of best outcomes for children in Ireland with up to date research into children’s lives based on data from the Growing Up in Ireland (GUI) national study (GUI 2011, GUI 2011a, GUI 2013, DoHC 2014).

McKeown *et al.* (2003) conducted research in the Irish setting and identified four main factors from the child’s perspective that influence child well-being. These included the ability to resolve problems with parents, maternal physical and mental well-being, paternal support and family income. This report indicated that the well-being of Irish children is almost directly influenced by their parents. Hanafin & Brooks (2005, p. 12) expanded upon the National Children’s Strategy by developing a national set of child well-being indicators based on the experience of Irish children aged between 8 to 19 years. This set of indicators comprised of “forty two well-being indicators and seven sociodemographic indicators”.



The main well-being indicators relating to children from birth to two years were:

- Accessibility to basic health services for children and young people
- Availability of housing for families and children
- Child abuse and maltreatment
- Children and young people in care
- Child mental health
- Child nutrition
- Chronic health conditions and hospitalisation
- Community characteristics
- Enrolment in childhood care and education
- Environment and places
- Health of the infant at birth
- Parental time with children
- Public expenditure on services for children and young people
- Quality of childhood care and education
- Relationship with parents and family
- Screening for growth and development

The main sociodemographic indicators relating to children from birth to two years were:

- Child population
- Children and young people with additional needs
- Family structure
- Parental education level attained

The United Nations Children’s Fund (2007) provided a comprehensive view of the lives and well-being of children from 21 nations in the industrialised world. The report showed that the Netherlands tops the table in relation to material, health and safety, education, family and peer relationships, behaviours and risks as well as subjective child well-being. The United Kingdom and the United States of America are located at the bottom of the table and Ireland ranks 9<sup>th</sup> place out of the 21 countries measured. The review noted that all countries have weaknesses in relation to child well-being which need to be addressed. However, no single dimension is “a reliable proxy for child well-being as a whole” (United Nations Children’s Fund 2007, p. 3).

In Ireland, The Report of the Expert Advisory Group on the Early Years Strategy “*Right from the Start*” (DoCYA 2013) pointed the way forward in promoting the development and well-being of children. Suggestions from this document are to:

- Ensure the health, development and well-being of children is considered by strategies that impact on children’s lives
- Provision of coherent and integrated supports and services for parents to promote healthy child development and well-being at all stages
- Support parents from disadvantaged groups by increasing high quality evidenced based programmes that improve child development and well-being outcomes
- Support staff and communities aiming to improve child development and well-being outcomes by meeting their future skills and training needs
- Support the provision of an adequate level of health services to ensure an effective reduction in the inequalities currently in child health outcomes

The Report of the Expert Advisory Group on The Early Years Strategy “Right from The Start”, Department of Children and Youth Affairs (DOCYA 2013, p. 12) also advised that a high-quality child development and well-being monitoring programme requires;

“A public health nurse home visiting service, which is an excellent early warning and preventative system. In order to do this work effectively, public health nurses must have the time to maintain effective contact with children and their families”.

This document cautioned that a lack of allocated time for public health nursing home visitation services would have a negative impact on the efficacy of the service. To facilitate this goal, it is crucial to provide an effective assessment of child development milestones at

the correct time intervals. If this aim is not achieved and there are any resultant delays in parents receiving help this can lead to further delays in accessing required services and more costly interventions.

While methods of measuring child development and well-being have advanced greatly in the past two decades, many remain targeted towards children and youth with special needs and their families. This is especially true following the adoption of the World Health Organisation's Classification of Functioning, Disability and Health (ICF) (World Health Organisation 2001) which resulted in the creation of an international standard of specific instruments to describe and measure child activity, impaired functioning and the influence of positive or negative environmental factors on human functioning. Most studies were based on home visiting programmes which were undertaken to measure child progress following specific treatments or interventions for vulnerable and high risk children with complex needs and their parents (Olds *et al.* 1997, Kitzman *et al.* 1997, Kitzman *et al.* 2000, MacLeod & Nelson 2000, Sweet & Applebaum 2004, O' Doherty 2007, Kertoy *et al.* 2012). Most programmes operated with the belief that parenting skills needed to be enhanced and were specifically designed to teach parents to improve their own health and well-being in order to improve outcomes for their children.

In addition, Mattson Bryan and Wirth (1995) identified the importance of holistic nursing care which integrates all aspects of health and well-being of children and families. They proposed that nurses offer valuable insight into the identification of community services to accurately respond to parental needs and wants. To achieve this, PHNs complete a health history, physical examination where necessary and assess child development and well-being by listening to parental concerns, addressing their needs and taking the opportunity to explore all aspects of a child's development and well-being. PHNs work in partnership with parents to identify community resources and source the best options to suit both parent and child needs (Mattson Bryan & Wirth 1995, Mulcahy 2004, Hanafin *et al.* 2009). In this way, a PHN can identify parental problems in childrearing and put in place interventions to prevent a home situation deteriorating.

### **2.6.3 Challenges facing public health nurses in Ireland**

The PHN provides a "broad-based multifaceted service to a multiplicity of client groups" (Hanafin *et al.* 2002, p. 69). Begley *et al.* (2004) examined the role of the PHN in the Galway Community Care Area. Their study supported the belief that PHNs "have a role within every facet of the community" and argued that their role has "remained largely unchanged since

1966". They suggested that the role of the PHN has "become the band-aid of the community" to "patch up gaps in service or breakdowns in the community service" (Begley *et al.* 2004 p. 92). Denyer (2005) called for this to be urgently addressed as the PHN service at the time was unable to meet the identified needs of children or provide appropriate and timely interventions. Nic Phibilin *et al.* (2010) supported the findings of Begley *et al.* (2004) noting Irish PHNs were left to fill gaps where adequate services were not available to meet family and childcare needs. This was further compounded by a lack of PHN recruitment to fill permanent posts, failure to address the shortfall of training provided to PHNs to meet child development needs and the lack of a clear workforce plan (O' Dowd 2013). The main challenges for Irish PHNs are "staff shortages, huge caseloads, masses of paperwork without added support and cuts to vital services" (Giltenane *et al.* 2016, p. 8). The Irish census 2011 identified an increase of 17.9% in preschool children aged from birth to 4 years since the previous census of 2006 (CSO 2013, O'Dowd 2013). It has been acknowledged that many HSE areas in the Republic of Ireland are unable to meet the statutory requirements of the child health surveillance programme due to a shortage of PHNs. Kent *et al.* (2011) suspected there is an ongoing lack of awareness of the work that PHNs undertake in the community and Hanafin and Coyne (2015) called for adequate support and funding to be provided for PHNs to enable them to fulfil their role.

The broad scope of the Irish PHN's role makes it difficult to provide a standardised service. This has implications for practice. The very nature of broad preventative and health promotion work also compounds the challenge of measuring the effectiveness of PHN interventions (Clancy *et al.* 2013). As early as 1995, O'Sullivan suggested the caseload of a PHN should average 2,600 clients. However, recorded caseloads vary dramatically from one area to another with many PHNs describing caseloads of 3,500 - 4,500. Hanafin & Cowley (2005) found that PHNs worked with populations ranging from less than 3,000 to more than 4,001. The enormity of such a caseload has implications for the way the public health nursing service is provided as irrespective of dedication to the promotion of child development and well-being, this variation in caseload makes it extremely difficult for PHNs to provide a standardised service across all HSE areas. Markham & Carney (2007) identified large caseloads as impacting on the PHN's ability to provide quality care in the community. For these reasons, Hanafin (2013) calls for equitable workloads for PHNs.

Hanafin *et al.* (2002) suggest that there is an assumption that a community of 2,500 served by a PHN is a homogeneous group. It is assumed that they will have similar needs however there are differences relating to rural versus urban geographical areas and client nationality. Denyer (2005) and O'Dowd (2013) also acknowledge the challenges for PHNs in meeting

the statutory requirements of the national child health surveillance programme. The challenges PHNs face have implications for meeting the needs of postnatal mothers who require PHN home support visits and for those requiring increased PHN referral to other professionals and support services. Coyne and Cowley (2007) echoed these findings when they showed that nurse shortages in the hospital setting led to the expectation that parents of hospitalised children would provide psychosocial care, routine childcare and undertake some nursing tasks due to inadequate staffing levels in paediatric units. Coyne (2013) stressed the need for nurses to undertake skilled training and have clear role identification, good supervisory support and appropriate resources in order to provide appropriate and timely interventions to parents and children. She emphasised the importance of a nurse's knowledge when providing comprehensive information to parents on childcare and support services.

#### **2.6.4 Complex area of public health nurse interventions**

Although a limited number of studies are available, the literature demonstrates remarkable differences in maternal and child development and well-being outcomes for those who receive increased nursing contact compared to those who receive limited nursing contact (Gutelius *et al.* 1977, Anderson Hall 1980, Barkaukas 1983, Olds *et al.* 1997, Kitzman *et al.* 1997, Olds *et al.* 2000, Kitzman *et al.* 2000, McNaughton 2000, Olds *et al.* 2004). Public health nursing interventions are defined as “actions taken by public health nurses on behalf of communities and the individuals / families” (Minnesota Department of Health 2003, McDonald *et al.* 2013, p. 8). Public health nursing interventions to children within the Republic of Ireland are guided by Best Health for Children and Best Health for Children Revisited (Denyer *et al.* 1999, Denyer 2005). However, implementation of these guidelines lacks standardisation across the four HSE areas (Denyer 2006, O'Dowd 2013). Therefore, interventions will be different from one community care area to another, from family to family and from problem to problem (McDonald *et al.* 2013).

Best Health for Children (Denyer *et al.* 1999) informs us that early intervention programmes are necessary to improve educational, social-emotional and economic outcomes for children. This is a view point supported by existing child development and mental health programmes as well as other intervention programmes throughout Britain, Europe, USA and Australia (HSE 2006). Interventions are actions undertaken to improve the environment in which the child resides or the ability of the primary carer (Bronfenbrenner 1977). O'Shea (2006, p. 11) proposed that PHN interventions result in changes in peoples' lives which produce outcomes

that reflect the interventions or actions that were undertaken. McDonald *et al.* (2013) noted that the role of the PHN involves providing an array of nursing interventions in a complex environment to client groups such as mothers and babies, children who are vulnerable or at risk and young chronically sick or palliative children.

PHNs base the implementation of interventions on the nursing process. This includes assessment of need, discussion of appropriate interventions, planning interventions, implementation of interventions to improve health, development and well-being of individuals, children, families and communities and finally evaluation of the effectiveness of interventions provided (Minnesota Department of Health 2003, McDonald *et al.* 2013).

The theorist Jean Watson argued that nurses should use the term “caring process” instead of intervention when describing their actions in assisting clients as she believed the term “intervention” to have mechanistic connotations which she saw as inconsistent with the caring nature of nursing practice (Falk & Adeline 2000, p. 37). This is in keeping with the thinking of Greene (2009) who challenged the use of the term intervention by professionals and suggested the term be changed to “support” to suit the Irish healthcare vocabulary.

There is much debate in the literature as to what constitutes an intervention. Byrd (1995, p. 83) defined home visiting by nurses as “an intervention” that occurs in one single meeting and argued that little empirical research has been undertaken to substantiate or perfect the definition or the stages of the home visiting process. She proposed PHNs develop a sense of knowing their clients by visiting them in their homes. This helps the PHN to not only realise the unique needs of the client visited but contributes to identifying the needs of other clients in similar situations. Such needs could include poor parenting skills, feeding problems, financial difficulties and lack of social support. This in turn raises a PHNs awareness of needs common to clients in similar situations in her geographical area (Byrd 1995). For this study, intervention is defined as “an action which results in a change” (O’Shea 2006, p. 11). This was selected as the most appropriate definition and as it was adopted for PHNs by the Institute of Community Health Nursing in Ireland.

Hanafin *et al.* (2002) called for a greater understanding of PHN interventions and the nature of the work they undertake at the point of service delivery. Issel *et al.* (2010) who looked at the difficulties in recruiting PHNs in Chicago, USA attempted to ascertain the impact such shortages were likely to have on the health of the public. One great difficulty they encountered was identifying reliable indicators to signify the positive or negative impact of PHN interventions on health. This challenge arose due to the complex environment in which the PHNs operate. Issel *et al.* (2010) highlighted both structural and contextual factors which

influenced interventions supplied by PHNs, including local guidelines, budget allocations and partners in healthcare. This was echoed by Hanafin *et al.* (2002) by identifying a lack of understanding of the nature of the PHN's role, limitations to their role and a lack of information on the interventions PHNs provide.

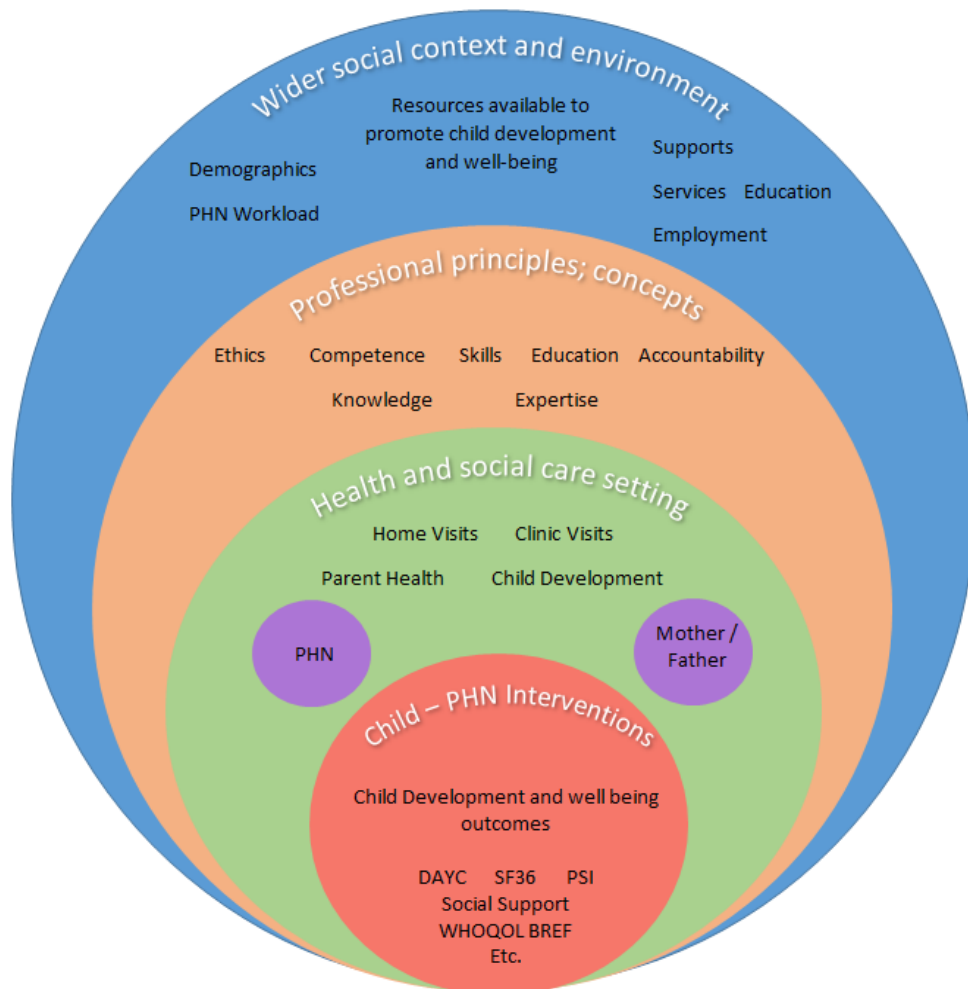
Interventions by PHNs can include child developmental and well-being assessment where assessment refers to the “detailed investigations of either manifest or suspected delay or abnormality” (Dworkin 1989, p. 1001). The following are the list of increased PHN interventions identified for this study from PHN practice in the Republic of Ireland.

Referral of parents or children to other professionals and support services including;

- Area medical officer
- Breastfeeding support group
- Child care worker
- Community parent
- General Practitioner
- Early intervention team
- Family support worker
- Home help service
- Mother & toddler group
- Lactation consultant
- Occupational therapist
- Physiotherapist
- Social worker
- Speech & language therapy
- Voluntary agencies

The role of the PHN is broad-ranging including nursing individuals of all age groups, from birth to end of life, providing nursing services in a variety of settings such as own home, community centre or health clinic, promoting health and participating in multidisciplinary primary community care teams (Begley *et al.* 2004). PHNs take a holistic view focusing on family circumstances rather than a single issue (Appleton & Cowley 2008). They discuss parental concerns, assess home circumstances, measure child growth and developmental milestones and observe for potential at-risk and vulnerable individuals. PHNs identify both potential and actual problems as they arise for parents and children to provide appropriate interventions and referral to other professional and support services which can prevent situations deteriorating (Appleton 1995, Appleton 1996, Hanafin 1998, Appleton & Cowley 2008). Figure 2-3 provides an overview of the context within which PHN population-based interventions are provided and the capacity of the PHN to meet identified needs within the complex environment in which they practice. This figure represents the complex environment whereby PHN interventions are promoted through education, training and knowledge. The manner in which PHNs provide interventions is influenced by prevailing policy and professional evidence based concepts. The diagram was adopted from the National Council for the Professional Development of Nursing and Midwifery (2010). It demonstrates the influence of the wider social and environmental context in determining child development and well-being outcomes such as population changes, cultural values and education. There are many factors that enhance clinical outcomes for children such as good clinical governance, evidence based practice, enhanced policy, funding, timely interventions and access etc.





**Figure 2-3: The Complex Environment in which PHN Interventions are implemented: (Adopted from The National Council for the Professional Development of Nursing and Midwifery 2010, p.4).**

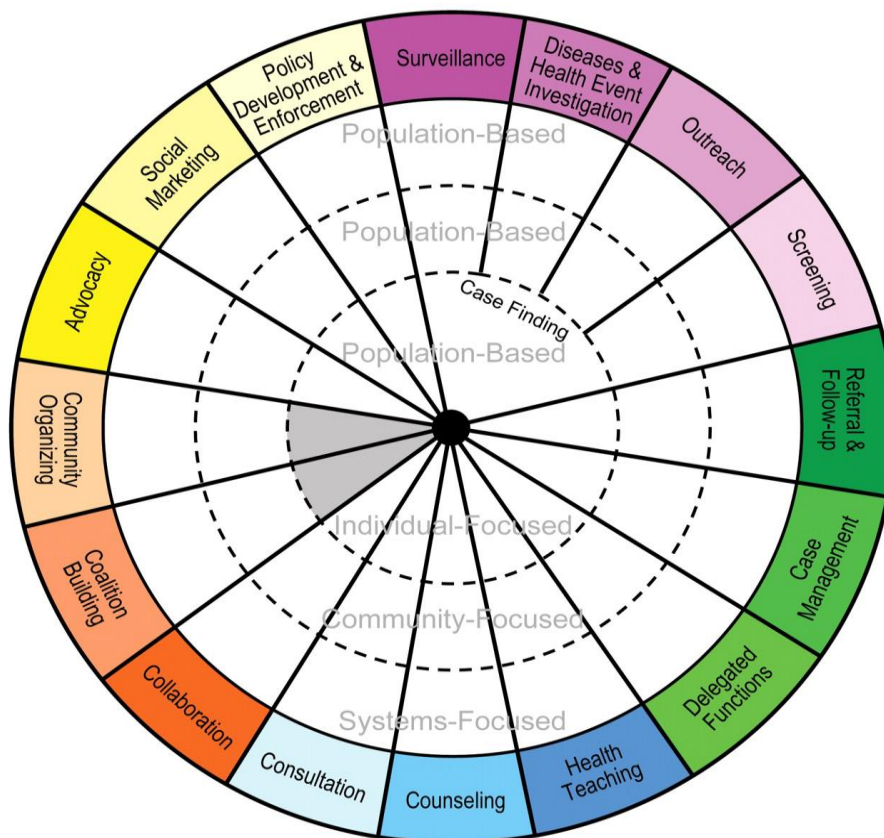
In 1998, PHNs in Minnesota using a grounded theory approach designed a public health nursing intervention wheel to outline the set of actions undertaken by members of their profession to improve the lives of individuals within their assigned geographical caseloads (Rippke *et al.* 2001). In 2011 the Institute of Community Health Nursing in Ireland convened a group interested in population health to review the American Intervention Wheel and found that Irish PHNs undertake similar actions to support their clients (Snyder *et al.* 1996, McDonald *et al.* 2013). Subsequently in 2013, the Institute of Community Health Nursing group developed and published an Irish Intervention Wheel based on the American model to provide insight into the actions Irish PHNs take on behalf of the communities they serve, see Figure 2-4. It also provided a common language for PHN home and community interventions

(McDonald *et al.* 2013). This resulted in a final list of seventeen population-based nursing interventions;

- Advocacy
- Case finding
- Case management
- Coalition building
- Collaboration
- Community organisation
- Consultation
- Counselling
- Delegated functions
- Disease and health threat investigation
- Health teaching
- Outreach
- Policy development and enforcement
- Referral and follow-up
- Screening
- Social marketing
- Surveillance

PHN interventions to support the development and well-being of children can be grouped under the following three headings; parental support, health information and professional competency (McNaughton 2000). These three areas are linked to the Irish Intervention Wheel in relation to PHN assessment, health teaching, surveillance, referral and follow-up (McDonald *et al.* 2013). Support involves supporting mothers and fathers in coping, shows

confidence in their parenting skills and encourages them to contact the PHN should problems arise. Health information interventions include discussing parental misconceptions in relation to child development, teaching mothers and fathers how to care for their infant, offering information on postnatal care, providing anticipatory guidance and health information literature and where increased interventions are necessary referral to other professionals and support services (McNaughton 2000). Professional competency involves detection of childhood illness, developmental delay, provision of serial weight checks and head-to-toe examination of the baby, provision of supplies to sick children, identification of children requiring protection, liaison between parents and supportive agencies and aspiring to reduce stress in the home for both mothers and fathers (McNaughton 2000, p. 410). These three approaches; parental support, health information and professional competency are drawn from the Bronfenbrenner (1977) theory of human development and Peplau's (1997) models of interaction, adaptation and human ecology. These conceptual models are used by PHNs as a theoretical framework to provide child-centred care where they identify and plan interventions to support parents of young children (Peplau 1997), see Table 2-6.



**Figure 2-4: The Irish Intervention Wheel**

(McDonald *et al.* 2013)

### **2.6.5 National child health surveillance programme**

The PHN offers holistic child-centred care by addressing many facets of child health, child development and child well-being (Mattson-Bryan & Wirth 1995, Hall 1999, Denyer *et al.* 1999, DoHC 2000, Appleton & Cowley 2008, Hanafin *et al.* 2009, Marks *et al.* 2011). This is achieved through detailed assessment of both parent and child. Details of public health nursing assessments undertaken at the first visit and subsequent 3 months, 7 - 9 month and 18 - 24 months developmental and well-being checks are not comprehensively outlined in one document in nursing literature. Details for this literature review were sourced from the HSE Training Manuals for PHNs and GPs (Denyer 2006), guidelines for public health nurses in Best Health for Children and Best Health for Children Re-Visited (Denyer *et al.* 1999, Denyer 2005) and HSE Child Health Record booklets. The areas of child development and well-being assessed by PHNs at the first visit are outlined in Table 2-2, 3 months in Table 2-3, 7 - 9 months in Table 2-4 and 18 - 24 months in Table 2-5.

### **2.7 First visit**

The first child developmental assessment by the PHN in Ireland takes place within 24 to 48 hours of discharge from the maternity hospital and later in the cases of home births following discharge by the community midwife. The PHN is alerted to the child's birth by receipt of a hospital discharge notification or correspondence from the community midwife. This visit includes a head-to-toe examination of the infant, determination of the child's ability as expected at this developmental milestone, assessment for signs of developmental delay or abnormality and discussion as to how the parents feel they are managing. The PHN must consider the possibility of genetic abnormality or physical / intellectual disability whereby parents can find it more difficult to care for an infant with complex needs. On occasion a premature infant may require time in the special care infant unit leading to the mother being discharged home alone. As this can lead to poor attachment and bonding, the PHN closely observes bonding and attachment to the primary caregiver to ensure timely social-emotional development (Anderson Hall 1980, Iwaniec 2006). A detailed prenatal and postnatal history is taken to pick up a difficult pregnancy, traumatic birth or postnatal complications such as infection, breast abscess, wound infection, hypertension, stress incontinence or postnatal depression. Appropriate referrals are made to the GP or other multidisciplinary team members to confirm the diagnosis (Dworkin 1989). If a PHN is concerned for parents or child, increased interventions may be put in place such as increased PHN home visits to

enhance parenting skills, education on infant feeding or completion of weekly weight checks (Iwaniec *et al.* 1988, Faughey 1997).

### **2.7.1 Head-to-toe physical examination of infant**

At the first visit, the PHN completes a head-to-toe physical examination of the infant. This includes examination of the infant's fontanelle, eyes, mouth, umbilicus, skin, genitals, reflexes and hearing.

The PHN measures the infant's head circumference with a measuring tape called a lasso tape. Results are plotted on the Baby Growth Assessment Chart developed by British Longitudinal Standards (BLS 1996) to ensure measurements are within normal limits. The anterior fontanelle is checked as this can stay open for up to 12 - 18 months. Occasionally the posterior fontanelle may be examined at the first visit although it usually closes shortly after birth. The infant's vision is checked using a pen torch to ensure the pupils respond to light. It is expected that within a few days of birth an infant will turn his / her eyes towards a large and diffuse source of light and close his / her eyes to sudden bright lights. The PHN examines the infant's mouth for signs of oral candidiasis or deformity. The infant's umbilicus is observed to ensure adequate healing and to rule out infection. The PHN assesses the overall appearance of the infant's body. The colour of the infant's skin is noted as well as respirations and chest movement and the infant is checked for any skin tags, birth-marks or rashes. The infant's fingers and toes are observed to ensure there is no deformity or skin condition.

Infant boys are examined for testicular descent at the first visit. PHNs are particularly vigilant to testicular descent if there is a family history of undescended testes, as there is evidence for irreparable histological changes in testes remaining undescended beyond 2 years of age. In the case of undescended testes, the PHN completes an early referral to the GP who in turn refers the infant for a surgical procedure called orchidopexy.

The Moro reflex is assessed by the PHN at the first visit and is the best known of all the infant's reflexes. The infant's response consists of symmetrical abduction of the arms and opening of the hands, then within moments the arms come together simulating an embrace. This reflex fades at approximately six months of age. The Plantar standing reflex and walking reflex are also assessed by placing the infant's feet on a firm surface and assessing if the infant mimics walking. The infant's spinal cord is also examined to ensure the absence of curvature or abnormalities of the spine.

The infant's hearing is checked in hospital prior to discharge and the PHN receives notification if concerns are noted. If there are concerns the PHN is notified of follow-up procedures and arrangements are made for further appointments.

At this first visit the infant is weighed without clothes or nappy to attain baseline readings. The infant's length is also measured. These results, similar to measurement of the infant's head circumference are entered on the Baby Growth Assessment Chart (BLS 1996). The PHN enquires as to a family history of genetic disorders or other serious illnesses such as diabetes, asthma, epilepsy or tuberculosis. The PHN will also ask if the infant underwent surgery prior to hospital discharge.

### **2.7.2 Congenital dislocation of hips**

Congenital dislocation of the hips (CDH) is checked by a paediatrician prior to hospital discharge. It is important for PHNs and GP's to be vigilant in the detection of late presenting cases and to pay special attention to children who are at particular risk such as those with a family history of CDH or breech presentation. PHNs inspect for CDH by placing the infant in the prone position. Noticeable asymmetry of skin folds would indicate the presence of CDH. If CDH is suspected the PHN will refer the infant to the GP for further investigations.

### **2.7.3 Failure to thrive**

Part of the PHNs role is to monitor infants and children for failure to thrive. This is most effectively achieved by plotting an infant's weight, length and head circumference on a Baby's Growth Assessment Chart (BLS 1996) at each developmental check. This tool allows the PHN to determine if an infant's nutritional intake is sufficient. An infant not maintaining a steady upward curve on the Baby Growth Assessment Chart (BLS 1996) or falling below the 50<sup>th</sup> percentile may not be in receipt of nutritional intake sufficient to his / her infant's needs. Not all children grow at the same rate and children who show very poor rates of growth are termed "failure to thrive" (Iwaniec 2004, p. 8). These children appear significantly smaller and thinner compared to children of the same age. Such children can be found in all classes of society. It is vital that failure to thrive children are detected early and referred to the GP as there is a significant likelihood that their physical growth, cognitive progress and emotional development will suffer if left untreated. The great fear is that the impact of these negative effects could be long lasting (Iwaniec 2004).

#### **2.7.4 Infant feeding**

Literature presenting details of PHN interventions in the area of infant feeding is sparse (Britton *et al.* 2009, Tarrant *et al.* 2011, Leahy-Warren *et al.* 2013).

Choices in relation to infant feeding include breast feeding, formula feeding, mixed or combined feeding of breast and formula, goat's milk or special formula to treat medical or genetic conditions. During the first home visit, PHNs support parents in their choice of infant feeding. Breastfeeding is acknowledged as "an important early component of children's well-being" (Fauth & Thompson 2009, p. 18). Previous literature identifies the many benefits of breastfeeding including improved digestion, greater absorption of nutrients, protection against allergies and a possible reduction in the need for antibiotic therapy (Fauth & Thompson 2009). The rates of breastfeeding in Ireland are amongst the lowest in Europe despite such extensive evidence of the benefits of breastfeeding.

Those who choose to breastfeed may require increased support or advice on correct infant-to-nipple attachment, nipple soreness, the importance of frequent feeding and need for rest to establish an adequate milk supply. Breastfeeding mothers and their partners are often concerned that the infant is not getting enough milk. In order to reassure them the PHN provides details on the general signs of a thriving infant such as an alert and responsive infant who is feeding frequently with soiled and wet nappies, good skin colour and respirations within normal limits. Breastfeeding support groups are another means of supporting breastfeeding mothers. These groups are PHN-led support groups offering a forum in which mothers can support each other on all aspects of breastfeeding. The PHN facilitates the group, undertakes infant weights and provides any necessary advice on feeding difficulties. Some HSE areas employ lactation consultants to offer support and advice to breastfeeding mothers, their partners and local public health nurses. He / she attends the breastfeeding support group in the primary community care area in which they are employed. Lactation consultants in some HSE areas are also available to visit the family home to offer assistance if a mother is unable to attend the breastfeeding support group.

Parents who choose to bottle feed may require increased support and advice in relation to choosing the appropriate formula for their infant. Options include milk-based formula, soya formula, partially hydrolysed formula, extensively-hydrolysed formula and amino-acid based formula. Infant formula is suitable from birth and throughout the first year of life. To prevent formula-related ill health, mothers are advised on the non-sterile nature of infant formula, the necessity for thorough bottle cleaning and sterilisation, hygienic methods of bottle preparation and appropriate storage of bottles, formula and cleaning equipment. The PHN

will also advise parents as to the need to prepare a fresh bottle for every feed and the risk of reusing previously prepared formula, namely the build-up of bacteria which can cause illness.

### **2.7.5 Metabolic screening test**

Metabolic screening of all newborn infants is undertaken by PHNs between 72 and 120 hours following birth. If an infant remains in hospital this procedure is undertaken by paediatric nurses. Parents provide written permission for the test to be undertaken. The test involves the PHN extracting a blood sample from the infant's heel. Specific guidelines must be followed in taking blood from an infant and PHNs are trained to undertake this duty. Currently tests are undertaken for 6 disorders; phenylketonuria, galactosaemia, maple syrup urine disease, homocystinuria, congenital hypothyroidism and cystic fibrosis (Health Service Executive 2011a). A further test for congenital toxoplasmosis was piloted in Ireland over a 2 year period from July 2005 to 2007. However, it has not been introduced. Blood for the newborn metabolic screening test is analysed at the National Newborn Screening Laboratory in The Children's University Hospital, Dublin.

### **2.7.6 Immunisation schedule**

The PHN provides parents with the booklet, 'Your child's immunisation: A guide for parents' (HSE 2011) at the first visit which outlines the child's recommended immunisation schedule. The PHN is also responsible for forwarding signed consent notification to the local HSE immunisation office identifying the parents' choice of GP to undertake the immunisation programme. PHNs receive regular notification of children's immunisation uptake and those who default require PHN follow up.

### **2.7.7 Attachment and bonding**

Iwaniec (2006, p. 94) described attachment as a "unique and powerful relationship that develops between an infant and caregiver during the child's first year of life". Attachment theorists suggest that a children's cognitive development allows them to form internal representational models of their future selves and others based on their relationship with their main caregivers (Bolby 1953). Secure attachment occurs when a child receives positive reinforcement from the person who attends to their needs and responds to their signs of



distress. This carer response enhances the child's cognitive development, communication skills, social-emotional development and adaptive behaviour skills (Voress & Maddox 1998). In contrast, insecure attachment occurs when a child does not receive positive responses from a caregiver and / or when their basic needs are not met. This can be due to maternal unavailability, neglect or emotional abuse (Iwaniec 2006).

PHNs are familiar with the importance of identifying the indicators of poor attachment and listening to the voice of the child (Horwath 2001, Cummins & McMaster 2006). In the Republic of Ireland, the PHN's role is underpinned by legislative responsibility under the Child Care Act (DoH 1991). The philosophy of the Act is the protection of children by intervention. Some reports on failures to protect children date back to 1993, namely the Kilkenny Incest case. In more recent years, The Monageer Inquiry, The Roscommon Child Care Case, The Victoria Climbié Inquiry and The Baby P Report have been published (McGuinness 1993, Jones 2003, Brosnan *et al.* 2008, Gibbons *et al.* 2010, Marinetto 2011). Hanafin (2013) calls for greater supports for PHNs, ongoing education, appropriate training, equitable workloads and utilisation of the Family Assessment Framework developed by O' Dwyer (2012) to ensure PHNs are facilitated in their child protection and welfare role. Both Irish and international literature indicate that the PHN's role with vulnerable families and their mandate to visit families in the home is a unique means of improving parenting skills and child outcomes (DoH 1991, Appleton 1994, Appleton 1995, Kelly 1995, Hanafin 1997a, Hanafin 1998, Mulcahy 2004). Parents are closely assessed by their PHN at the first visit to ensure early identification of poor attachment or bonding between parent and newborn infant.

### **2.7.8 Maternal assessment**

Maternal health is also checked at the first visit. The PHN enquires about difficulties relating to blood pressure, bowel and bladder function, breasts, Caesarean section wound, diet, fundal height, haemoglobin level, leg oedema, lochia, perineum, postnatal exercises and varicose veins. Advice is given in relation to cervical smear test and modes of contraception.

The mother's health history is taken into account including the number of previous pregnancies, the ages of older children and the PHN enquires if the family are receiving support services in rearing their children.

The mother is asked about her hospital confinement and her mode of delivery. If the delivery was a traumatic experience both mother and father may wish to talk about their experience.

If parents are distressed or if there is any evidence of depression, the PHN may suggest they visit their GP or attend counselling. If parents require extra time to talk about their experiences in relation to their infant's birth this is facilitated by the PHN who is available to listen to parental concerns (Denyer 2005).

### **2.7.9 Postnatal depression**

Postnatal depression is a term used to denote the onset of clinical depression within 6 months of childbirth. The symptoms of postnatal depression can include low mood, altered sleep pattern, tearfulness, inability to concentrate, feelings of guilt and self-blame and suicidal ideation or suicidal intent. The symptoms are similar to depression in any adult, but risk issues change as the care and safety of an infant must be considered. In severe cases there can be a risk of suicide, self-harm or harm to the infant. At the first visit, the PHN takes into consideration the mother's health and coping skills. The PHN enquires about the mother's mental health history, including episodes of previous non-pregnant, antenatal or postnatal depression. To assess for possible postnatal depression the PHN enquires as to the presence of depressive symptoms. Screening tools can also assist in assessing for postnatal depression. The Edinburgh Postnatal Depression Scale is a screening tool developed specifically for Health Visitors and PHNs to detect postnatal depression (Cox *et al.* 1987, Davies *et al.* 2003).

Postnatal depression is distinct from baby blues which is a sudden change in mood, occurring 2 - 4 days postpartum in 50% to 75% of mothers. It is thought to be related to hormonal changes following the birth of an infant (Beck 2006). Postnatal depression is also distinct from puerperal psychosis which is a more severe and debilitating mental illness characterised by paranoia and delusions. Puerperal psychosis is rare occurring in one to two women per thousand following childbirth (Affonso *et al.* 2000). Leviston & Downs (2000) reported that 10% to 15% of women experience postnatal depression. Davies *et al.* (2003) reported higher prevalence rates of up to 20% at 6 weeks postpartum. Research has shown that postnatal depression may not be confined to the postnatal period but can persist for many months afterwards. The purpose of the public health nursing assessment is to enhance early detection and facilitate early referral to appropriate mental health services for diagnosis and treatment (Davies *et al.* 2003).

The consequences of untreated postnatal depression are potentially severe for both mother and child. There is a breadth of literature on the negative impact of untreated maternal depression and poor maternal mental health on child health, child development and child

well-being (Harris *et al.* 1996, Leviston & Downs 2000, Leahy-Warren *et al.* 2011, Emmanuel & Sun 2013, Huang *et al.* 2014). Not only can postnatal depression affect a woman's relationship with her partner, but also the development of a close and nurturing bond with her infant with subsequent adverse effects on the child's social-emotional development, communication skills, adaptive behaviour and cognitive development (Harris *et al.* 1996, Leviston & Downs 2000).

It is not possible to predict which women will develop postnatal depression. Symptoms of postnatal depression can be mild, moderate or severe (Davies *et al.* 2003). If the condition is mild the PHN would contact the mother's GP and refer her for assessment. Should the mother be found to be suffering from moderate to severe postnatal depression the PHN would discuss her concerns with the mother and the infant's father and request an urgent GP assessment. PHNs facilitate increased intervention during this time to support the family including home help services, to assist with housework, laundry and meals and a community mother or a child care-worker to assist with childcare. Should the mother's condition deteriorate posing a possible risk to the infant, the PHN would discuss her concerns with the parents, their GP and her line manager to ensure rapid assessment and treatment. He / she would also proceed with a referral to the social work department to ensure maximum supports are put in place for the family during this time.

Postnatal depression is a treatable condition. Research has shown that counselling and antidepressant medication can be an effective means of treatment. Barnes *et al.* (2009) examined the impact of social support through Home-Start schemes in London and determined social support to be protective against depression at two months postpartum. Identifying postnatal depression at the earliest possible stage is important due to the impact it can have on mother-baby bonding and the formation of secure attachment (Cowley 2013).

#### **2.7.10 Health promotion**

The PHN uses the opportunity of the first visit to discuss the importance of health promotion with the infant's parents. The risk of Sudden Infant Death Syndrome (SIDS) is discussed with parents and guidelines are given on preventative measures such as not smoking at home, correct room temperature for infant and positioning a sleeping infant in the supine position with his / her feet at the end of the cot. Parents are advised to use cellular infant blankets to reduce the risk of smothering.

Accident prevention is addressed at the first visit including having a working smoke alarm, using a spark guard for an open fire and ensuring the infant’s car seat meets the standard requirements. The PHN outlines the importance of not leaving an infant unattended for any period with a view to preventing accidents and reducing the burden of childhood injuries (Dudani *et al.* 2010). PHNs provide parents with a health promotion DVD on car seats and the HSE booklet “Caring for Your Baby from Birth to Six Months” (HSE 2005).

PHNs identify parents who are struggling financially and offer to support their application for financial assistance to the community welfare officer and the Society of St Vincent de Paul.

The first visit may appear long and detailed, but it is a very important visit to identify parental concerns and for the PHN to establish a trusting relationship in partnership with parents. This early visit promotes the development and well-being of each infant as the PHN uses the information gathered at the first visit to determine the need for increased PHN home visits or referral to other professionals and support services.

**Table 2-2: National Child Health Surveillance Programme in the Republic of Ireland at**

**Birth**

**First Visit**

**Baby Examination and History**

|  |   |  |   |
|--|---|--|---|
| Check that infant is visually alert                  | Measure head circumference                                    | Measure fontanelle   | Examine umbilicus   |
| Examine neck and vertebral column                    | Condition of infant at birth & during first week of life      | Observe overall appearance of the infant’s body                        | Examine oral cavity, mouth, palate and tongue   |
| Examine ears   | Measure length  | Measure weight (unclothed)   | Examine reflexes, posture, tone and movement  |
| Check for developmental dysplasia of hips            | Examine genitalia and anus (check testicular descent in boys) | Examine colour, respiration, chest movement, hands and feet            | Examine skin for birth marks, skin tags or other skin conditions  |
| Enquire regarding infant feeding and type of feeding | Provide advice on Vitamin D supplementation                   | Complete newborn screening procedure for inherited metabolic disorders | Ensure infant’s hearing was checked by Audiologist and advise parents to observe for hearing difficulties |

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**Maternal Information and Maternal Health Check**

---

|   |  |   |   |
|---|--|---|---|
| Pre-natal history   | History of previous pregnancies                                  | Examine fundal height, wound, lochia and perineum | Enquire regarding bowel and bladder function                                  |
| Enquire regarding hospital confinement, birth history and period of gestation | Examine legs for oedema and varicose veins. Check blood pressure | Provide advice regarding family support           | Review of mental health, emotional health and assess for postnatal depression |

---

**Health Promotion**

---

|  |  |   |  |
|--|--|---|--|
| Discuss immunisation programme               | Discuss BCG vaccine (Vaccine not currently available in ROI)         | Educate regarding child's emotional health                    | Educate regarding Sudden Infant Death Syndrome (SIDS)                            |
| Promote GP two and six-week follow-up visits | Educate regarding infant nutrition and preparing infant feeds        | Educate regarding car safety, fire safety and passive smoking | Provide booklets on infant and child hearing and caring for infants and children |
| Provide advice regarding family planning     | Provide information on services and supports available in local area | Educate regarding home safety and accident prevention         | Provide PHN contact details including contact phone number                       |

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## 2.8 Three month visit

This developmental assessment can be undertaken in the family home or in a clinic setting. However, as it is a very important developmental check, it is advocated that if at all possible the second visit should be undertaken in the family home, to give parents time to discuss issues or concerns they may have in relation to parenting, their infant's development or their infant's well-being (Kelly 1995).

The PHN weighs the infant without clothes to obtain an accurate weight for comparison to previous weights. The infant's length and head circumference are measured and the results are entered on the Baby Growth Assessment Chart (BLS 1996). The infant's fontanelle, skin condition, vision, head control, degree of alertness, ability to smile and signs of torticollis are assessed.

The PHN assesses range of movement of the infant's limbs which should be smooth at this stage of development. When the infant is supported to sit up, the PHN checks for little or no

head lag and the infant should be able to hold its head up and steady for several seconds before bobbing forward. When placed in the prone position, the infant should lift his / her head and upper chest. At 3 months the infant is visually alert. Infants move their heads deliberately to gaze attentively around and follow movements of others within their visual field. They can turn their head towards a source of sound and should respond with obvious pleasure, smiles and coos when held by parent or carer.

During the second visit, the PHN discusses the introduction of solid foods. He / she recommends introduction of solids between 4 and 6 months of age for formula fed infants and at approximately 6 months of age for exclusively breastfed infants. PHNs give health promotion literature on suitable foods and recipes for weaning onto solids.

The PHN typically completes this visit by repeating advice in relation to maternal health, family circumstances and prevention of Sudden Infant Death Syndrome.

**Table 2-3: National Child Health Surveillance Programme in the Republic of Ireland  
3 months Developmental Assessment**

| <b>Baby Examination and History</b>   |  |   |   |
|---|--|---|---|
| Measure length  | Measure weight<br>(unclothed)  | Measure head<br>circumference   | Measure fontanelle  |
| Examine if infant is<br>visually alert, corneal<br>light reflex                               | Observe infant's<br>hearing  | Observe if infant<br>vocalises when<br>spoken to  | Observe if infant is<br>bright, alert and<br>responsive   |
| Check for response to<br>familiar situations and<br>people by smiling,<br>cooing and gurgling | Observe if infant lifts<br>head when prone using<br>forearms for support<br>with little or no head lag | Determine if infant is<br>beginning to engage in<br>finger play and<br>watching hands                 | Assess if infant can<br>loosely open hands<br>and clasp and unclasp<br>objects                                    |
| Check for<br>developmental<br>dysplasia of hips   | Examine palate, skin,<br>hands, feet, colour and<br>respiration  | Examine for testicular<br>descent in boys   |   |
| Enquire about parental<br>concerns for infant's<br>health and<br>development                  | Enquire if mother<br>attended GP for the two<br>and six week follow-up<br>visits                       | Address any postnatal<br>health issues for<br>example stress<br>incontinence or poor<br>wound healing | Discuss feeding and<br>introduction of solid<br>foods at appropriate<br>time for breast or<br>formula fed infants |
| Enquire about vitamin<br>D administration   | Discuss immunisation<br>programme  | Enquire about family<br>and wider supports  | Discuss mother's<br>mental and physical<br>health   |

## **2.9 Seven to nine months visit**

The seven to nine months developmental assessment was undertaken in the clinic setting up to 2013 due to the need for a second PHN to be present to undertake a hearing or distraction test. As the infant's hearing assessment is now completed by the audiology department of Irish hospitals, the 7 - 9 months check can be carried out in either the infant's family home or the health centre.

At this visit, a full physical examination of the infant from head-to-toe is undertaken, the infant's weight without clothes, length and head circumference are measured and again entered on the Baby Growth Assessment Chart (BLS 1996). The infant's fontanelle, skin condition, vision and presence of strabismus, bilateral reflexes, pincher grasp and chewing reflex are assessed. The PHN checks if the infant can wave bye-bye or clap their hands, reach for objects and weight bear when standing. An infant should vocalise and appear alert and interested. The dangers of infant walkers are discussed and the HSE booklet *Caring for your Child: Six Months to 2 Years* is given to parents (HSE 2005a).

Other observations by the PHN at the seven to nine months development assessment include assessment of testicular descent in boys, observation of the infant sitting unsupported for 1 minute, standing holding on and that the infant can weight bare on his / her hands when in the prone position to ensure the infant could protect his / her face and head if falling forward. Parents are asked if they are satisfied with the infant's hearing and response to loud noises.

The PHN gives advice on feeding the infant, the importance of introducing lumpy foods, finger foods, cup feeding, three meals per day and avoidance of sugary snacks. Parents are advised to observe the infant at all times when eating. The infant's teeth are examined and advice given on cleaning with a soft toothbrush. The PHN also discusses the options relating to continued breastfeeding or switch from formula to cow's milk at age 12 months. The infant's immunisation schedule is discussed. The PHN offers advice on the infant's sleeping position. This visit also concludes on discussion of concerns in relation to the infant's development and well-being or the health and well-being of the mother.

**Table 2-4: National Child Health Surveillance Programme in the Republic of Ireland  
7 - 9 Months Developmental Assessment**

**Baby Examination and History**

|   |  |  |   |
|---|--|--|---|
| Measure length  | Measure weight (unclothed)                             | Measure head circumference                                   | Measure fontanelle  |
| Full physical examination   | Examine for testicular descent in boys                 | Ensure infant can sit without support                        | Ensure infant can reach for objects                                       |
| Check if infant extends hands in anticipation of weight bearing when placed in prone position | Check if infant weight bears on legs                   | Check for developmental dysplasia of hips                    | Ensure infant is bright, alert, responsive and interested in surroundings |
| Check chewing reflex and advise on introducing a variety of thickened foods                   | Examine eyes for squint and corneal light reflex       | Enquire about hearing and response to sources of noise       | Check ability to stand while holding on to a chair                        |
| Asses crude finger and thumb grasp  | Check if infant responds to his/her name               | Check if infant plays peek-a-boo                             | Check if infant waves bye-bye or claps hands                              |
| Check infant's skin, colour, respiration and sleep pattern                                    | Check if infant eats finger food and drinks from a cup | Check if infant can reach for and hold a toy with both hands | Check if infant makes loud tuneful babbles and imitates vocal sounds      |
| Check if infant begins to point with index finger   | Inspect erupting primary teeth, advise on dental care  | Check if infant will seek out a hidden toy                   | Discuss immunisation programme and MMR vaccine                            |



## **2.10 Eighteen to twenty-four months visit**

Between 18 and 24 months, the fourth child assessment is usually undertaken in the health clinic unless the parents are unable to attend or request a home visit. All assessments appropriate to age from previous visits are repeated. Height and weight, while wearing light clothing, are again measured and entered onto the Baby Growth Assessment Chart (BLS 1996) to ensure the child is growing at an appropriate rate. The child is assessed for ability to walk up steps holding one hand, build a block tower using 3 to 7 blocks, kick a ball, respond to and understand simple commands, play alone, eat with a spoon, take off and put on own clothes and point to body parts such as hair and teeth.

The PHN uses the Mayo Screening Test to assess a child's speech and language within the context of the Irish child health surveillance programme for preschool children (McGinty 2000). By 18 - 24 months, a child should speak two clear words that are easily recognisable. If a PHN has concerns in relation to speech delay, a referral is sent to the speech and language therapist with parental permission.

The child's vision is again checked for the presence of strabismus. The PHN enquires if the parents are satisfied that their child's ability to hear. The child's social skills are considered, including ability to interact with the PHN or others present. If a child has difficulty separating from his / her parents or appears overly attached to their primary caregiver, the benefits of attending a parent and toddler group are outlined. Toilet training is discussed and advice in relation to same is provided to parents at this visit.

The aim of the PHN child health surveillance programme is to promote healthy growth, development and well-being of children. That is to identify supports necessary, at the earliest possible stage and targeted to those in greatest need, to promote the well-being of the whole family (Denyer *et al.* 1999, Poutiainen *et al.* 2013). If mother or infant needs are assessed as requiring increased interventions over the course of these visits, if an infant has complex needs or a mother is suffering from postnatal depression increased home visits and increased interventions will be provided by their PHN.

**Table 2-5: National Child Health Surveillance Programme in the Republic of Ireland  
18-24 Months Developmental Assessment**

| <b>Child Examination and History</b>                          |   |  |   |
|---|---|--|---|
| Measure height  | Measure weight<br>(in light clothing)                   | Examine eyes for<br>squint and corneal<br>light reflex                           | Ensure child responds<br>to and understands<br>simple commands                                |
| Check if child can build<br>3 - 7 blocks                      | Check if child can kick a<br>ball                       | Check if child can<br>feed self with a spoon                                     | Check if child can drink<br>from a cup  |
| Observe child's gait<br>and walking                           | Ensure child can walk<br>unaided                        | Ensure child can walk<br>up steps holding one<br>hand                            | Check if child attempts<br>to take off and put on<br>clothes                                  |
| Check child is<br>developing imitative<br>behaviour and play  | Check if child enjoys<br>messy play and noisy<br>toys   | Check if child is<br>content to play alone<br>near a familiar adult              | Ensure child has<br>developed social skills<br>and interacts with peers<br>and family members |
| Assess speech<br>development using the<br>Mayo Screening Test | Ensure child speaks<br>phrases of at least two<br>words | Check if child can<br>point to various body<br>parts including hair<br>and teeth | Enquire about parental<br>concerns for child's<br>hearing and speech<br>development           |

## **2.11 Theoretical considerations**

By the late 1970's nursing models such as Orem, Watson and Rogers began to emerge with an emphasis on moving away from the medical care model to nursing care models and so the nursing process evolved. Models of nursing care and supporting theoretical frameworks are important to ensure nursing is recognised as distinct from medicine and other care disciplines.

The perspectives of different theorists on child development and well-being are well debated (Tomey & Alligood 1998). Child development and well-being outcomes are directed toward the goal of self-actualisation and child health and are therefore embedded in the structure of

theory (Chinn & Kramer 1995). Theories are important in order to gain a greater understanding of child development and to understand which factors are most relevant to improved outcomes (Berger 2005).

Theories selected to guide this study were based on a theoretical framework integrating the influence of Peplau's Theory (1997) of interpersonal relations in nursing and Bronfenbrenner's (1977) ecological theory of human development. These theories were chosen based on the literature review as the author believed they best describe and explain child outcome phenomena following PHN interventions within the descriptive and exploratory context of this study.

### **2.11.1 Peplau's Theory (1997)**

Peplau's Theory (1997) focuses on the nurse-client relationship which suggests specific strategies to foster communication styles that are effective in resolving maternal or child difficulties. Communication can take the form of increased PHN visits to communicate with the mother and infant in their own home or local health centre by assessment, teaching and collaboration. Communication can also be seen in verbal or written form when PHNs ensure appropriate referral to other professionals and services to support mother and child in resolving an identified need. This theory was developed for mental health nursing but has been widely used in other clinical areas of nursing and is adaptable to PHN practice (Peplau 1992, McNaughton 2000).

A synthesis of qualitative home visiting research by McNaughton (2000) offers credibility to Peplau (1997) theory of the nurse-client relationship and interaction theory. The results of her analysis highlighted the importance of the nurse-client relationship in forming "the context of the home visiting practice of PHNs" (McNaughton 2000, p. 407). Peplau (1997) describes the nurse-client relationship in Figure 2-5 as progressing through four stages; orientation, identification, exploitation and resolution.

In the orientation phase, the nurse-client relationship becomes established where the PHN assesses the mothers "felt need" that is the need for which she is seeking professional assistance. This is the assessment remit of the PHN during postnatal home visits and follow up clinic assessments (Denyer *et al.* 1996, Hanks & Smith 1999). The PHN interacts with the mother and supports her in recognising and understanding her identified need (Tomey & Alligood 1998, p. 337).

During identification, the mother responds to the PHN by expressing and exploring feelings and beliefs in relation to her identified need.

The exploitation phase occurs when the PHN and mother work together, in the working phase of their relationship. They develop and implement a plan. This plan works towards setting and achieving agreed goals in order to promote the development and well-being of the child by addressing the mother's identified need. As the exploitation phase progresses the mother uses health and support services as discussed with her PHN. These can include increased PHN home visits or PHN referral to other primary community care professionals and support services. The mother then adopts new health behaviours to promote the development and well-being of her child and attempts to derive full value from the established nurse-client relationship.

The final phase is resolution which results in the identification of alternative sources of help for the mother and may end her relationship with the PHN. Examples include referral to a GP, paediatrician, lactation consultant, physiotherapist, family support service, breastfeeding support group or mother and toddler group. This process supports the mother in identifying new forms of help as her infant is getting older and enables her to move away from PHN support (Forchuk 1989, Tomey & Alligood 1998).

A practical example of the PHN drawing on Peplau's theory is as follows;

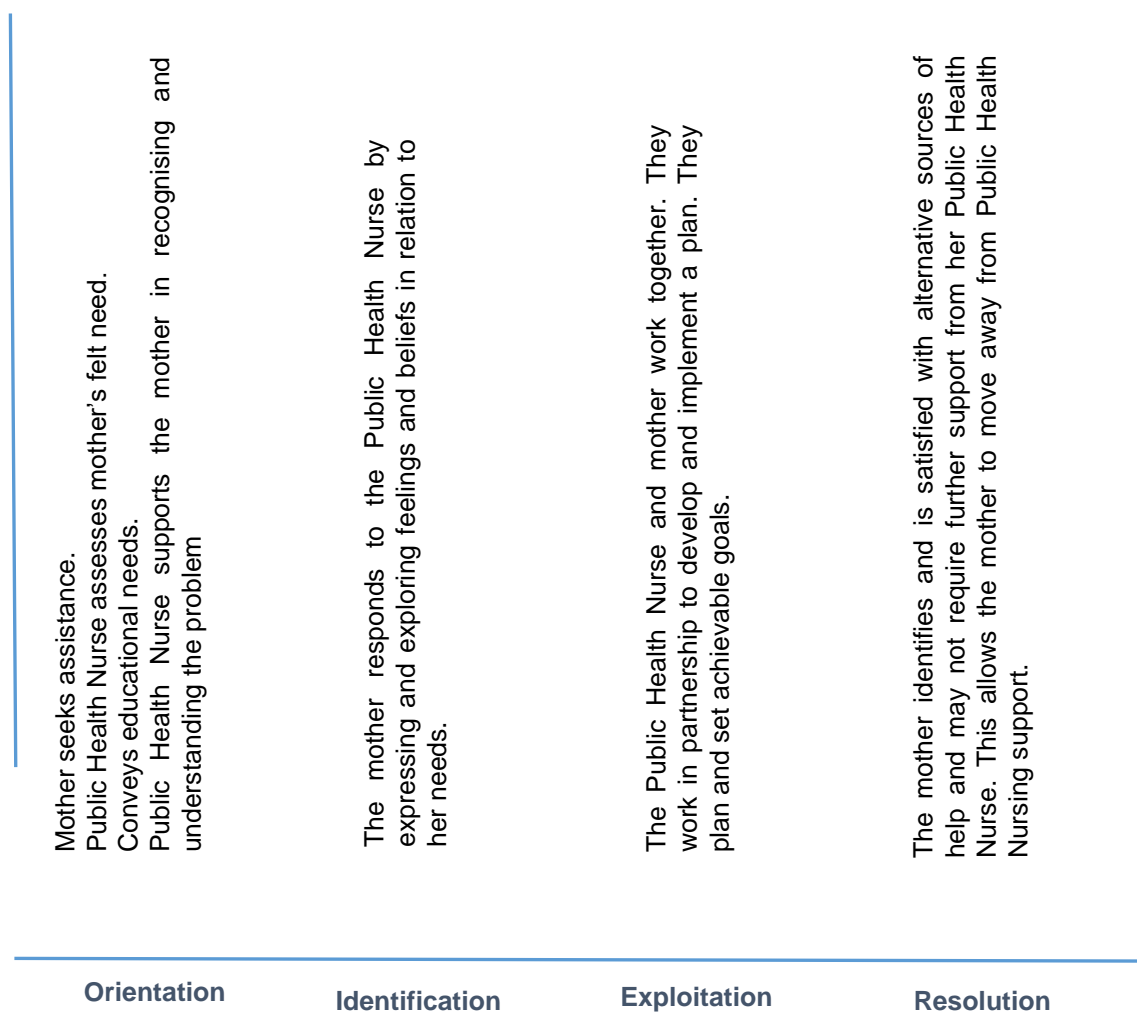
A mother describes difficulty in comfortably breastfeeding her infant. The PHN begins in the orientation phase by visiting the mother and infant and assessing the mother's felt need, namely a desire to successfully and comfortably breastfeed her infant.

In the second stage, the identification phase, the PHN works in collaboration with the mother to identify beliefs and feelings relating to her difficulty in breastfeeding her infant. The PHN, who began as a stranger to the mother, begins to assume the role of "resource person, teacher and counsellor" (Forchuk & Brown 1989, p. 36).

In the third stage, the exploitation or working phase, the PHN and mother work together to understand the reasons underlying the mother's difficulty in breastfeeding and formulate a treatment plan. Together they explore potential issues such as poor latch, tongue tie, lip tie, nipple pain, breast abscess, poor milk supply, positioning of the infant, understanding cues from infant and so forth. Treatment options can include review of maternal diet and hydration, use of a feeding pillow, nipple shields or breast pump, referral to a lactation consultant or referral to a GP or paediatrician. By working together in the exploitation phase the mother obtains value from public health nursing support and orchestrates a shift in her

behaviour from dependence on her PHN to independence and self-confidence in breastfeeding comfortably.

In the final stage, the resolution phase, the mother's anxiety is reduced and she can identify positive factors in breastfeeding successfully. She can set new goals in relation to breastfeeding her infant. The mother is now independent of her PHN's support and has a more positive view of her own skill set. She can apply newly developed problem-solving skills when breastfeeding and can terminate dependence on her PHN (Forchuk & Brown 1989), see Figure 2-5.



**Figure 2-5: The Nurse-Client Relationship**

**(Forchuk & Brown 1989, p. 32)**

Peplau's (1997) theory of interpersonal relations in nursing is adaptable to resolving a range of maternal and child difficulties such as infant colic, failure to thrive, sleeping difficulties, feeding difficulties, infants with complex needs as well as addressing maternal physical and mental health issues. Peplau's (1997) theory focuses on the nurse-client relationship reflecting the internal dynamics of the family system. It is complemented by Bronfenbrenner's (1977) ecological theory which takes account of the wider family-centred support and community service systems.

### **2.11.2 Bronfenbrenner's ecological theory of human development (1977)**

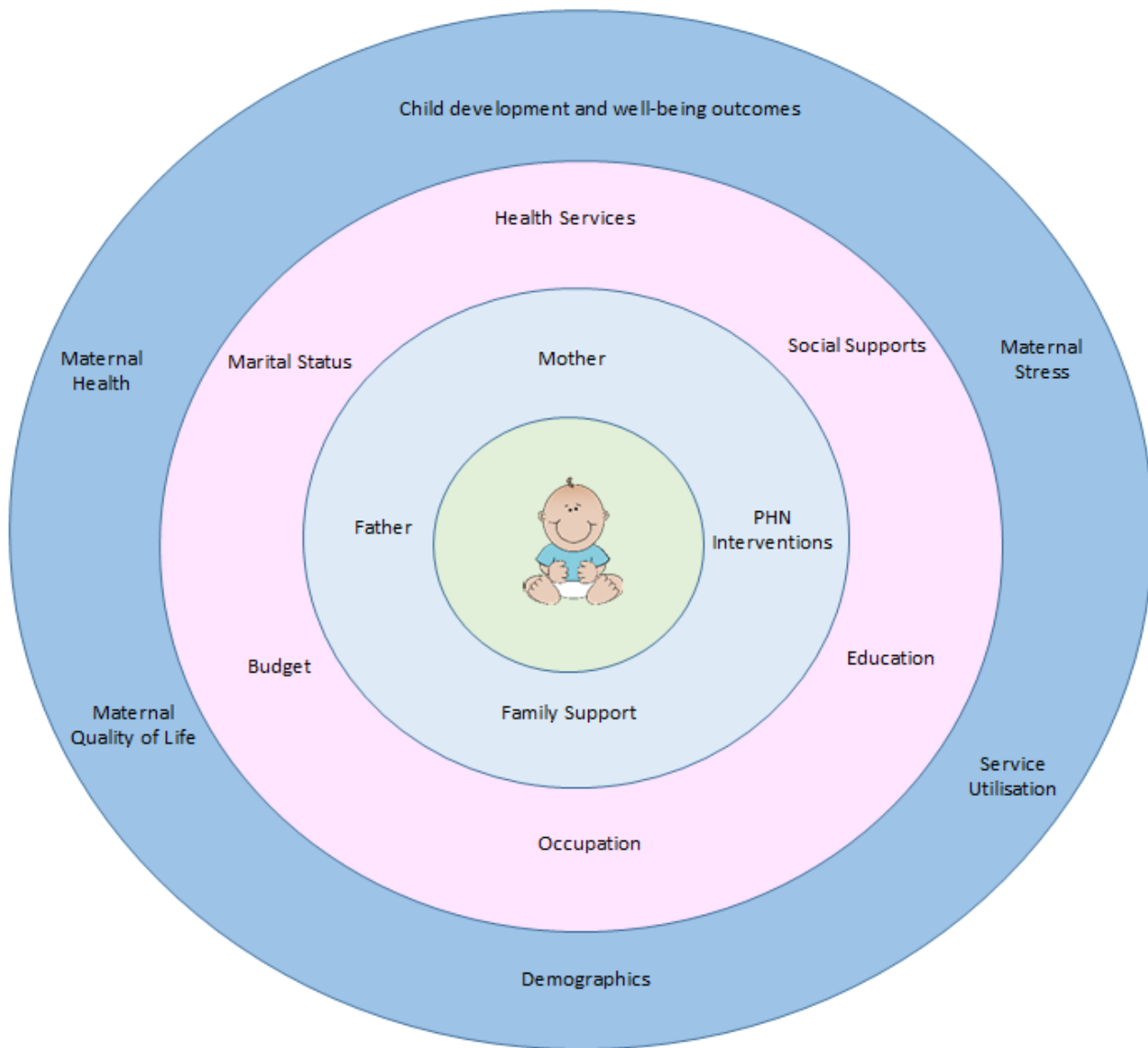
Human brain development begins in the first trimester of pregnancy and at birth the infant possesses almost all the brain cells (neurons) required for life. The infant's brain develops at an astonishing rate and increases in volume following birth due to growth of synapses or connections between neurons (DoCYA 2012). Infants have two neural systems with different functions. The first system is termed "experience-expectant" or the survival system which relates to organ function such as the respiratory and circulatory systems. The second neural system is based on "interaction and sensory reaction" where neural connections depend on new experiences to strengthen the existing synapses and create new ones. In order for this to occur infants need stimulation in the form of communication, touch, warmth and comfort. "A fundamental characteristic of brain development is that environmental experiences are as important as genetic programmes" (Iwaniec 2006, p. 118). Child well-being from an ecological perspective is dependent on an infant's interaction with other people, their family, the social world in which they find themselves and their community (Bronfenbrenner 1977).

An ecological perspective is required in order to understand interactions between individuals and their social and economic environments. The study of "ecology requires the examination of multipurpose systems of interactions not limited to a single setting and must take into account aspects of the environment beyond the immediate situation containing the subject" (Bronfenbrenner 1977, p. 514). A systems model was developed by Uri Bronfenbrenner (1979) to analyse "the social ecology of families" looking at a parent's capacity to meet the developmental and well-being needs of the child. External influencing factors are considered including education, employment, accommodation, neighbour and peer support, financial support and a safe physical environment (Jack 2000, p. 704). Bronfenbrenner's (1977) ecological theory of human development is founded upon a child's growth and development as part of different ecological settings (Fauth & Thompson 2009). The theory identifies the child as a member of their family and notes the importance of family support services to

meet the needs and goals of both the child and family within the context of the community (Kertoy *et al.* 2012). There is a growing body of empirical and theoretical evidence on the influence of the environment on the lives of both families and children (Barnes *et al.* 2006). The different levels of influence on child development and well-being from the ecological perspective are “from the closest micro level, such as family to the farthest macro level such as politics or culture” (Bronfenbrenner 1977, World Vision International 2013, p. 10). The range of influences included in Bronfenbrenner’s ecological theory of human development as outlined in Figure 2-6 incorporates the eight instruments used in this study.

Development is defined as “an ongoing change in the way a person perceives and deals with or adapts to the environment” (Reifsnider *et al.* 2005, p. 217). The environment includes the characteristics of the developing child which is identified as the microsystem. This includes the child’s age, gender, cognitive development, communication skills, social-emotional development, physical development, adaptive behaviour as well as maternal health and quality of life. The mesosystem is divided into primary, the child’s parents and secondary, the child’s wider family and local community. The macrosystem looks at cultural influences, education, socioeconomic status and receipt of public health nurse home visit interventions (Bronfenbrenner 1977 & 1986), see Figure 2.6.

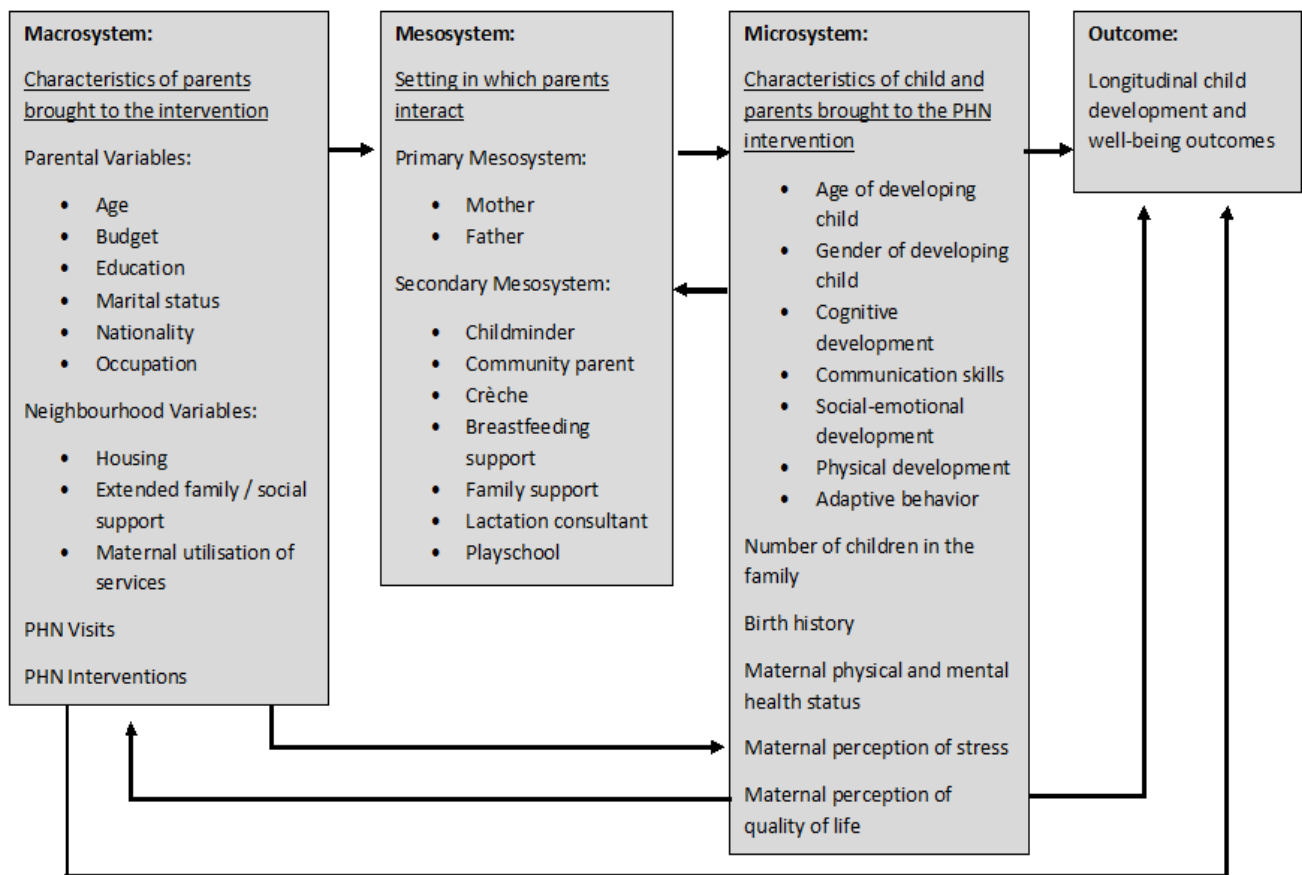
Three major areas are conceptualised when the Bronfenbrenner’s model of microsystem, mesosystem and macrosystem is applied. The first is primary prevention including parental education in areas such as infant feeding, growth and development. Secondary prevention is viewed as monitoring and detection of early warning signs such as a child not attaining his / her developmental milestones. PHNs provide education and specific support for mothers including referral to a parent and toddler group and provision of a community parent or child care-worker to prevent a home situation deteriorating. Tertiary prevention is viewed as the provision of therapy to ameliorate pre-existing cognitive and developmental deficits (Hanafin *et al.* 2002). The ecological perspective portrays the “interplay of multiple factors” on child development and well-being outcomes rather than the influence of a single factor (Coman & Devaney 2011, p. 50).



**Figure 2-6: Ecology of Human Development  
(Bronfenbrenner 1977)**

The ecological model of child development and well-being based on Bronfenbrenner (1977) profiles the characteristics of respondent parent and child that influence child development and well-being outcomes. The characteristics include variables from the microsystem of child and mother to the macrosystem which includes wider social influences such as culture, socio-economic status and receipt of PHN home visits and PHN interventions, see Figure 2-7.





**Figure 2-7: The Ecological Model of Child Development and Well-being**

**(Bronfenbrenner 1977)**

This study incorporates Bronfenbrenner (1977) and Peplau (1997) theoretical frameworks in measuring child development and well-being longitudinal outcomes following PHN interventions based on parental support, health information and professional competency. These factors are outlined in Table 2.3 which was developed for this study based on the work of Healy (2005) and is linked to the Irish Intervention Wheel as discussed earlier.

**Table 2-6: Incorporating Bronfenbrenner (1977) and Peplau (1997) theoretical framework in measuring child development and well-being longitudinal outcomes following PHN interventions**

| <b>System Level</b>                           | <b>Actions</b>                                 | <b>Methods</b>   |
|---|--|--|
| Micro system<br>(Home and family)             | PHN interacts with mother                      | Identify supports - husband / partner, family  |
|   | Assess maternal felt needs and quality of life | PHN supports the mother in identifying her felt needs<br>Provide listening service and knowledge of support agencies |
|   | Assess maternal and child care-needs           | Address maternal concerns<br>Support mother in coping<br>Identify mother's need                                      |
|   | Assess child developmental milestones          | Show confidence in parental ability to parent<br>PHN works towards ensuring healthy child development and well-being |
|   | Assess maternal physical and mental health     | Provide increased home visits, increased interventions and health information  |
| Micro system<br>(Community and neighbourhood) | Develop partnership with parents               | Develop a plan to resolve maternal and child concerns in partnership with parents                                    |
|   | Develop and implement a plan                   | Link to community health care services and family supports   |
|   | Set achievable goals                           |  |
|   | Identify local supports                        | Identify and link with locally available supports, services and GP practice  |

| <b>System Level</b>                 | <b>Actions</b>  | <b>Methods</b>   |
|-------------------------------------|---|--|
| Mesosystem<br>(Support Structures)  | <p>Assess home &amp; family environment</p> <p>Explore maternal feelings and beliefs in relation to child development and well-being</p> <p>Discuss parent's misconceptions about child development</p> | <p>Identify peer, family, statutory and voluntary supports</p> <p>Teach childcare techniques to parents</p> <p>Address maternal concerns</p> <p>Provide health promotion literature</p> <p>Provide PHN contact details</p> <p>Address parental concerns in relation to education, social supports, health services and family finances</p> <p>Discuss concerns</p> <p>Show confidence in parents' ability to parent</p> <p>PHN referral to other professionals and support services</p> <p>Liaise between parents and support agencies</p> |
| Macrosystem<br>(Policy and culture) | <p>Identify other sources of help such as education supports, statutory and financial aid, housing options, employment support and cultural or linguistic supports for non-Irish families</p>           | <p>Make appropriate use of nursing research</p> <p>Make recommendations to governmental policy makers on the identified needs of parents</p> <p>Make recommendations to policy makers at PHN director and manager levels in relation to PHN practice</p>   |

(Healy 2005)

## 2.12 Summary

Most of the knowledge available on the effectiveness of PHN home visits and interventions date from the 1960's to mid-2000's (Cowley 2013). Furthermore, it is mainly experimental research that tested the impact of specific treatments or interventions across an array of outcome measures. This research allowed a generally held belief that public health nursing interventions promote positive maternal and child outcomes, however concrete evidence of a true link between PHN interventions and maternal and childcare needs was not established (Combs-Orme *et al.* 1985). A fear remains that the failure to assess the impact of PHN assessment, home visiting, health promotion and intervention could be interpreted as a failure by the PHN to provide an effective, efficient and appropriate service based on client needs. They called for future studies to address this shortcoming. A further limitation of previous research is the lack of valid and reliable measures, low statistical power and high attrition rates. Combs-Orme *et al.* (1985) and Byrd (1997) suggest this limitation may be the most significant factor to challenge future research in this area of nursing practice. It is clearly evident that considerable thought would be needed to ensure appropriate study design, selection of measures and sample size for future research. This literature review highlights the need for future studies to adopt a theoretical approach to nursing research in order to demonstrate the impact of public health nursing interventions on child development and well-being.

PHNs work in the community to provide “universal low threshold services” through health promotion and disease prevention (Clancy *et al.* 2013, p. 1). They work in complex environments (Hanafin *et al.* 2002, Begley *et al.* 2004, Hanafin & Cowley 2005, Denyer 2005, Issel 2010, Clancy *et al.* 2013, p. 1, O'Dowd 2013). The value of their unique contribution to promoting child development and well-being is often questioned and this is increasing with the expansion of multidisciplinary primary community care teams to include a number of other health professional specialists working with children (Mattson Bryan & Wirth 1995, DoHC 2001). Several studies have identified the benefits of intensive early intervention programmes in promoting child development and well-being. However, it has been difficult to make firm recommendations in relation to structure and benefit of PHN care as it is currently configured as these studies are primarily purposely designed research projects which are better staffed and supported than routine PHN services (Hall 1999).

The role of the Irish PHN in monitoring child development and well-being is similar to that of their European counterparts. However, Irish PHNs face unique challenges reducing their capacity to provide a standardised service to parents and young children. These include the broad remit of their role, large and varied caseloads, staff shortages and recruitment

embargos (O' Dowd 2013). Begley *et al.* (2004) and McDonald *et al.* (2013) note that the role of the PHN involves providing an array of nursing interventions to parents and children in a complex environment. The danger associated with such challenges is that PHNs working in the community are likely to only provide short-term interventions and a single home visit to parents which has been shown to be insufficient (Appleton & Clemerson 1999, King *et al.* 2001). This has been further compounded by the shortage of PHNs due to the lack of recruitment of nurses in the Republic of Ireland (O' Dowd 2013).

The National Children's Strategy (DoHC 2000) which was updated in 2014 with Better Outcomes Brighter Futures 2014-2020 (DoHC 2014) places the child at the centre to ensure their views are heard and their contribution to society valued. These strategy documents advocate that the highest possible standards be adopted in relation to child services and supports. This requires quality research and examples of good practice (DoHC 2000). In 2008, Coyne conducted a literature review and showed that children are not involved in decision-making, their views are rarely heard and they themselves are rarely acknowledged in relation to the healthcare they receive. Health Visitors and PHNs visiting the family home should work in partnership with parents providing family-centred care (Coyne *et al.* 2013, Morton *et al.* 2015). To facilitate family-centred care Coyne *et al.* (2013) suggest the need for continual educational-based programmes to assist nurses in identifying a family's social support needs.

The focus of public health nursing home visits and clinic assessments in the Republic of Ireland is health promotion and disease prevention through child development and well-being health surveillance programmes and referral to other professionals and services within the primary community care team (Appleton 1996, Denyer *et al.* 1999, Clancy *et al.* 2013). The importance of research looking at child development and well-being outcomes following PHN interventions based on the theoretical perspectives of interpersonal relationships and ecological influences on children is evident throughout nursing literature. PHNs themselves express significant concern at child health and development clinics noting the outcome of their assessment and interventions are understudied (Byrd 1995, 1997, Kertoy *et al.* 2012).

It is also worthy to note that examination of the PHN service as a whole has not been undertaken (Kertoy *et al.* 2012). Hanafin and Cowley (2005, p. 244) agree that it is important to "examine the long term impact of Health Visitor assessment practices and interventions". In order to fully understand families, it is essential to investigate their "ongoing processes in real time through repeated observations over the span of development time" (Broderick 1993, p. 245). Byrd (1995 a) proposed that attempts be made to measure the outcomes and effectiveness of any intervention rather than just describing the process and what is entailed.

It has been argued that studies from the late 1960's to the 1990's failed to consider the nursing process or use solid theoretical frameworks in measuring child or parent outcomes following PHN involvement (Byrd 1997).

This quantitative research has been framed around Bronfenbrenner's ecological theory of human development (1977) and on Peplau's theory of interpersonal relations in nursing (1997). Two theorists were chosen to guide this research as combined they provided a greater understanding of the link between child outcomes and PHN home visits (Sitzman & Wright Eichelberger 2004). These theories were also seen to incorporate the principles of the chosen measures. MacLeod and Nelson (2000) and Coyne (2013) identified family-centred interventions as too narrow and minimising of the social and cultural contexts of families. Bronfenbrenner's ecological theory of human development (1977) has widened the scope of research by recognising the context and ecology in which a child is developing. Bronfenbrenner (1977) identified the social environment and social context to include parents, siblings, grandparents, supportive friends, relatives, childminders and community support and services. This study applied Bronfenbrenner's (1977) argument that it is not good enough to simply describe the extended aspects of social ecology, it is necessary to show how these complex systems influence child development and well-being. Using an understanding of the ecological and nurse-client relationship theories, this study focused on internal family needs which required increased PHN home visits and increased PHN referrals. This approach is supported by Bronfenbrenner (1977) Peplau (1997), O' Doherty (2007) and Kertoy *et al.* (2012). Hatrick-Doane *et al.* (2009) also identified the need for PHNs to theorise the process of support to mothers and children within the complexity of a mother's life. This involves a nurse-client relationship in which mothers view the PHN as a "resource person" available to support them in promoting the development and well-being of their children (Forchuk 1989, p. 36). Salter Ainsworth (1979) stressed the need to support parents following childbirth towards positive parent-child interactions. Such support is essential in attaining positive child social, emotional, cognitive and physical development, particularly in the first year of life.

## **2.13 Conclusion**

In this chapter, literature relating to the broad role of the PHN from an international perspective and within the context of their employing agency, the HSE, has been examined. Their role in monitoring the development and well-being of children from birth to two years was outlined and PHN interventions across four timelines were described. The theoretical

frameworks employed in this study to identify the influences of public health nursing interventions on child development and well-being outcomes were demonstrated. Literature pertaining to the concepts of child development and child well-being were explored as were maternal and child outcomes following public health nursing home visits. However, no similar study measuring the development and well-being longitudinal outcomes of children from birth to two years following PHN interventions was identified as part of this literature review.

In the next chapter the methodological process, measures, outcome measures, ethical approval, pilot study, participant recruitment and data collection will be described.

## Chapter Three: Methodology

### 3.1 Introduction

In the previous chapter, Irish and international literature relating to mother and child outcomes following public health nursing interventions was outlined. The theoretical frameworks underpinning these concepts were identified and discussed. In this chapter the research process undertaken to achieve the aim of measuring the development and well-being longitudinal outcomes of children from birth to two years following increased PHN home visits and interventions will be outlined. The methodological design, recruitment and setting, selection of measures, outcome measures, pilot study, ethical approval, data collection and data analysis will be described.

### 3.2 Methodological design

Child development and well-being outcomes are not stand-alone concepts and therefore are not easily measurable. Many confounding variables such as parental health, educational background, family income, the availability of supports and services as well as environmental issues (McDonald *et al.* 2013) must be considered. Literature highlights several methodological approaches previously used in an attempt to overcome these difficulties. These included randomised controlled trials, observational studies, surveys and structured questionnaires.

The most successful previous studies measuring maternal and child outcomes were noted to be quantitative in design. Mark (1996) suggests that a quantitative design allows different researchers to address the same research question using standardised measures and both should reach the same conclusion. Knapp (1998, p. 16) supports this theory and advised sufficient time is taken to phrase the research question properly and develop the study hypothesis, as this will inform the “almost automatic” choice of research design. A quantitative design was used to address the four objectives of this study. The quantitative design was chosen based on the study hypothesis and was considered the best fit for the purposes of this research.

This study is a quantitative prospective cohort study examining a random sample of one hundred and fifty four children, assessed on four occasions from birth to two years. The routine care structure currently in place in Ireland, based on Best Health for Children, is a PHN home visit within 48 hours of discharge from hospital and 3 clinic based developmental



assessments (Denyer *et al.* 1999). For this study “waves” is used to denote each assessment across four timelines. Due to this study being conducted by a sole researcher, the waves of data collection were broader whilst still mirroring the pre-existing PHN timeline of visits to parents of newborn infants within 48 hours following notification of hospital discharge, at age 3 months, at 7 - 9 months and at 18 - 24 months ensured minimal passage of time post PHN visit thereby reducing the risk associated with recall bias. As part of this study;

The term “infant” is used to refer to study respondents at waves 1 and 2 in conjunction with the WHO definition of an infant as “a child younger than one year of age” (WHO International 2013). The term “child” is used to refer to study respondents at waves 3 and 4.

A hypothesis is defined as “a guess about the nature of the relationship between two or more variables” (Mark 1996, p. 21). The hypothesis for this study was decided upon prior to data collection and the validity of the hypothesis was based upon data findings from eight measures administered to the study sample. Statistical techniques were used to prove or disprove the following hypothesised relationship;

“The development and well-being longitudinal outcomes of children from birth to two years who received increased PHN home visits and interventions will not differ from the outcomes of children who received routine public health nursing care”.

The Development Assessment of Young Children (DAYC) was the main outcome measure of child development and well-being used in this study.

### **3.2.1 Epistemological approach**

The quantitative method in this study was used as it tests objective theories by using measures to examine relationships among theories (Creswell 2013). The positivist tradition of quantitative research methods arises from biomedical science (Gerrish & Lacey 2006). It draws on the “positivist paradigm” and espouses to a revised form of empiricism. This refers to the use of measures with the belief that phenomena such as quality of life, stress, social support that an individual receives and how this impacts upon them can be reported by using specific measures (Parahoo 1997, p. 51). The influence of positivism in quantitative research, via the recording of phenomena that occur, is through the use of a reductionist approach. Quantitative is “also deterministic” which believes in cause and effect. Other

aspects of quantitative research are deductivism (hypothesis testing) and the collection of descriptive statistics. Quantitative methods are used to identify and explain causal relationships between events. (Parahoo 1997, p. 51). The relationship between variables can be measured using instruments, as was undertaken in this study, to allow for numerical data to be analysed using statistical procedures. The findings can then be used to make predictions or indicate trends. Having adopted a quantitative method, using the same measures over four timelines allows the opportunity for others to replicate this study in order to make comparisons and question study findings as supported by Gerrish & Lacey (2006).

### **3.2.2 Research questions**

The null hypothesis states that development and well-being longitudinal outcomes of children from birth to two years who received increased PHN interventions will not differ from the outcomes of children who received routine PHN care. The research questions were;

- What frequency of PHN home visits in excess of those seen as routine care that were required to promote child development and well-being?
- What defined increased interventions as provided by PHNs to promote child development and well-being?
- Were baseline development and well-being outcomes and longitudinal outcomes of children who received increased PHN home visits comparable to those who received routine PHN care?
- Were baseline development and well-being outcomes and longitudinal outcomes of children who received increased PHN interventions comparable to those who received routine PHN care?

### **3.2.3 Participants and settings**

The Irish healthcare system is governed by the Department of Health and Children and is divided into four Health Service Executive (HSE) areas which were established under the Health Act 2004 as a single system. PHNs have statutory responsibility for the management and delivery of both health and social services in the Republic of Ireland (Purcell 2011). Ireland has thirty-two counties, six of which are Northern Ireland where health care is provided by the National Health Service, the remaining twenty-six are the Republic of Ireland

where health care is provided by the HSE. This was an Irish study undertaken in two of the four HSE areas in the Republic of Ireland, the HSE South and HSE West.

The HSE South is based in the most southern part of the country and includes counties Kerry, Cork, Carlow, Kilkenny, Waterford, Wexford and South Tipperary.

The HSE West extends down the west coast and includes counties Galway, Mayo, Roscommon, Clare, Leitrim Roscommon, Sligo, North Tipperary and Limerick.

Following the discharge of a newborn infant from an Irish maternity hospital, the hospital discharge co-ordinator forwards a birth notification to the local PHN service. The purpose of this notification is to ensure inclusion of the infant in the national child health surveillance programme conducted by PHNs. Such notifications are received by the secretarial staff of the Directors of Public Health Nursing. Following receipt of ethical approval, the researcher met with the Directors of Public Health Nursing in the HSE South, Cork and Kerry and HSE West, Sligo, Mayo and Limerick. This meeting was to request access to secretarial staff as required by the ethics committee of the Faculty of Health Sciences, Trinity College Dublin. Each Director of Public Health Nursing agreed to the participation of their secretarial staff. Birth notifications received were used to compile a potential study sample of 2,076 infants born between May 2011 and March 2012. A recruitment information package was posted to the parents of each of the potential 2,076 study respondents. The recruitment information package contained a parent information leaflet, a participation acceptance card and a stamped reply envelope addressed to the researcher.

Given her role in clinical practice, the researcher was aware of the large number of births in both HSE areas under study. For this reason, a potential sample of greater than 2,000 was not unexpected. In anticipation, the study was designed to incorporate a randomisation process. Although the primary goal of randomisation is to prevent selection bias in randomised controlled clinical trials (Knapp 1998), this process served to strengthen the quantitative design of this study by reducing self-selection bias and slowing the recruitment process. As the researcher in this study functioned as a sole data collector across a large geographical area, a slower recruitment process was preferable in this study. It allowed the researcher to ensure all assessments were conducted in a timely fashion and complete in their recordings. Correspondence relating to recruitment of the study sample is included in Appendix 2. Prior to commencement this study undertook a pilot study which involved three phases.

The purpose of this quantitative prospective cohort study that involved a random sample of one hundred and fifty-four children aged from birth to two years was to measure their development and well-being outcomes following increased PHN home visits and increased PHN interventions in the form of referrals accepted by respondents to other professionals, supports and services. Their outcomes were compared to respondents who received routines PHN care which for this study was one home visit and no referral to another support or service over the two-year study period. Respondents were recruited in two out of four HSE areas in the Republic of Ireland and followed-up using repeat measures across four timelines. The four measurement timelines were designed to coincide with the universal age-specific child health surveillance programme run by Irish PHNs. Those timelines incorporate visits by PHNs to parents of newborn infants within 48 hours following notification of hospital discharge, at 3 months, 7 - 9 months and 18 - 24 months (Denyer *et al.* 1999, Denyer 2005).

This study was carried out in counties Cork, Kerry and Limerick in the Republic of Ireland. The total population of the two HSE areas at the time of study was 680,007 of which 49.8% (n=339,155) were male and 50.2% (n=340,852) were female (Central Statistics Office, CSO 2013). The total number of live births registered for 2011 and 2012 in the two areas of the HSE from which recruitment was undertaken was 21,635 (CSO 2012, 2013). There was no birth data available nationally on the birth rate of Irish traveller children (O'Shea 2014). There were over 500,000 non-Irish nationals from 199 different countries living in Ireland in 2011 (Cullen 2011).

### **3.2.4 Inclusion and exclusion criteria**

Inclusion criteria;

- All infants discharged home from hospital within three weeks of birth
- Infants of parents living within the HSE South and West areas
- Infants of parents who consent to participate in the study
- Infants of parents / guardians aged 18 years and above

Exclusion criteria;

- Infants hospitalised for longer than three weeks of birth
- Infants of parents living outside the HSE South and West areas
- Infants of parents who do not consent to participate in the study
- Infants of parents / guardians aged 17 years and younger

### **3.3 Pilot study**

The pilot study was conducted in the HSE South, Kerry Region, in February 2011. The pilot samples were convenience samples chosen from the researcher's area of clinical practice. The Pilot study incorporated three phases to establish face validity of the chosen measures (Cormack 2000). The eleven respondents included in the pilot study were not involved in the main study.

#### **3.3.1 First phase of pilot study**

The first phase administered eight measures to a group of six mothers and two fathers with children ranging in age from three weeks to two years. All children were present for the first phase of the pilot. The first phase lasted 105 minutes. The eight measures assessed were the Biographic / demographic questionnaire, the Parent Questionnaire, Developmental Assessment of Young Children (Voress & Maddox 1998), Family Global Health and Well-Being Scale (Anon 2010), Family Support and Natural Ecology Chart (Anon 2010), Mental Health Integration Form (Intermountain Health Care 2004-2009), Short Form 36 Health Survey (Ware & Kosinski 2001) and Service Utilisation Form (Chisholm *et al.* 2000).

The first phase of the pilot was undertaken to ascertain the parents understanding of each question and the ease with which they could answer questions. Pruitt & Privette (2001) suggested the key to ensuring retention rates and reducing respondent burden is to use measures which are simple, easy to understand and follow a logical structure and sequence (Pruitt & Privette 2001, Nicholl & Tracey 2007).

Respondents reported no difficulty in answering the biographic / demographic questionnaire, parent questionnaire, DAYC and Service Utilisation Form. Five respondents described the Mental Health Integration Form as difficult to understand. Four of the five respondents reported it to be excessively time consuming and "confusing". Respondents were unwilling to answer beyond question 36 on the Family Global Health and Well-Being Scale. All respondents described the instrument as pertaining to children with disabilities and unsuitable to accurately capture their family's level of functioning. All eight respondents felt the Family Support and Natural Ecology Chart did not truly reflect the level of support they receive from family members. Four respondents needed to amend the questionnaire with additional headings to capture other sources of family support. One respondent struggled to complete the Short Form 36 Health Survey. She noted conflicting descriptions between question 1 describing her health as excellent and question 2 indicating her health limited

participation in vigorous activities. The respondent suggested the Short Form 36 Health Survey did not capture transient states of ill health relating to pregnancy, such as fatigue or hyperemesis.

Based on respondent feedback, four measures were retained, one was amended and three were removed. The biographic / demographic questionnaire, parent questionnaire, DAYC and Service Utilisation Form were retained. The Short Form 36 Health Survey was amended by including a question relating to possible current pregnancy. The Family Support and Natural Ecology Chart, Family Global Health and Well-Being Scale and Mental Health Integration Form were removed.

A further literature search identified three additional potential measures; the Medical Outcomes Study Social Support Survey (Sherbourne & Stewart 1991), Parent Stress Index Short Form (Abidin 1995) and World Health Organization Quality of Life - BREF (Orley 1996).

### **3.3.2 Second phase of pilot**

The second phase administered eight measures to four respondent mothers with infants ranging in age from one month to two years. Three children were present for the second phase of the pilot study. Administration time averaged 65 minutes. Measures were: Biographic / demographic questionnaire, Parent Questionnaire, Developmental Assessment of Young Children (Voress & Maddox 1998), Medical Outcomes Study Social Support Survey (Sherbourne & Stewart 1991), Parent Stress Index Short Form (Abidin 1995), Short Form 36 Health Survey (Ware & Kosinski 2001), Service Utilisation Form (Chisholm *et al.* 2000) and World Health Organization Quality of Life - BREF (Orley 1996).

The second phase of the pilot study was undertaken to ascertain parents understanding of each question and determine the validity of data generated by the measures on child development and well-being outcomes (Bell 2005). Respondents answered all questions on the combined measures and described the tools as easy to understand and comprehensive.

The Short Form 36 Health Survey again produced conflicting results as it failed to detect transient illness relating to pregnancy, namely recent C-section and stress incontinence.

Based on the results of the second phase of the pilot study, all eight questionnaires were retained. However, the Short Form 36 Health Survey required a further amendment in the form of an additional question relating to current illness as a result of pregnancy.

### **3.3.3 Third phase of pilot**

A third and final phase of the pilot study was undertaken with a single respondent mother who had participated in the first pilot study. The aim was to confirm an improved understanding following amendment of the measures. The respondent reported the improved questionnaire structure to be easier to follow and understand.

It was agreed that the set of measures as presented in pilot study phase three was reflective of the research question and appropriately accessible to potential respondents to proceed to participant recruitment and data collection. The final eight instruments were:

- Biographic / demographic questionnaire (designed specifically for this study)
- Parent Questionnaire (designed specifically for this study)
- Developmental Assessment of Young Children (Voress & Maddox 1998)
- Medical Outcomes Study Social Support Survey (Sherbourne & Stewart 1991)
- Parent Stress Index Short Form (Abidin 1995)
- Short Form 36 Health Survey (Ware & Kosinski 2001)
- Service Utilisation Form (Chisholm *et al.* 2000)
- World Health Organization Quality of Life - BREF (Orley 1996)

### **3.4 Selection of measures**

As no previous study examining the same hypothesis could be identified from the literature, an extensive literature search was undertaken to identify and critique the potentially suitable measures across a range of medical and nursing disciplines. This was undertaken to best guide the theoretical framework and best measure child development and well-being while capturing increased interventions provided by PHNs from the first visit to when the children were two years of age. A number of measures were created or identified. However, following the pilot study, eight measures were considered appropriate, see Appendix 4, these eight measures are as follows;

#### **3.4.1 Biographic / demographic questionnaire**

The biographic / demographic questionnaire was purposely designed for this study based both on the literature and existing child development assessment booklets in use by PHNs in the two HSE areas of the study. It was designed to collect parental biographic and

demographic information. It recorded parental nationality, marital status, county of residence, number of children, housing / accommodation, ability to manage on household budget, level of education, history of physical or mental illness, medical conditions occurring due to pregnancy or childbirth, sources of family support, support services received and referrals accepted to other professionals through their PHN.

### **3.4.2 Parent Questionnaire**

The Parent Questionnaire was a purposely designed questionnaire to collect data on child development and well-being outcomes as part of this study. It was based on child development and well-being outcomes by Denyer *et al.* (1999) and Denyer (2005) as adapted from the PHN national child health development surveillance programme currently in use in the two HSE areas being measured. Child development milestones are monitored by PHNs in the family home from 24 - 48 hours following receipt of the hospital discharge notification. Child development monitoring from three months onwards can take place in the family home or in a clinical setting (Denyer *et al.* 1999, Denyer 2005).

The first measurement questionnaire (colour coded yellow) used for wave 1 data collection, asked mothers for their infant's date of birth, gestational age, gender, place of birth, birth weight, length at birth and type of feeding. The infant's weight was measured using a standardised calibrated Seca scale and the infant's length was measured using a Seca measuring mat and recorded in the first Parent Questionnaire. Data were gathered relating to the respondent mother's prenatal history, type of delivery, number of previous births and number of older children. The questionnaire also allowed for observation of the infant, recording of health promotion offered by the PHN and recording of the number and duration of each PHN home visit.

The second Parent Questionnaire (colour coded green) used for wave 2 measurement at 3 - 7.5 months allowed for the collection of data on infant's age, type of feeding, degree of alertness, fine motor skills and gross motor skills. The infant's weight and length were again measured using calibrated Seca instruments and recorded in the Parent Questionnaire. A list of public health nursing interventions was outlined and respondents were requested to tick yes or no for each intervention accepted to date.

The third Parent Questionnaire (colour coded blue) for wave 3 data collection at 9 - 14 months collected data on child's age, type of feeding, duration of breastfeeding and other



interventions provided by the PHN since wave 2. It also allowed for observation of child's development and well-being milestones. Length and weight were measured and recorded.

The fourth Parent Questionnaire (colour coded peach) collected ongoing data relating to the child's age, type of feeding and duration of breastfeeding allowing for the developmental and well-being trajectory of the child at age 23 - 24 months. It also recorded PHN interventions as accepted since wave 3 data collection.

### **3.4.3 Developmental Assessment of Young Children (DAYC)**

The Developmental Assessment of Young Children (Voress & Maddox 1998) measure was designed to evaluate five areas of child development: cognition, communication, social-emotional, physical and adaptive behaviour. These five subsets measure different but interrelated developmental abilities. The DAYC is used to determine developmental milestones of children from birth to five years eleven months. It can also be used to identify abnormalities in child development such as intellectual disability, speech and language delay and mental illness. The measure is suited for use with parents, as the best judges of their child's progress and abilities (Voress & Maddox 1998, Rydz *et al.* 2006).

Normative data for the DAYC was established using a national sample of 1,269 English speaking individuals. The DAYC is a valid measure of child development with proven content validity. Each of the five subsets provides a raw score, age equivalent, percentile and sum of standard scores to determine where a child lies compared to normative data. Results can be converted to descriptives such as below average, average, above average, superior and very superior for ease of comparison. Evidence of high reliability is demonstrated, content validity allows users to have confidence in the results (Voress & Maddox 1998). Test-retest coefficients for each of the five subsets were greater than 0.90. All correlations were statistically significant to 0.0001. In a study of communication ability, teachers administered the communication subset to twenty four children to test its usefulness in detecting language delay (Andersson 2006). The DAYC proved to have excellent sensitivity in detecting language delay in children. The DAYC measure was selected as it was best suited to accommodate the development trajectory of children.

#### **3.4.4 Family Global Health and Well-Being Scale**

The Family Global Health and Well-Being Scale (Anon 2010) is a self-report measure describing emotional relationships and functioning within the family at a specific point in time. This measure was not used in the main study following the first phase of the pilot study, see Appendix 3 for details.

#### **3.4.5 Family Support and Natural Ecology Chart**

The Family Support and Natural Ecology Chart (Anon 2010) is a measure based on the Adaptabilities from Learning Environments Programme, which was not used in the main study, see Appendix 3 for details.

#### **3.4.6 Mental Health Integration Form**

The Mental Health Integration Form (Intermountain Health Care 2004-2009) is a parental screening and family rating scale which requests a respondent's views on family and support systems. This measure was excluded from the main study following the first phase of the pilot, see Appendix 3 for details.

#### **3.4.7 Medical Outcomes Study Social Support Survey (MOS SSS)**

The Medical Outcomes Study Social Support Survey (Sherbourne & Stewart 1991) measure was designed as a comprehensive assessment of social support to determine the effectiveness of help and emotional support as a protective factor in times of significant stress or illness. It is a twenty item multidimensional self-administered questionnaire assessing a mother's close friends, relatives and companions, her support network and availability of affectionate supports, tangible supports, positive social interactions and emotional / informational supports. Each item is rated on a 5 point Likert scale ranging from 1 (none of the time) to 5 (all of the time). Low scores indicate no, little or infrequent support. Higher scores indicate frequent or constant support (Sherbourne & Stewart 1991, p. 713). The questionnaire is designed to be as inclusive as possible yet short enough not to become a burden for respondents. Internal consistency and reliability scores were estimated using Cronbach's alpha coefficient and found to be high for all support measures, exceeding a

0.50 (Sherbourne & Stewart 1991, p. 708). Validity measures were reported to be equally high.

#### **3.4.8 Parent Stress Index Short Form (PSI SF)**

The Parent Stress Index Short Form (Abidin 1995) is a direct derivative of the Parent Stress Index. It identifies areas of stressful parent-child functioning and has been validated to predict parent behaviour, current child behaviour, future child behaviour and emotional adjustment. The Parent Stress Index Short Form uses three subscales of the Parent Stress Index: parental distress, parent-child dysfunctional interaction and difficult child. These subscales measure primary components of the parent-child system focusing on the parent, the child and their interaction. Results are recorded on a Likert scale ranging from 1 to 5 where low scores indicate less stress (Huang *et al.* 2014).

The defensive responding scale of the PSI SF measures a respondent's manner of reporting. Low scores indicate a very competent mother whose child is growing and developing in a well-supported environment. Although a proportion of mothers may try to portray an image of competence, results are generally reliable in indicating mothers who are free from stress and competent in handling parenting responsibilities.

The parent-child dysfunctional interaction subscale measures a parent's perception of their child. It can detect negative interactions between parent and child by assessing a parent's expectations of their child and whether they feel their child is meeting these expectations. High scores are indicative of an unestablished or threatened parent-child bond. Scores above the 95<sup>th</sup> percentile are indicative of rejection or child neglect triggered by maternal frustration and requires early intervention.

The difficult child score relates to behavioural child characteristics and can predict how easy or difficult it is to parent a child. High scores before a child is 18 months old can be indicative of a child with self-regulatory difficulties. These characteristics are mostly temporary and usually associated with transient states such as infant colic. A child aged over two years with high scores may suggest a parent is having difficulty directing a child's behaviour, setting limits or obtaining a child's co-operation. A cut-off point at the 90<sup>th</sup> percentile suggests a parent needs assistance in parenting their child regardless of the causative issue. In extreme cases, scores over the 95<sup>th</sup> percentile indicate parents requiring professional support (Abidin 1995).

The parental distress subscale measures difficulties for a parent in the area of “personal adjustments” (Abidin 1995 p. 56).

Scores above the 90<sup>th</sup> percentile in the total stress index suggests a clinically significant level of experienced stress.

Reliability coefficients were calculated for each subscale, each domain and the total stress score. Results ranged from 0.70 to 0.90 (Abidin 1995, p. 31). Correlation between the Parent Stress Index Short Form and the Parent Stress Index has been reported as 0.94 in a sample of 530 subjects and is described as “exceptionally high” by the instrument’s authors (Abidin 1995, p. 61).

### **3.4.9 Service Utilisation Form (SUF)**

The Service Utilisation Form (Chisholm *et al.* 2000) is a modified version of the Client Socio-Demographic and Services Receipt Inventory - European Version (CSSRI-EU). It was adapted as an abbreviated version of the CSSRI-EU to measure service use for the purposes of economic analysis by comparing residential care, community care, day care, outpatient care and inpatient care (Chisholm *et al.* 2000a, Chisholm & Knapp 2002). The SUF is divided into four sections each measuring a family’s use of healthcare and social care services in different settings since the assessor’s previous visit.

Section A1 asks the parent to rate their child’s general health on a Likert scale from 1 to 5, where 1 is considered very poor and 5 is very good. Section A2 is a list of potential community-based healthcare and social care providers which a child may have attended. Parents are asked to detail the number of visits a child has made to each practitioner since the assessor’s last visit. Section B2 looks at hospital-based services a child may have accessed and parents again document the frequency of visits. Section C1 asks the parent to rate his / her own general health on a Likert scale from very poor to very good. Section C2 assesses a parent’s use of community-based and hospital-based healthcare and social care services. Section B1 focuses on a child’s use of foster services since the last assessment and was not used as part of this study. Settings, from which a parent can choose, include the family home, school, nursery, GP surgery, hospital, health centre or “other” location.

#### **3.4.10 Short Form 36 Health Survey (SF 36)**

The Short Form 36 Health Survey (Ware & Kosinski 2001) is a generic measure of health-related quality of life outcomes (Ware 2004). It is a self-rated or assessor-rated, multipurpose health survey containing 36 questions measuring health across eight scales. These are physical functioning, role limitations due to physical related health problems, bodily pain, social functioning, role limitation due to emotional problems, general health, vitality energy, fatigue, mental health and psychological distress or psychological well-being. The first five scales define health status as the absence of limitation or disability where higher scores indicate no difficulty. The remaining three measures are “bi-polar” as scores in the mid-range indicate no limitation or disability (Benjamin-Coleman & Alexy 1999, p. 225). Following completion by the respondent, scores for the SF 36 are calculated using Quality Metric Health Outcomes™ scoring software and the eight scales can be converted to physical and mental health summaries.

The physical and mental health scores of respondent mothers were objectively measured using the SF 36. The SF 36 is not a diagnostic measure, rather it functions as an indicator of risk. A score of 50 indicates average health, greater than 70 indicates excellent (best) health and below 30 indicates poor (low) or very poor (worst) physical health. Higher scores suggest better physical functioning and well-being while lower scores indicate respondents who require physical health assessment by their GP or medical consultant. A respondent is considered to be at risk of depression when they obtain a total mental health score at or below 42.

Systematic comparisons indicate that the Short Form 36 Health Survey is relevant to measuring eight of the most frequently occurring health concepts. Evidence of validity is seen in a number of studies (Sullivan *et al.* 1995, Benjamin-Coleman & Alexy 1999, Fossa & Dahl 2002). Reliability studies were undertaken on two populations; 454 pregnant women in China (Li *et al.* 2012) and 8930 members of the general population in Sweden (Sullivan *et al.* 1995, p. 1349). Internal consistency was noted to range from 0.70 to 0.88. It is quoted as possibly the most extensively used measure to demonstrate discrepancies in health outcomes (Roberts *et al.* 2001).

#### **3.4.11 The World Health Organization Quality of Life - BREF (WHO QOL-BREF)**

The WHO QOL-BREF assessed maternal perception of quality of life at the time of the study in relation to physical health, psychological health, social relationships and environment.

Descriptive statistics display values of four domain scores with a range from 4 to 20. Higher scores indicate a better quality of life for respondents.

The World Health Organization Quality of Life - BREF (Orley 1996) is an abbreviated version of the World Health Organization Quality of Life - 100 and functions as a quality of life measure. Quality of life is defined as the individual's "perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (Power & Kuyken 1998, p. 1570). It was developed by the World Health Organization to assess quality of life in different cultures. This measure helps to improve our understanding of how quality of life affects an individual and the means by which it is determined by different cultures and societies. (Power & Kuyken 1995, p. 1404, Power & Kuyken 1998).

The World Health Organization Quality of Life - BREF contains 26 questions across four domains. It has been used in a number of longitudinal studies assessing quality of life in those suffering from specific health conditions (Power & Kuyken 1995). Webster *et al.* (2010) assessed the psychometric properties of the World Health Organization Quality of Life - BREF in 320 women in the postpartum period and reported acceptable reliability standards (alpha co-efficient >0.70) and moderate-to-high correlation between individual items and domain structure. It is a "well-accepted and valid" measure for assessment in both clinical and research settings (Webster *et al.* 2010, p. 134). Use of the World Health Organization Quality of Life – BREF instrument requires permission which was sought and granted for this study, see Appendix 5 for summary of study variables.

### **3.5 Ethical approval**

Ethical principles underpinning research in clinical practice remain unchanged from the Belmont Report on research involving human subjects (Zimmerman 1997). These identified rights of the research respondents with regard to respect, beneficence and justice. The respect for the respondents is recognising each individual respondent as an autonomous individual whose opinions are respected. Beneficence is to enhance the respondent's well-being by doing no harm. Justice is to treat each respondent fairly and equal as well as protecting vulnerable respondents (Zimmerman 1997). Hence, in this study, the researcher recognised that respondents had the right to agree or not agree to engage in the research. Where informed consent was obtained, the study adhered to the principle that informed consent is a continuous process throughout the study period. The belief that as it is an

ongoing process, it is not merely enough to obtain consent at the beginning of the study but each of the following three waves of the study.

Due consideration of ethical issues are of major concern in research studies involving parents and children (Nicholl 2007). Ethical approval was sought from the Faculty of Health Sciences, Trinity College Dublin (TCD). An initial concern was raised by the committee requiring inclusion of a third party to function in a “gatekeeper” role. “Gatekeepers” ensure respondents are protected against coercion (Twycross 2009). It was agreed that involvement of the secretarial staff to each Director of Public Health Nursing in both HSE areas under study would be an acceptable step to meet the committee’s requirements. Application for ethical approval was granted by the Faculty of Health Sciences, TCD, on 21<sup>st</sup> July 2010. Ethical approval was also sought from and granted by the HSE South and HSE West ethical committees on 16<sup>th</sup> August 2010. Amendments to ethical approval were sought following the first phase of the pilot study and were granted on 28<sup>th</sup> March 2011 and 19<sup>th</sup> May 2011. Correspondence relating to ethical approval are included in Appendix 6.

The researcher was acutely aware of the ethical obligations to respect the rights of respondents throughout the duration of the study (Burton 2000). When carrying out this study the researcher identified herself as a PHN working in clinical practice and ensured the utmost respect was shown to each respondent mother and participating child. At the first assessment in order to gather research data for wave 1, each respondent parent read the parent information literature and signed the consent form for their participation and that of their child. This was completed prior to administration of questionnaires or measurement of the infant. Verbal consent and any clarification needs were repeated at follow-up visits in line with good research practices as advised by Hall & Stevens (1991) and Wood & Haber (2006). Each potential respondent mother was given a copy of the parent information leaflet containing contact details for the researcher and study supervisors as well as the signed consent form in keeping with ethical principles (Kent 2000). Respondent mothers’ phone numbers were requested for the purposes of arranging subsequent assessments. Respondents were assured that personal details would remain confidential. Each respondent’s measurement booklet was assigned a reference number to protect their identity and names were not recorded in measurement booklets. Respondent names and addresses were kept separate from their data and stored in a locked fire-proof filing cabinet. Hard copy files including consent forms and completed questionnaires were stored in a second locked fire-proof filing cabinet. Data were stored on a password-protected computer to which only the researcher had access. Data will be retained for five years in line with TCD policy.

### 3.6 Data collection

The power of a study is defined as “the probability of correctly rejecting the null hypothesis when a true difference exists” (Lawrie *et al.* 2000, p. 64). Statistical power “is the measure of how likely the study is to produce a statistically significant result for a difference between groups of a given magnitude” (Bowling 2002, p. 167). Based on the literature review where sample sizes were found to be too small to detect a significant difference between groups, a “0.05 level of significance” was required and expected power should be “greater than 0.8” (Bowling 2002, p. 167). Given these considerations and given a possible medium effect size between the two groups. Cohen (1992) recommends a minimum sample size of 64 respondents per group or 128 in total. This study primarily compared the cohort across time points however it was powered to allow a comparison of two potential groups within each time point. Hence to also allow for potential loss to follow up of 20% a sample size of  $128 + (20\% \text{ of } 128)$  was chosen. This provided a sample size of  $128 + 25.6 = 153.6$  or 154 respondents as was the achieved sample size.

Two hundred and sixty eight parents of newborn infants returned the acceptance card indicating a desire to participate in this study. Two hundred and twenty two respondents met eligibility criteria and 154 were randomly selected to participate using computerised randomisation software. Respondents not selected to participate received a letter thanking them for their expression of interest and explaining the recruitment process. Respondents selected to participate were contacted by phone with further details of the study. The researcher answered questions the parents had in relation to the study process and arranged a date, time and place of the respondent’s choosing to meet for the first assessment.

On each of the respondents’ acceptance card the following information was recorded for follow up purposes;

- Date of receipt of acceptance card
- Date of each phone or text contact with respondent
- Location and directions to respondents’ homes
- First child or number of older children
- Dates and times suitable to respondents to participate in next assessment
- Date and time of confirmation SMS text sent to respondents
- Date and time of each follow-up assessment



In conjunction with the information recorded on each respondent's acceptance card a monthly plan was drawn up to record the location of each measure undertaken and a follow up plan for further measures as discussed and agreed with each respondent. Each of the four follow up measures were organised by SMS text message.

### **3.6.1 Minimising attrition**

Attrition, in the form of respondent withdrawal and loss to follow-up, can threaten a study by introducing bias (Cotter *et al.* 2005). There is no specific rule as to the number of respondents that should remain in a study for the results to be considered valid (Desmond *et al.* 1995), however when retention rates are close to 100% they are considered to be most robust. Studies with 20% attrition are considered to be reasonable even though studies with lower rates do appear in the literature (Desmond *et al.* 1995). Home visit studies have reported lower attrition rates where trust was established, respondents were informed of the need for the research and confidentiality assured (Sullivan *et al.* 1996). From the sample of 154 children in this study, 4% (n=30) of the respondent parents were unable to meet with the researcher across four timelines. This resulted in a reduction of the final sample from an expected 616 to a total of 586 children over the four timelines, who were assessed with their respondent parents, resulting in a 95% retention rate.

Attempts to minimise attrition included:

- Assessments were conducted shortly after the child's national child health surveillance check by their PHN
- Respondents chose a time, date and place most convenient to them to meet the researcher
- Each respondent parent received an SMS reminder text message prior to each of the four assessment appointments
- Respondent parents were fully informed of the study design, aim and time commitments associated with participation in this study
- Respondent parents were made aware that their child would be weighed and measured as part of data collection
- Respondent parents were made aware that participation in the study was entirely voluntary and withdrawal from the study would not impact negatively on them or their child
- Confidentiality was assured at all times

- In order to develop an acceptable partnership, parents must retain control over the information disclosed at each assessment (Price 2002). This concept was respected throughout this study.

### **3.6.2 Establishing rigour**

To establish rigour within the research process, reduce selection bias and provide for credible findings a number of strategies were adopted during the recruitment process:

- The researcher did not directly recruit respondents. Recruitment invitation letters were posted by the secretarial staff to the Directors of Public Health Nursing
- All infants born between May 2011 and March 2012 in the HSE South and West areas
- Reply envelopes were received by health centre secretarial staff
- Reply envelopes were randomly assigned a response number (in the order they were removed from the reply post box)
- Respondents who met eligibility criteria were randomly selected to participate in the study using computerised randomisation software
- A delay of ten to fourteen days, between receipt of reply envelopes and first assessment, was used to allow respondents time to opt out of the study.

### **3.7 Data analysis**

The researcher compiled an SPSS codebook and dataset to reflect the data gathered at each wave of assessment. Variables reflected the content of the assessment, namely the biographic / demographic questionnaire, Parent Questionnaire, DAYC, MOS Social Support Survey, PSI SF, SUF, SF 36 and WHO QOL-BREF. Variables were categorised into child characteristics, maternal characteristics, paternal characteristics, sources of maternal support, interventions as provided by the PHN, referrals as provided by the PHN and measures of child development. A detailed summary of the study variables addressed in this study can be seen in Appendix 5.

Data were analysed using the Statistical Package for Social Sciences (SPSS) IBM version 22.0. Child development and well-being outcomes were profiled across four timelines using a combination of descriptive, exploratory statistics, t-tests and cross-tabulation. Frequencies and percentages were employed to summarise socio-demographic data. In the study where

data were normally distributed mean scores and standard deviation were reported and where data were skewed median and interquartile ranges were reported. To help readership understanding of study results, median scores were reported in a number of tables. T-tests and one way repeated measures ANOVA using Bonferroni correction for multiple testing were carried out across four waves of assessment to test the mean differences between the intervention and routine care groups. This was to identify statistically significant differences between groups, at particular timelines or across four timelines within groups. Alpha level was set at  $p < 0.05$ . Cohen d values of 0.01 are considered to represent a small effect size, 0.06 reflects a moderate effect and 0.14 is a large effect size (Cohen 1988, p. 284 - 298). The independent variable which was increased PHN interventions was measured as categorical data and the dependent, child outcomes, were measured as scalar data. Rates of missing data were low as participant retention rates remained high. Wave two had the lowest response rate of the four waves of assessment at 136 out of a possible 154 children.

### **3.8 Conclusion**

In this chapter, the methodological design, details of the selected measures, pilot study, ethical approval, recruitment and measurement of respondent mothers and their infants were outlined. Methods used to minimise attrition and establish rigour within the research process were detailed.

In the next chapter the study sample and infant / child variables employed to meet the aim and objectives of this study through a theoretical framework will be described

## Chapter Four: Results 1

### 4.1 Introduction

In this chapter data characteristics of the study sample and infant / child sample will be described. Outcome data in relation to infants and children based on the Service Utilisation Form and Development Assessment of Young Children will also be detailed. This includes a description of changes occurring at each wave of measurement.

### 4.2 Sample characteristics

Respondent mothers ranged in age from 19 to 47 years (mean age 33 years, SD 3.17) and fathers were aged 19 to 53 years (mean age 35 years, SD 5.56). The majority of respondents were married parents (73%, n=111), 22% (n=33) cohabiting, less than 4% (n=6) were single parents, (0.6%) one was a separated mother and (0.6%) one was widowed. By wave 3 one couple had separated. At wave 4 one cohabiting couple had married and one cohabiting couple had separated. Sixty four percent of families reported between 1 and 5 children older than the infant of the respondent parent but aged less than 18 years residing in the household at wave 1.

Eighty three percent of parents were of Irish nationality, 4% originally from Poland and 4% from the United Kingdom. The remaining 9% were from 15 other countries including America, Europe, Africa, Asia and Australia representing a strong diversity of ethnicities and cultures see Appendix 8. The majority of children (73%) lived in rural settings in County Kerry, 25% in County Cork and 2% in County Limerick. Also 71% of the study sample lived in their own house, 25% in rented accommodation, 2% in social housing, 1.3% with maternal grandparents and one family (0.6%) lived in a mobile home. Respondent accommodation remained relatively unchanged from wave 1 to wave 4 apart from one family who had been living in a mobile home and had moved into a house, one family had moved in with respondent infant's grandparents and two families had moved to rented accommodation.

All parents attended school with 78% moving on to further education following completion of secondary school. Sixty seven percent of mothers had attained a third level qualification and 70% of fathers. Data were unavailable relating to one set of parents. By wave 4 a further 4% (n=6) mothers had started or completed a third level course. At wave one, 49% of parents were professionally employed, 17% in skilled employment, 15% self-employed, 13% worked

in the home, 4% were unemployed, 1% in ongoing education and data were missing for one father. A greater proportion of mothers were professionally employed or working in the home compared to fathers who were noted to work in professional employment, self-employment or as skilled workers in almost equal numbers. By wave 4, an increase of 1.3% (n=2) in fathers educated to university level was noted. Reported employment status for respondent mothers remained relatively unchanged from wave 1 to wave 3. However, by wave 4 a significant change was noted. Twenty one percent of mothers had left employment to fulfil the role of stay-at-home parent while 7% had upskilled to professional employment. By wave 3 one father (0.6%) had become unemployed and 4% (n=6) had progressed from self-employment or semi-skilled work to working in a professional capacity. By wave 4 a further two fathers had obtained professional work and one was on long term sick leave see Figure 4-1 and Figure 4-2.

When mothers were asked if they could manage the household on their current financial budget at wave 1, 67% reported no difficulty and 27% were managing adequately, while 6% reported it to be difficult or impossible. A reduction in respondents managing well or very well was seen from wave 1 to wave 3, the number falling by 16%. A marginal improvement was seen by wave 4 as 6% recovered and could be described as managing adequately. Seventy percent of respondents had acquired the HSE local health centre phone number as a means of contacting the PHN. A further 40% had the mobile phone number of their PHN. Data were unavailable for 23% of the sample.

Infants of parents in this study ranged in age from three to six weeks (mean 4 weeks, SD 0.8 weeks) at the first assessment. Ninety seven percent of infants were born at full-term. Five infants (3%) were born prematurely, prior to 37 weeks gestation. Sixty seven percent were born by spontaneous vaginal delivery, 25% by Caesarean section, 5% required vacuum assistance and 3% were forceps assisted deliveries. Four infants (2.4%) were reported to have had complex needs by the age of 2 years. Birth weight ranged from 2.8 kg to 4.5 kg (mean 3.5 kg, SD 0.5 kg). When infants were weighed at wave 1, aged three to six weeks, weights ranged from 2.9 kg to 6.4 kg (mean 5 kg, SD 0.7 kg).

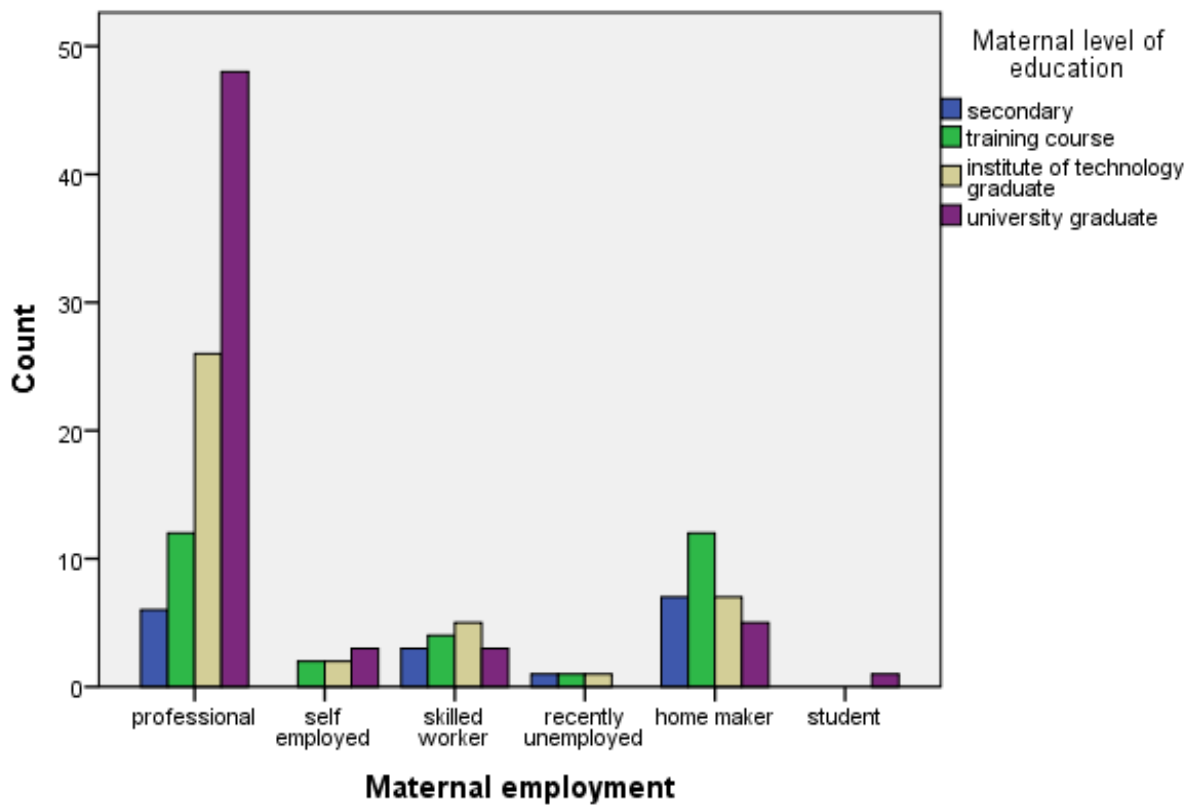


Figure 4-1: Maternal employment relative to education.

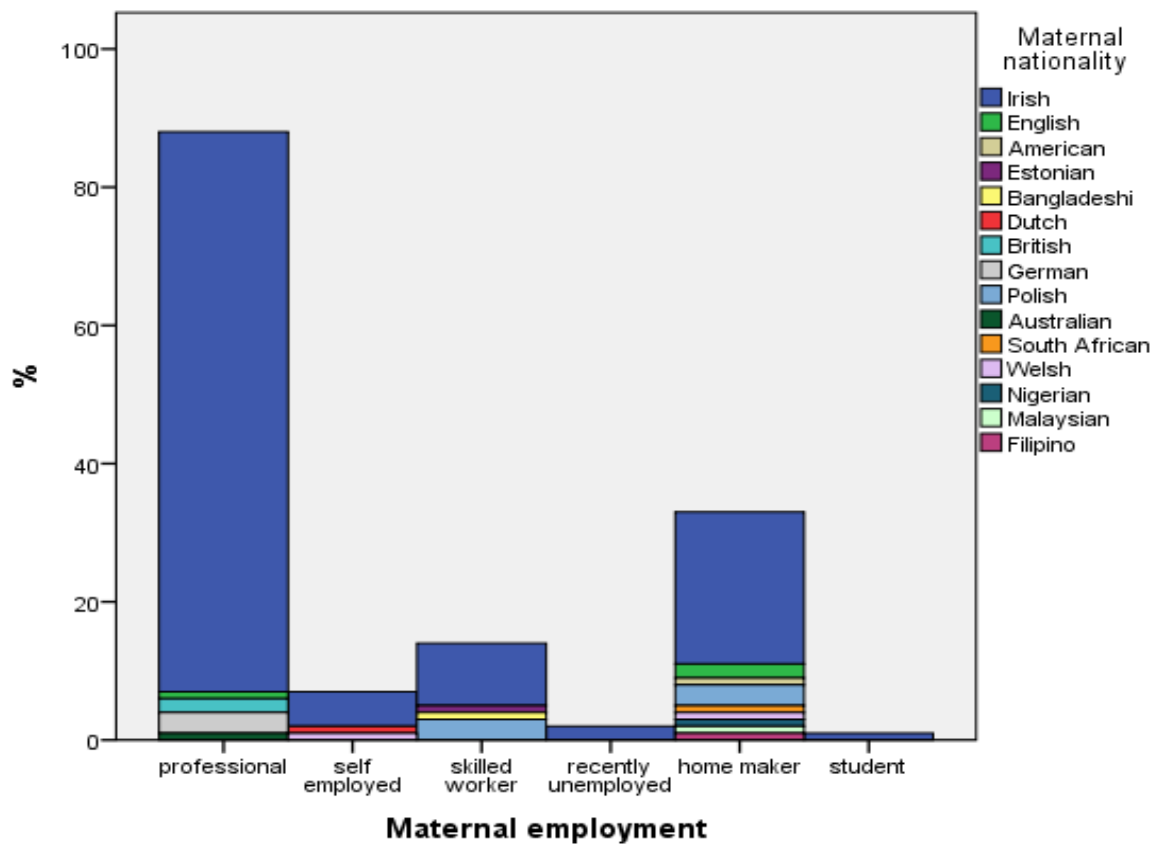


Figure 4-2: Maternal employment relative to nationality.

### 4.3 Child development and well-being outcomes

The study sample consisted of 154 infants including two sets of twins. The mean gestational age of respondents at birth was 39 weeks (SD 1 week). At wave 1, 7% (n=11) were aged 3 weeks, 58% (n=89) aged 4 weeks, 21% (n=32), aged 5 weeks and 14% (n=22) were 6 weeks old. Five infants (3%) in the study group were born prematurely, ranging from 33 to 36 weeks gestation. Four infants (2%) were reported to have complex needs, some from birth and others by the age of 2 years such as Failure to thrive, Down's syndrome and Autism spectrum.

### 4.4 Infant weight

Birth weights with some outliers ranged from 2.8 kg to 4.5 kg (mean 3.5 kg, SD 0.5 kg). Weights at wave 1 ranged from 2.9 kg to 6.4 kg (mean 5 kg, SD 0.7 kg). Infant weights increased steadily across the three follow-up assessments. Measurements were spread along the percentile of child weights as per the Baby Growth Assessment Chart, ranging from the 2<sup>nd</sup> to > 90<sup>th</sup> percentile at waves 2, 3 and 4, see Figure 4-3.

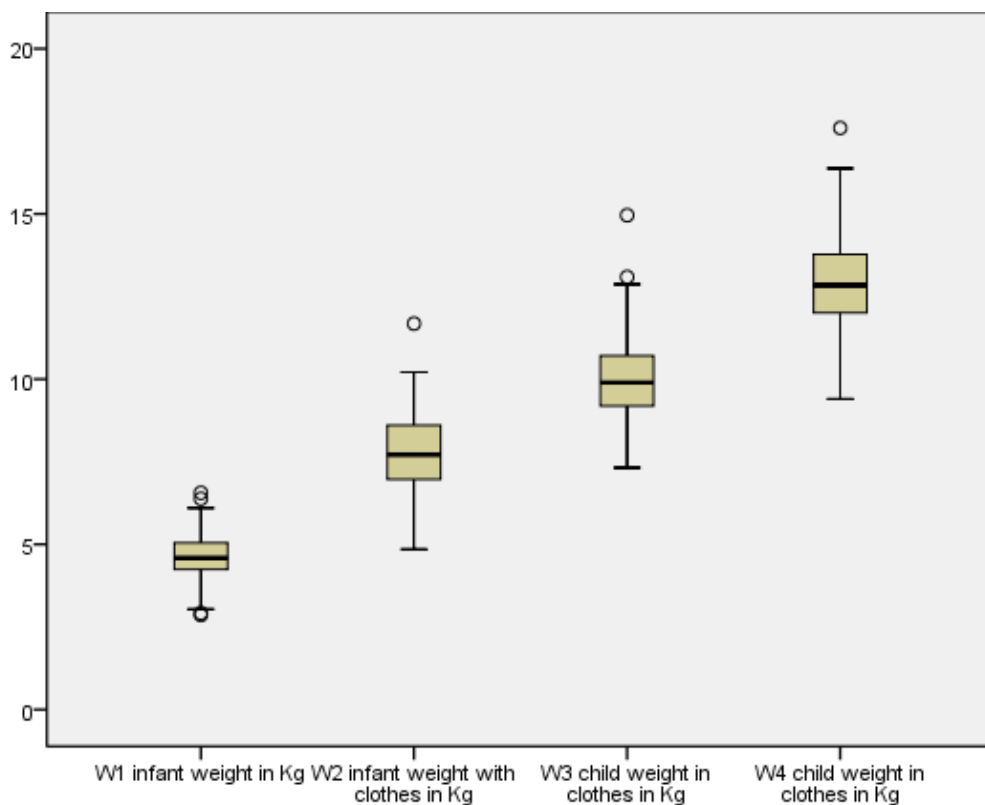
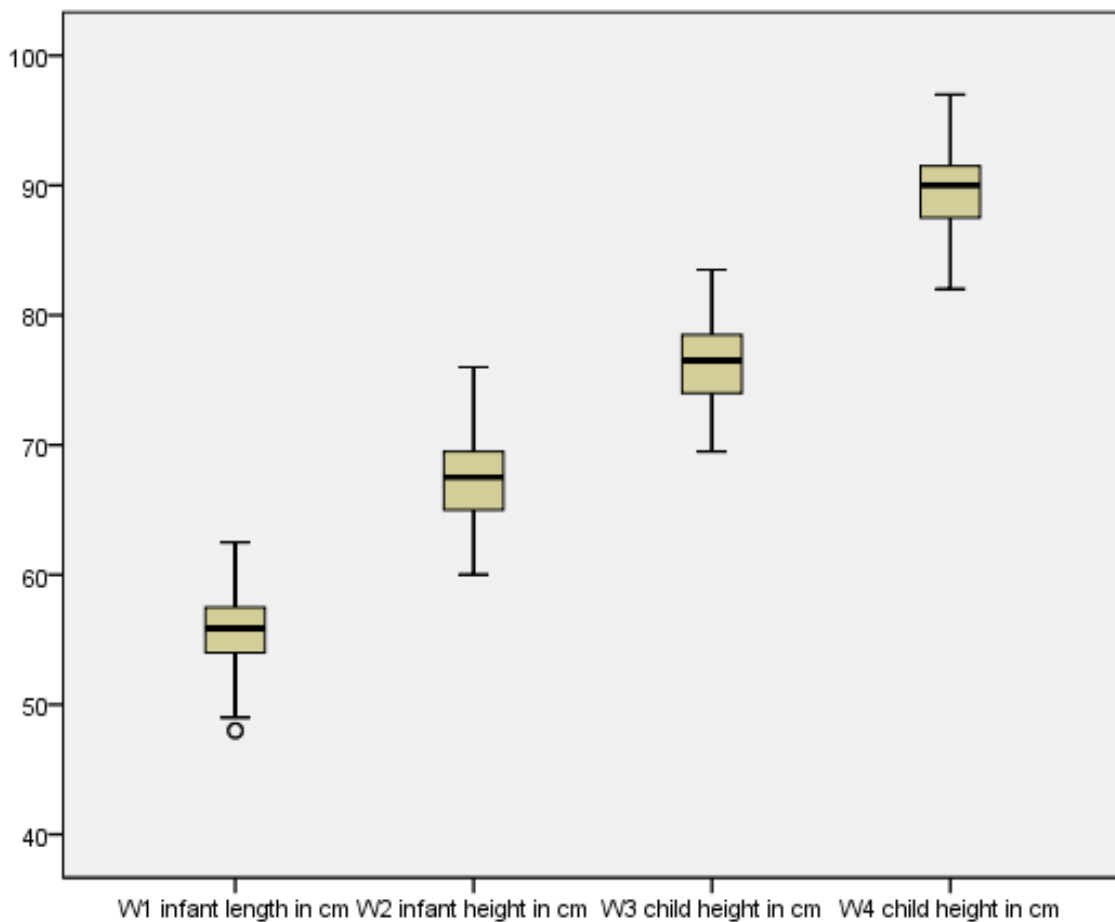


Figure 4-3: Infant weights from wave 1 to wave 4.

## 4.5 Infant length

Infant lengths at birth were available for 37% of the study sample and ranged from 45cm to 58cm. Infant's lengths measured at wave 1 ranged from 48cm - 63cm. Data on infant length showed a normal distribution except for wave 2 where the data showed a slight negative skew. Infant lengths improved steadily from wave 1 to wave 4, commencing from the 4<sup>th</sup> - 99<sup>th</sup> percentile but averaging between the 75<sup>th</sup> and 98<sup>th</sup> percentile at wave 4, see Figure 4-4.



**Figure 4-4: Infant length from wave 1 to wave 4.**

## 4.6 Infant feeding

The majority of infants were formula fed (41%), followed by exclusive breastfeeding (33%) and partial breastfeeding (27%) at wave 1. When infant feeding was compared according to



gender no significant difference was seen between groups, Figure 4-5 outlines these comparisons further.

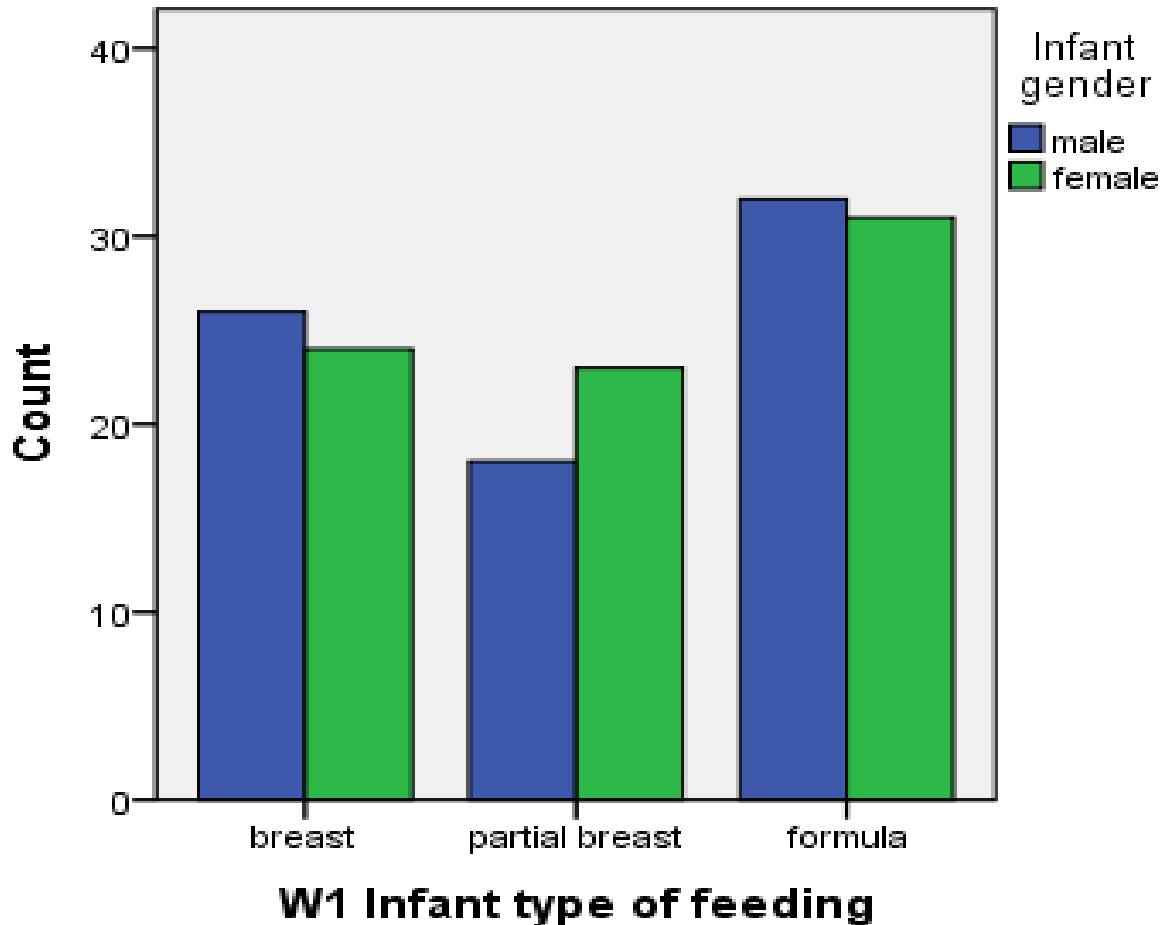


Figure 4-5: Infant feeding type by gender.

The feeding pattern changed for respondents from wave 1 to wave 2. A fall of almost 50% was seen in the number of infants exclusively breastfed. A fall of 16% was noted for those being partially breastfed. By wave 2, 4% of infants (n=5) were receiving goats milk or GP-prescribed formula feed. The feeding pattern changed again at wave 3 with a further reduction in breastfeeding rates and a 31% increase in formula feeding. A small number of mothers were exclusively (n=7) or partially breastfeeding (n=5) at wave 4. Of interest, 10% of children continued to receive formula feed at age 2 years.

## 4.7 Childcare

All infants were cared for by their parents in their own homes at wave 1. One mother reported also employing the assistance of a childminder in the home at wave 1. This trend continued at wave 2 with only 7% of infants being cared for by a childminder. The type of childcare being provided to children at wave 3 showed a dramatic change with a large proportion now attending a childminder outside the family home (36%), followed by crèche (12%) and one child cared for by their maternal grandmother. Wave 4 was similar to wave 3 with 46% of children being cared for by a childminder, 15% attending crèche, two children (1.4%) attending playschool and one child (0.6%) cared for by an Au Pair, see Figure 4-6.

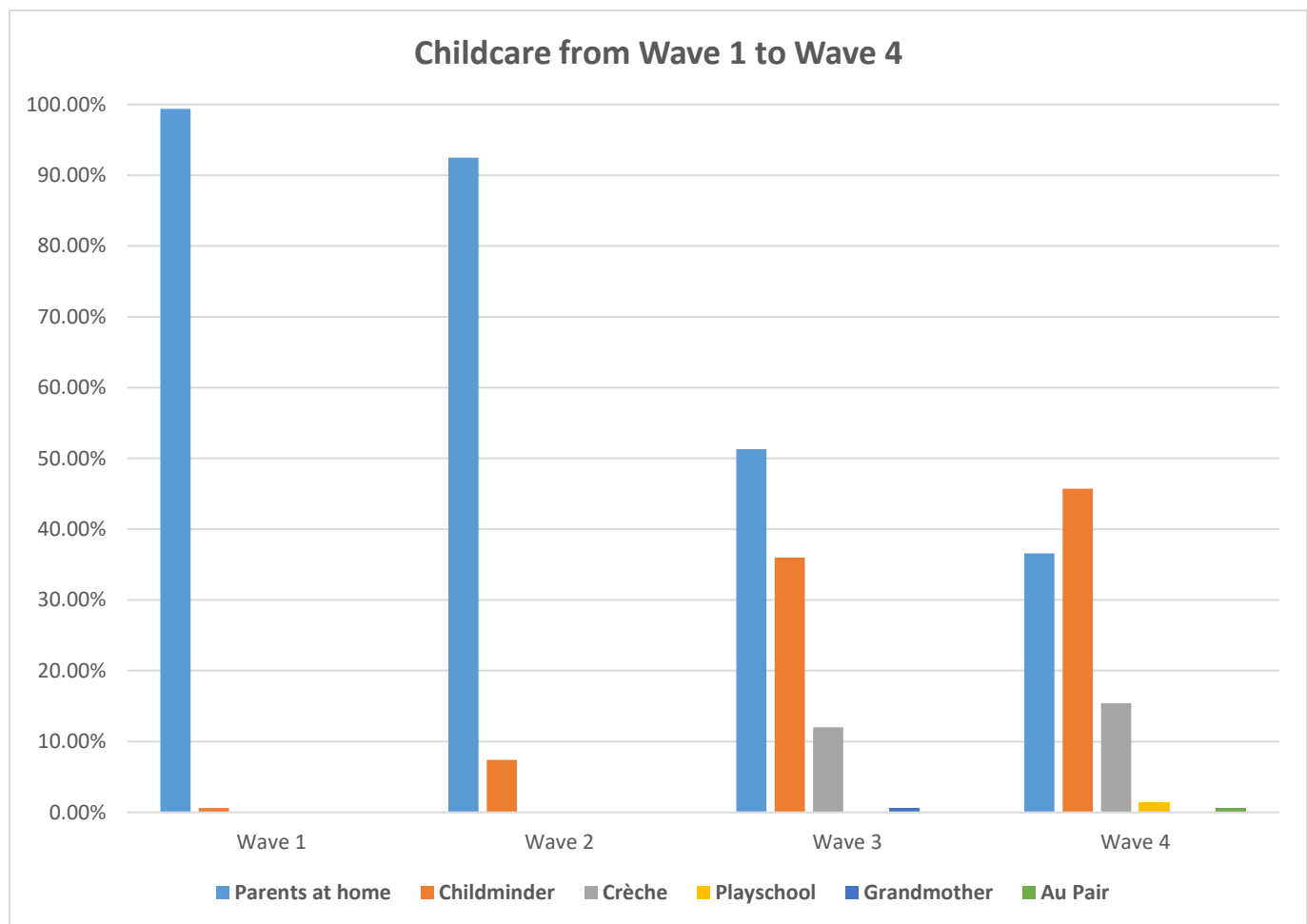


Figure 4-6: Childcare from wave 1 – wave 4.

## **4.8 Service Utilisation Form**

Using the Service Utilisation Form, 96% of mothers reported their infant's health since birth as good or very good and 3% (n=5) reported their infant's health as fair or mixed. Data were unavailable for one infant at wave 1. At wave 2, 82% of respondent mothers described their infant's health as good or very good, with a small proportion (5%) rating their infant's health to be very poor or fair or mixed. Wave 3 showed a deterioration in respondent rating of child health as 10% described it as very poor or fair or mixed. A slight further deterioration was seen at wave 4 when this figure rose to 11%.

### **4.8.1 Hospital Attendance**

Four infants (2.6%) were admitted to hospital due to illness within the first 3 - 6 weeks of life. Of these, one infant was admitted twice before age 6 weeks. The principal reason for admission to hospital was breathing difficulties and one infant was admitted due to vomiting. The duration of hospital stays ranged from 1 to 7 nights. By wave 2, the number seen in the Emergency Department had more than doubled and the number admitted to hospital had also increased. At wave 3, eleven mothers reported taking their child to the emergency department and twelve reported that their child was admitted to hospital.

The reasons for admission also showed a marked change across four timelines. Children were admitted mainly due to illness up to wave 3. However, from wave 3 to wave 4, as children became more active, the influence of accidental injury increased with a resultant impact on the number of hospital attendances. Reasons reported for infants and children attending the Emergency Department or admitted to hospital are outlined in Table 4-1.

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**Table 4-1: Reasons for Hospital Attendance**

---

| <b>Waves 1 – 3</b>              | <b>Wave 4</b>               |                |
|---------------------------------|-----------------------------|----------------|
| Bronchiolitis                   | Abscess                     | Hydrocele      |
| Croup                           | Bronchitis                  | Impetigo       |
| Falls                           | Burns                       | Infection      |
| Gastroenteritis                 | Concussion                  | Laceration     |
| Head injury                     | Convulsion                  | Pneumonia      |
| High pitched cry                | Dislocated elbow            | Pyrexia        |
| Gastroesophageal Reflux Disease | Fainting episodes           | Rash           |
| Pneumonia                       | Falls                       | Self-poisoning |
| Pyrexia                         | Gastroenteritis             |                |
| Tonsillitis                     | Haemolytic uraemic syndrome |                |
| Urinary tract infection         | Hip dysplasia               |                |

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#### **4.9 Development Assessment of Young Children**

The Development Assessment of Young Children (DAYC) was the main outcome measure of child development and well-being used in this study. It provides information on child outcomes in the areas of cognitive development, communication skills, social-emotional development, adaptive behaviour and physical development, see Appendix 7.

The measure identifies children that are developing normally and distinguishes them from their peers who may be significantly below them in any of the above mentioned four areas of development. This instrument helps healthcare professionals to determine a child's strengths and weaknesses and tailor interventions towards these. This is particularly beneficial in identifying communication deficits of children and allows for programmes to be put in place to support children with communication difficulties.

### 4.9.1 Cognitive development

The median cognitive standard score for the total sample of infants (n=154) at wave 1 was 115 (IQR 112, 115). The sample mean was 114 (SD 3, 95% CI: 80 - 82). These scores placed the cognitive development of all infants on the 50<sup>th</sup> percentile, which is within normal limits for expected developmental milestones at age 3 - 6 weeks. Cognitive development outcome scores remained average or above across four assessments from wave 1 to wave 4. One hundred percent (100%) of infants scored at or above average at wave 1. A small rise in the proportion scoring in the superior and very superior ranges was seen from wave 1 (4%) to wave 2 (15%), wave 3 (32%) and wave 4 (39%). At wave 3 a small number of children (3%) obtained below average scores. By wave 4 however, those who scored below average had reduced by 50%. Cognitive development scores across four timelines are outlined in Figure 4-7.

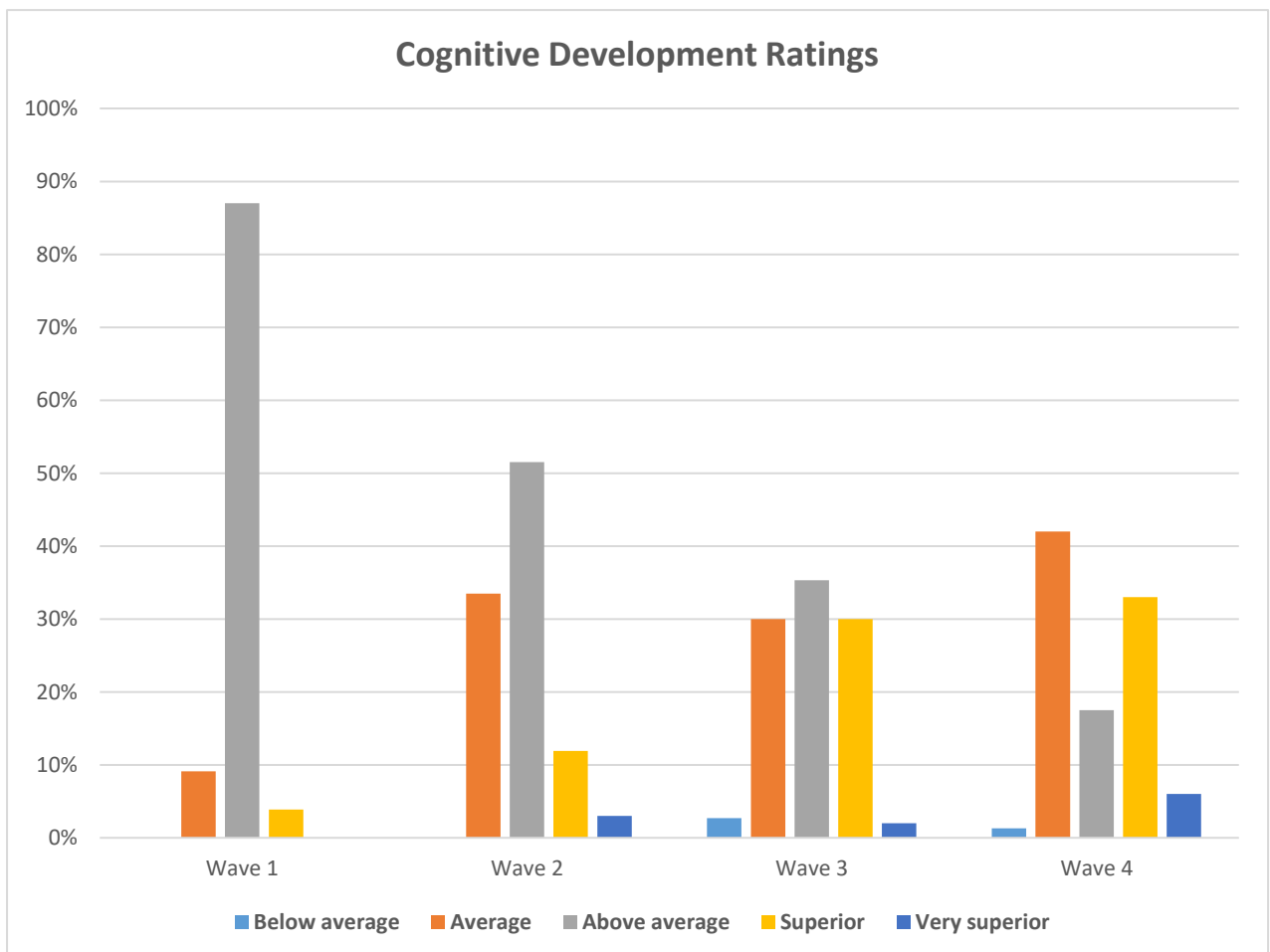


Figure 4-7: Cognitive Development Ratings from Wave 1 to Wave 4.

### 4.9.2 Communication skills

Data on communication skills was negatively skewed with a median of 103 (IQR 103,109) at wave 1. The mean score was 105 (SD 4, 95% CI: 104, 106). These scores rate 90% of infant's communication skills as average compared to the general population at wave 1 with the remaining 10% rating as above average. Communication outcomes scores at wave 1 demonstrated that the majority of infants' communication skills were on the average spectrum. An improvement in communication outcome scores was seen at waves 2 and 3 as 5% rated as superior or very superior at these assessments. Wave 4 demonstrated a broader range of communication scores spread from very poor (1%) through to very superior (13%).

Communication outcomes of respondents varied across the four timelines. At wave 1, up to 90% scored in the average range, by wave 2 communication scores improved ranging from average to very superior. Continued improvement was seen at wave 3, with a low number scoring below average. Although the majority of children scored between average and very superior at wave 4, communication data demonstrated a cumulative 8% (n=12) who were scoring poorly with below average scores. Communication skills scores across four timelines are outlined in Figure 4-8.

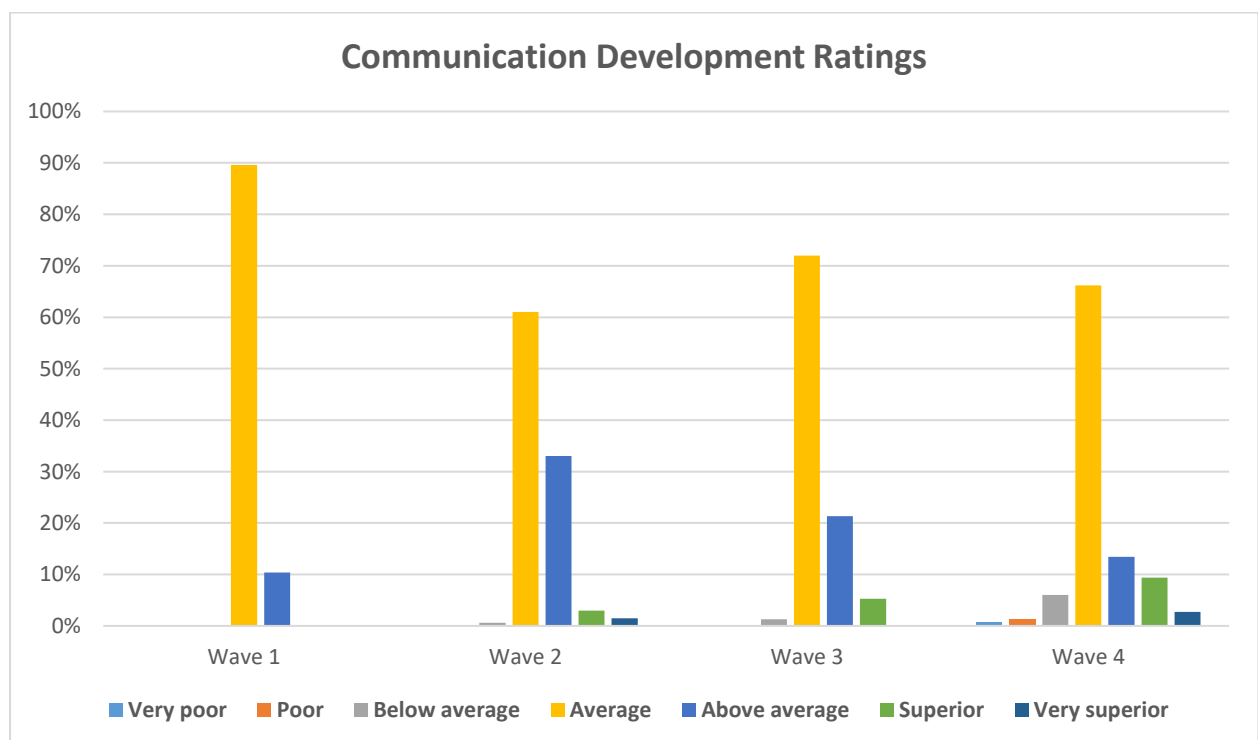


Figure 4-8: Communication Development Ratings from Wave 1 to Wave 4

### 4.9.3 Social-emotional development

The social-emotional developmental outcomes of infants at wave 1 showed a median score of 123 (IQR 119, 123). The mean score was 121 (SD 6, 95% CI: 121, 122). The majority of infants (55%) obtained scores slightly above the population norm. A small number of infants (6%) scored below the 50<sup>th</sup> percentile and 2% scored in the superior range. At wave 2, outcome measures showed a deterioration in social-emotional development scores as 19% of infants were rated as very poor and below average. At wave 3 and wave 4 the social-emotional development outcome scores improved as all children returned to average or higher scores in this domain. Social-emotional development scores across four timelines are outlined in Figure 4-9.

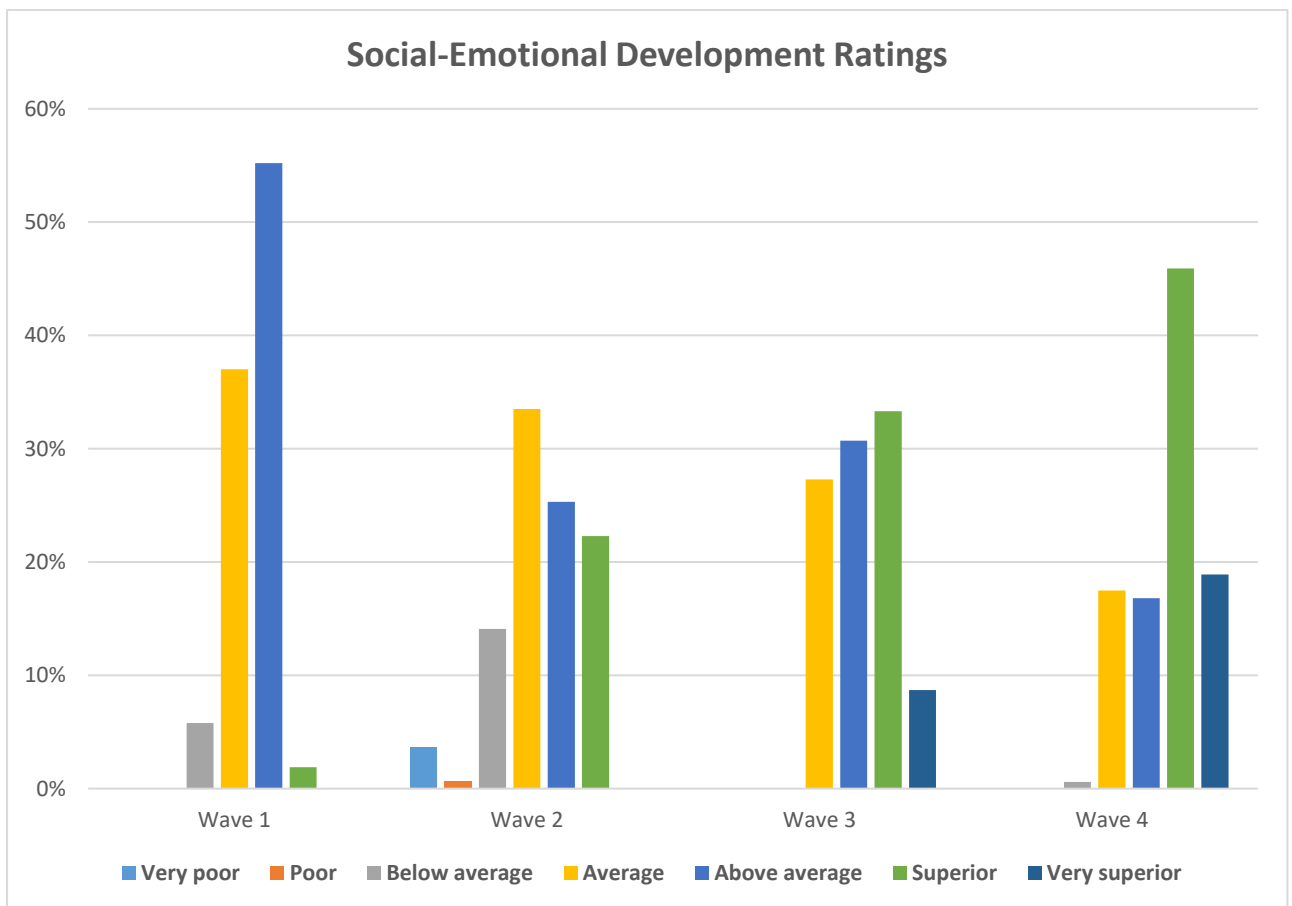


Figure 4-9: Social-emotional Development Ratings from Wave 1 to Wave 4

#### 4.9.4 Adaptive behaviour

The adaptive behaviour standard median score at wave 1 was 110 (IQR 110, 110). The mean score was 109 (SD 4, 95% CI: 109, 110). These scores demonstrate that 83% of infants scored at the 50<sup>th</sup> percentile for adaptive behaviour while the remaining 17% were shown to be above average at wave 1. The standard outcome scores for adaptive behaviour followed a normal distribution at wave 2 and scores were noted to improve as 24% of infants moved from an average rating to superior or very superior. This improvement was not maintained across waves 3 and 4 as respondents in the superior and very superior range fell to 12% and 7%.

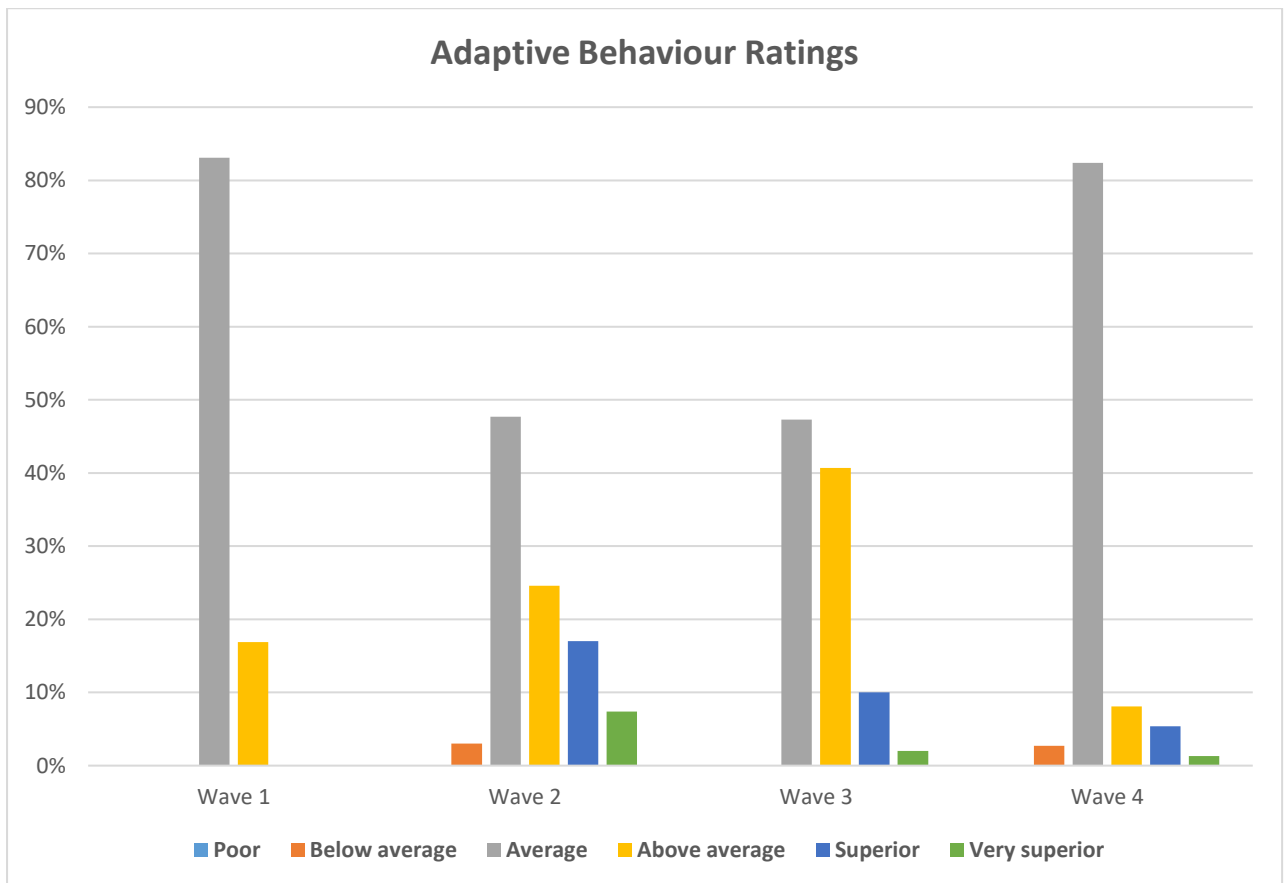


Figure 4-10: Adaptive Behaviour Ratings from Wave 1 to Wave 4



#### 4.9.5 Physical development

The standard measures at wave 1 for infant physical development were positively skewed with a median score of 105 (IQR 102, 110). The mean score was 106 (SD 6, 95% CI: 105, 107). Again, the majority of infants (81%) were seen to be on par with population norms at wave 1 while the remaining 19% were shown to be above average. Physical development scores varied across the timelines and no particular pattern was discernible. From wave 1 to wave 2 an early improvement was noted with an extra 7% scoring above average to very superior. Scores moved in the opposite direction at wave 3 when an extra 18% fell from average to below average ratings. By wave 4 a recovery was seen as 18% of this group moved back to average and an extra 23% moved into the above average and superior categories. One infant demonstrated a very superior physical development outcome score at wave 2 but this was not demonstrated at the following two assessments. Physical development scores across four timelines are outlined in Figure 4-11.

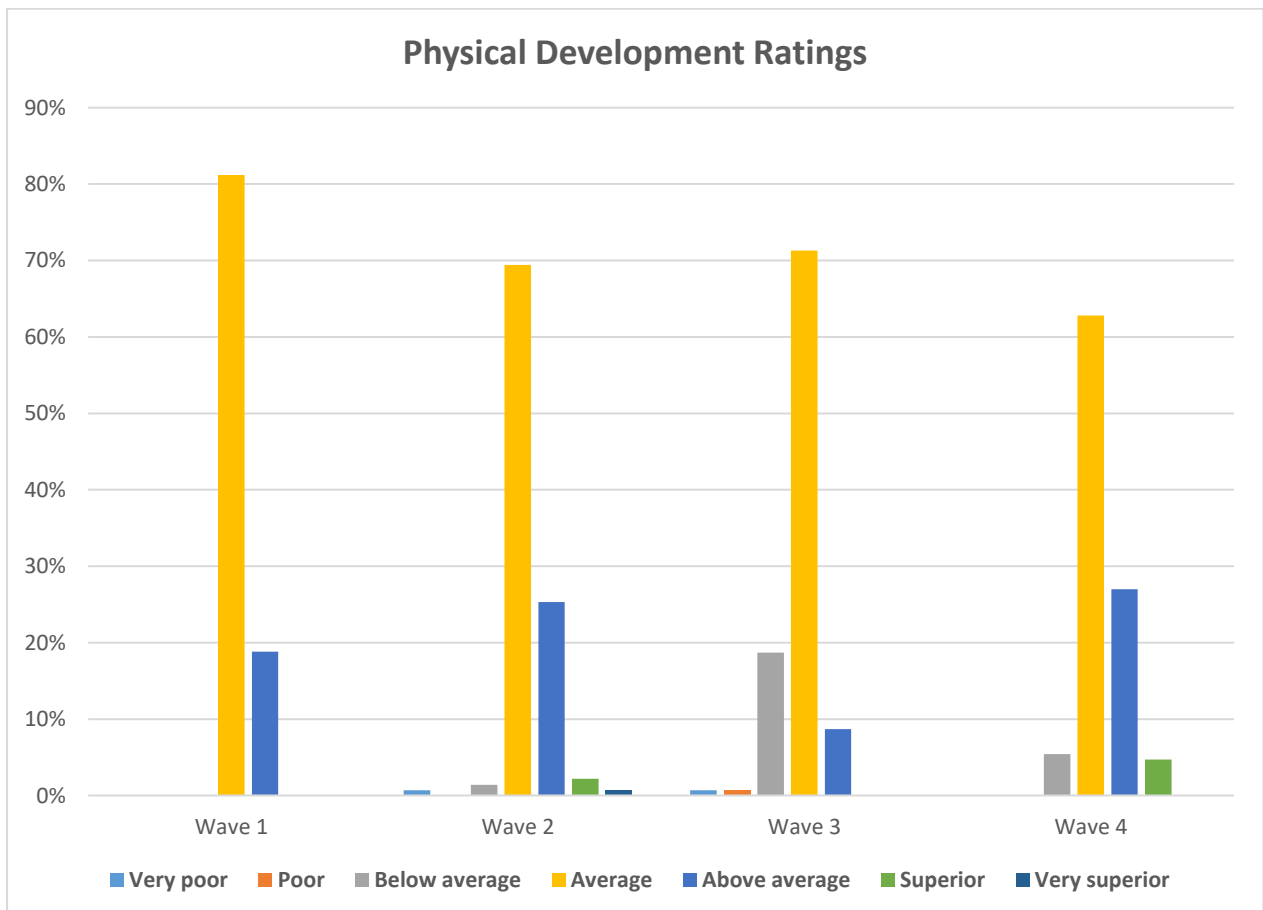


Figure 4-11: Physical Development Ratings from Wave 1 to Wave 4

#### **4.10 Summary of study findings**

1. Respondent mothers ranged in age from 19 years to 47 years (mean age 33 years, SD 3.17).
2. The majority of respondent parents were Irish (83%).
3. The number of non-Irish mothers was 17%.
4. The majority of parents were married (73%).
5. The greater proportion of respondents lived in their own house (71%).
6. Sixty seven percent of mothers and 70% of fathers were educated to third level.
7. Up to fifty percent of mothers were employed professionally with an equal number of fathers being either self-employed or skilled workers.
8. When mothers were asked if they could manage their household on their current budget, 6% (n=9) reported “not at all” or that it was difficult. The remaining 94% (n=143) reporting that they were managing their household on their income at wave 1. This group reduced by 10% at wave 4.

#### **4.11 Child development and well-being outcomes**

1. Gestational age of infants ranged from 33 to 42 weeks with 3% (n=5) born prematurely and 2.4% (n=4) reported to have complex needs, some at birth, others at the age of 2 years. Overall child weights continued to improve steadily from 3 - 6 weeks to age 2 years. The majority of weights averaged at the 50<sup>th</sup> percentile or above when the children were aged 2 years.
2. The majority of infants were formula fed (40.9%, n=63), followed by exclusive breastfeeding (32.5%, n=50) and partial breastfeeding (26.6%, n=41) at age 3 - 6 weeks. The feeding pattern changed over time with a reduction in exclusive breastfeeding by 50% and partially breastfeeding by 16% by age 4 - 7.5 months. Aged 2 years, 10% of children remained on formula feeding and 5% were breastfeeding.
3. Age 3 - 6 weeks, 99% (n=153) of infants were being cared for by their parents in their own homes. This trend continued up to age 7.5 months. The greatest change in childcare arrangements occurred between the ages of 9 and 14 months when only half of the sample (51%, n=77) were cared for in their homes.
4. Cognitive development outcome scores remained average or above across four measurements from wave 1 to wave 4. One hundred percent (100%) of infants scored at or above average at wave 1 with a small rise in superior and very superior from wave 1 to wave 2. A change was seen at wave 3 where a small number of children (3%)

obtain below average scores. By wave 4 however, those who scored below average had reduced by 50%.

5. Communication outcomes of respondents varied across the four timelines. At wave 1, up to 90% scored in the average range, by wave 2 communication scores ranged from average to very superior. This trend continued to wave 3, with a low number scoring below average. The majority of children scored between average and very superior at wave 4 with a cumulative 8% who scored poorly with below average scores.
6. Social-emotional developmental outcomes for the majority of infants (55%) obtained scores slightly above the 50<sup>th</sup> percentile with a small number (6%) scoring below the 50<sup>th</sup> percentile and 2% in the superior range. A deterioration was noted at wave 2, where 19% of infants were rated as very poor and below average. Outcome scores improved at wave 3 and wave 4 as all respondents returned to average or higher scores.
7. The adaptive behaviour scores at wave 1 showed that 83% of infants scored at the 50<sup>th</sup> percentile while the remaining 17% were shown to be above average. Scores were noted to improve further at wave 2 from an average rating to superior or very superior. This improvement was not maintained across waves 3 and 4 as children in the superior and very superior range reduced to 12% and 7%.
8. The physical development outcomes of infants (81%) at wave 1 averaged around the 50<sup>th</sup> percentile with up to 20% on the above average spectrum. Physical development scores varied across the four timelines. From wave 1 to wave 2 an improvement of 7% from average to very superior was noted. Scores deteriorated somewhat at wave 3 and recovered at wave 4.

#### **4.12 Conclusion**

Overall the findings demonstrated that infant's communication skills, adaptive behaviour and physical development were within expected population norms for developmental milestones at wave 1 aged 3 - 6 weeks. As infants grew into childhood differing trends were noted across the five domains of development.

Cognitive development was primarily rated as average across waves 1 and 2, showed an even spread from below average to superior at wave 3 and were polarised to below and above expected normal range at wave 4. The majority of communication skill measurements rated as average consistently across waves 1, 2, 3 and 4. Both social-emotional and physical development ratings were consistently raised among the study sample, the majority

of measurements categorised as above average across waves 1, 2, 3 and 4. Adaptive behaviour commenced in the average range at wave 1, improved to above average at wave 2 and wave 3 and reduced at wave 4.

In this chapter characteristics of the study sample and infant / child outcomes from wave 1 to wave 4 were described. Findings using the Development Assessment of Young Children detailed child outcomes in cognitive development, communication skills, social-emotional development, adaptive behaviour and physical development.

In the next chapter details will be provided of maternal variables based on the Service Utilisation Form, Short Form 36 Health Survey, Parent Stress Index, Medical Outcomes Study Social Support Survey and WHO Quality of Life - BREF.

## Chapter Five: Results 2

### 5.1 Introduction

In the previous chapter characteristics of the study sample and infant / child outcomes from wave 1 to wave 4 were described. In this chapter maternal variables based on the Service Utilisation Form, Short Form 36 Health Survey, WHO Quality of Life - BREF Parent Stress Index, Medical Outcomes Study Social Support Survey from wave 1 to wave 4 will be outlined. For information on scoring of each measure please refer to chapter 3.

### 5.2 Maternal physical health

Findings relating to prenatal history indicate that this period was uneventful for the majority of respondent mothers (86%), while 11% (n=17) were hospitalized and 3% (n=4) reported suffering from either pre-eclampsia or symphysis pubis dysfunction.

At wave 1, 5% (n=8) of mothers reported previously suffering from postnatal depression with 90% having received medication to treat the condition. By wave 3, two more mothers had received a diagnosis of postnatal depression and by wave 4 a further two mothers had been diagnosed. Of those diagnosed with PND, eleven reported receiving medication for same, an increase of four mothers from wave 1. By wave 4, the majority of mothers (73%) had completed treatment.

### 5.3 Service Utilisation Form

The Service Utilisation Form asked respondent mothers to self-rate their physical health over the past six months. Eighty four percent of mothers rated their overall health in the previous six months as good or very good while 16% (n=24) rated their health as fair or mixed or very poor. Data were unavailable for five mothers.

At wave 2, the number of respondents rating their overall health as good to very good was 76% (n=117) demonstrating a decrease from wave 1 of 8%. At wave 4, the number of mothers rating their health as very poor, fair or mixed fell to 12% (n=17). From wave 1 to

wave 4, one mother reported resolution of migraine, however two further medical conditions were noted including colitis and cardiac conditions.

Thirteen mothers (9%) reported suffering from a medical condition over the course of this study. Medical conditions are outlined in Table 5-1.

At wave 1, 26% of respondent mothers reported suffering from a medical condition following childbirth. This included varicose veins (9%), stress incontinence (5%), hypertension (4%) and pelvic floor conditions including uterine or vaginal wall prolapse (2%). By wave 2, two further mothers had developed carpal tunnel syndrome since their infant's birth. There was also an increase in hyperthyroidism, anxiety and recurrent urine infections. At wave 3, two mothers reported resolution of stress incontinence.

By wave 4 when the children were 23 - 24 months old there was a marked improvement in some areas of their mother's medical conditions. These included a reduction in those suffering from hypertension, varicose veins, stress incontinence and haemorrhoids. While not all the medical conditions due to pregnancy had resolved, a large proportion had improved.

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**Table 5-1: Maternal Medical Conditions**

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| <b>Maternal Medical Condition</b> | <b>Maternal Medical Condition due to Pregnancy</b> |
|-----------------------------------|--|
| Asthma                            | Anxiety  |
| Back pain                         | Back pain  |
| Cardiac conditions                | Carpal tunnel syndrome                             |
| Colitis                           | Cystitis   |
| Depression                        | Gestational diabetes                               |
| Haemorrhoids                      | Hypertension                                       |
| Hypertension                      | Hyperthyroidism                                    |
| Hypothyroidism                    | Immunosuppression                                  |
| Irritable bowel syndrome          | Oedema   |
| Migraine                          | Postnatal depression                               |
| Polycystic kidney disease         | Sciatica   |
| Rheumatoid arthritis              | Skin rash  |
| Sarcoidosis                       | Stress incontinence                                |
| Scoliosis                         | Tachycardia  |
| Type I diabetes                   | Uterine prolapse                                   |
|                                   | Vaginal prolapse                                   |
|                                   | Varicose veins                                     |

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## 5.4 Short Form 36 Health Survey

The physical health outcome scores at wave 1 demonstrate that the physical health of 37% of respondent mothers (n=152) was below average or poor, that is that they obtained a score of less than the average score of 50, with five mothers (3%) obtaining worst scores, which was a score of less than 42. By wave 2 (n=134) maternal physical health scores showed an improvement with a further improvement by wave 3 (n=148). However, by wave 4 (n=146) a physical health deterioration was noted for 12% of the sample. Results demonstrated that the improvements seen at waves 2 and 3 in mother's physical health had reduced by wave 4. Physical health scores are outlined in Table 5-2 and Figure 5-1.

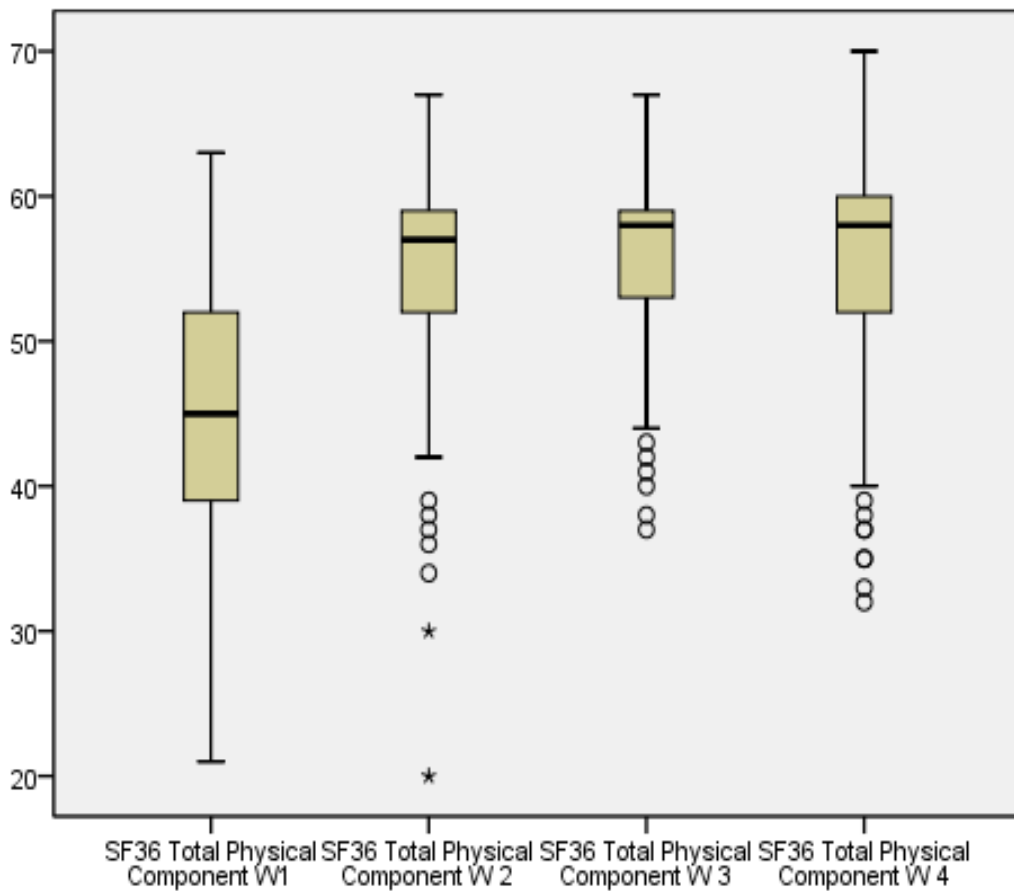
The mental health outcomes scores of respondents at wave 1 (n=152) were negatively skewed and indicated that 22% of mothers were at risk of depression, in that they obtained scores of less than 42 when their infants were aged 3 - 6 weeks. This represents 29 new mothers at risk of depressive illness. One respondent obtained a score of 13 and a further five mothers scored between 13 and 24. By wave 2 (n=134), mental health scores showed a slight improvement ranging from 21 to 64. Fourteen mothers considered at risk of depression at wave 2 had moved out of the risk range. However, fifteen mothers remained at risk. At wave 3 (n=148), scores ranged from 12 to 64. Although it would be expected that a trend for improved mental well-being would be seen as the child aged, the data showed a mental health deterioration for five further mothers, now scoring less than 42. At wave 4 (n=146), scores ranged from 18 to 62 with further deterioration as the number of mothers at risk of depression rose from 20 (at wave 3) to 22 (at wave 4). Mental health scores are outlined in Table 5-3 and Figure 5-2.

An important contributory factor to note in relation to physical and mental health outcomes is the number of respondent mothers pregnant with another baby (n=6), the number after giving birth to another infant (n=17) and those who had suffered miscarriages (n=3), see Figure 5-3 for comparisons of maternal below average physical and mental health outcomes from wave 1 to wave 4.



**Table 5-2: SF 36 Short Form: Physical Health Scores**

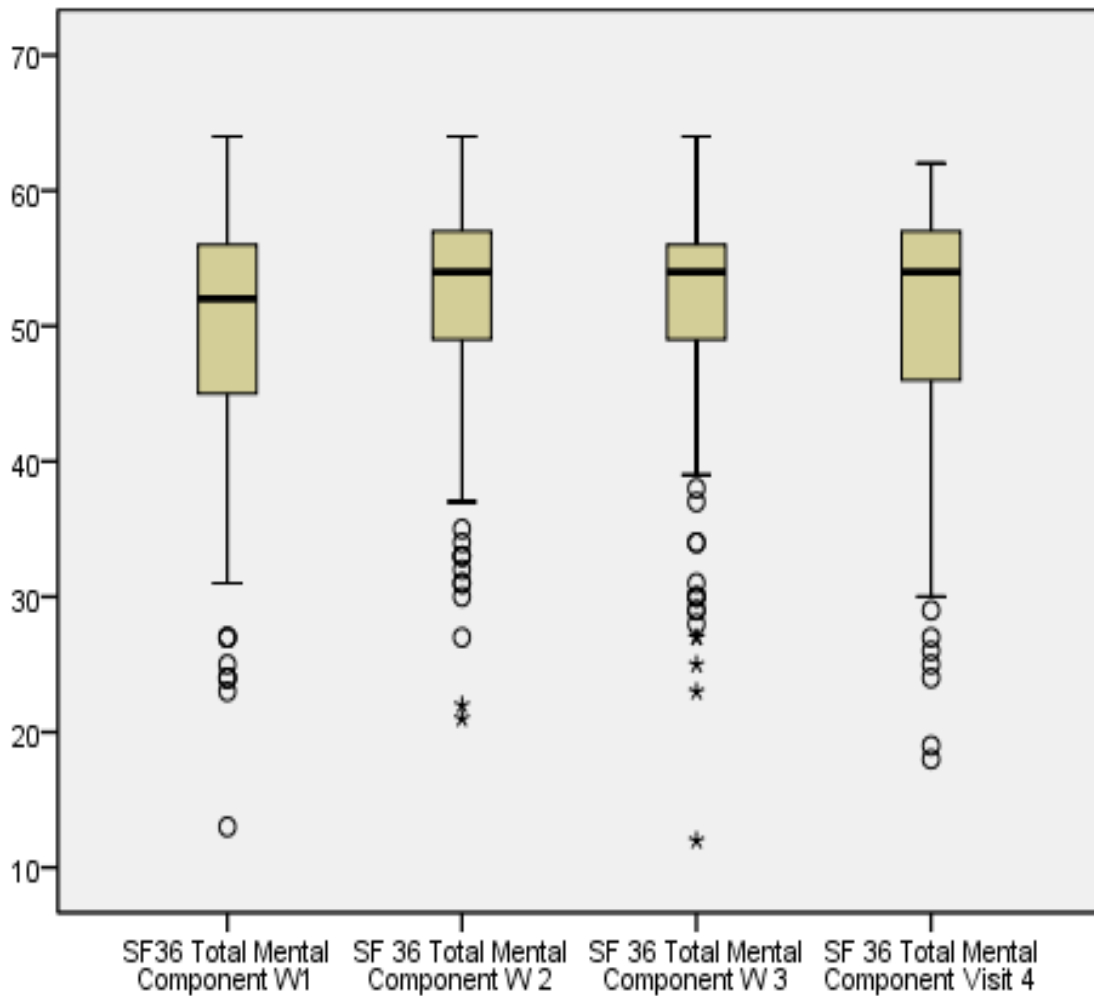
| Wave   | Mean | Standard Deviation | Median | Interquartile Range | Low Scores of <30 - 42 |
|--------|------|--------------------|--------|---------------------|------------------------|
| Wave 1 | 45   | 8.6                | 45     | 39, 51              | 57 (37.4%)             |
| Wave 2 | 55   | 6.9                | 57     | 52, 59              | 4 (3%)                 |
| Wave 3 | 55   | 6.9                | 58     | 53, 59              | 5 (3.3%)               |
| Wave 4 | 54   | 7.9                | 57     | 51, 60              | 17 (11.5%)             |



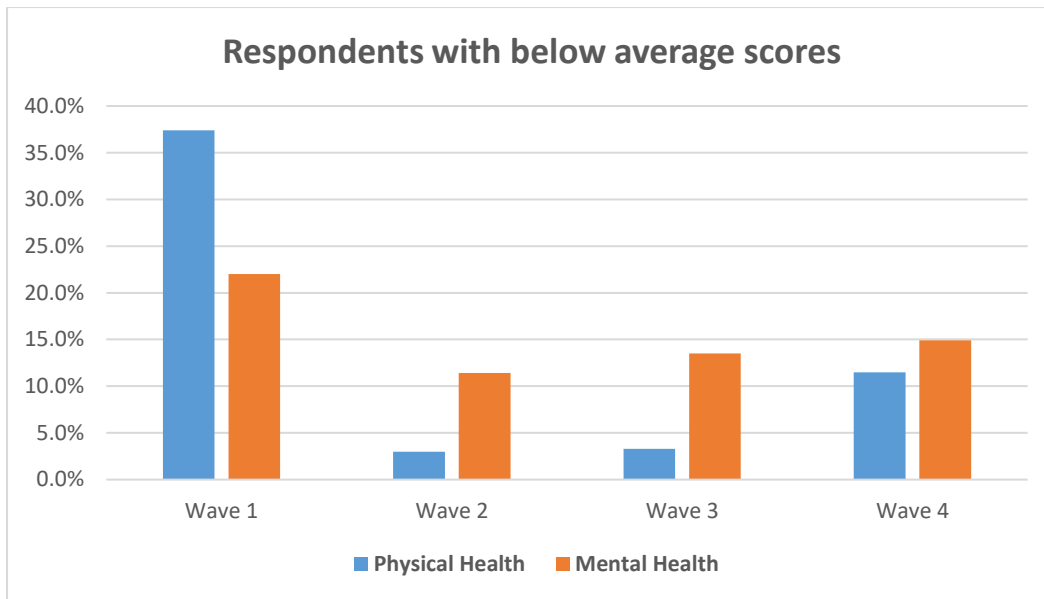
**Figure 5-1: Maternal physical health outcomes from wave 1 to wave 4.**

**Table 5-3: SF 36 Short Form: Mental Health Scores**

| Wave   | Mean | Standard Deviation | Median | Interquartile Range | Low Scores of <30 – 42 |
|--------|------|--------------------|--------|---------------------|------------------------|
| Wave 1 | 49   | 10                 | 52     | 45, 56              | 29 (22%)               |
| Wave 2 | 51   | 8.2                | 54     | 50, 57              | 15 (11.4%)             |
| Wave 3 | 51   | 9.5                | 54     | 49, 56              | 20 (13.5%)             |
| Wave 4 | 51   | 9                  | 54     | 48, 57              | 22 (14.9%)             |



**Figure 5-2: Maternal mental health outcomes from wave 1 to wave 4.**



**Figure 5-3: Maternal below average physical and mental health outcomes from wave 1 to wave 4.**

## 5.5 World Health Organization Quality of Life - BREF

The WHO QOL-BREF was used to measure respondent satisfaction with quality of life.

### 5.5.1 Physical health

Data relating to physical health was negatively skewed. Seven percent of respondents scores ranged from 9 to 12 and 83% ranged from 15 to 20. The data demonstrated that 7% of respondents rated their quality of life due to physical illness as low to average while 83% rated it as good to high at wave 1. Physical health scores at wave 2 ranged from 10 to 20 with a fall in mothers scoring 15 to 20 (77%). At wave 3, an improvement was seen as 86% of mothers obtained high scores indicating good quality of life in relation to experiences of physical health. This remained unchanged at wave 4. Wave 4 also showed a reduction in those scoring their physical health as poor, falling from 7% at wave 1 to 5% at wave 4.

These findings demonstrated that while the majority of respondents obtained high scores across four timelines indicating good quality physical health, 5% of the sample rated poorly on physical health. These findings relate to the low physical health outcome scores demonstrated by the SF 36 measure.

### **5.5.2 Psychological health**

Data representing psychological health showed a normal distribution. Scores ranged from 8 to 20 with 84% of mothers obtaining scores from 15 to 20 and 4% scoring 8 to 12, indicating good quality psychological health for 84% of the sample. Data from wave 2 demonstrated a fall in the percentage of mothers obtaining high scores in psychological health to 74%. At wave 3, respondent psychological health outcome scores showed a slight improvement increasing to 84% of the sample. At wave 4, outcome scores ranged from 8 to 20 with 78% of the sample scoring between 15 and 20. Findings again mirror those of the SF 36 maternal mental health outcome data at wave 4.

### **5.5.3 Social relationships**

Eighty three percent of respondent mothers scored 7-20 in domain 3 of the WHO QOL-BREF indicating good quality social relationships for the majority at wave 1. By wave 2 scores ranged from 8 to 20 with 76% of mothers obtaining score between 15 and 20. At wave 3, 80% of mothers scored from 15 to 20, with the remaining sample obtaining score from 9 to 15. By wave 4, 75% of mothers scored from 15 to 20, with some respondents obtaining a score as low as 4. The outcome scores demonstrate that the majority of respondents scored highly at wave 1 and 3 indicating good quality social relationships at those two time points. However, from wave 2 to wave 4 there was an almost three fold increase in the number of mothers scoring their social relationships as poor with a knock-on effect on their quality of life. These findings are in keeping with the MOS Social Support Survey which demonstrated a drop in affectionate and instrumental / tangible support between wave 1 and wave 4.

### **5.5.4 Environment**

In assessing the environmental impact on maternal quality of life, wave 1 scores ranged from 8 to 20 with 91% of mothers scoring 15 to 20 indicating good quality environmental. This refers to maternal satisfaction with the physical environment such as safety, pollution, noise, transport, social outlets and opportunities for recreation. By wave 2, this fell to 81% of respondents but rose slightly by wave 3 to 84%, with a small number obtaining a low score of 5 and was relatively stable at 82% for wave 4.

In summary, physical health outcomes demonstrated an improvement from wave 1, fell at wave 2 and demonstrated an improvement at wave 3 and rated at 86% at wave 4. The 86%

rating by mothers at wave 4 indicated good quality of life in relation to their physical health. Psychological health scores were highest at wave 1, falling at wave 2 but improving for wave 3 with a fall again to 78% at wave 4. Social relationships were relatively stable averaging 75% across the four timelines and environmental outcomes were strongest at wave 1, falling slightly at wave 2 and holding stable across waves 3 and 4. Likewise, scores in general were good for the majority of respondent mothers but the small number of respondents rated their quality of life poorly did so in a pervasive manner across four domains and in a persistent manner across four timelines, see Table 5-4.

**Table 5-4: WHO QOL- BREF**

|                         | <b>Mean</b> | <b>Standard<br/>Deviation</b> | <b>Minimum<br/>Score</b> | <b>Maximum<br/>Score</b> |
|-------------------------|-------------|-------------------------------|--------------------------|--------------------------|
| W1 Physical health      | 16          | 2                             | 9                        | 20                       |
| W2 Physical health      | 17          | 2                             | 10                       | 20                       |
| W3 Physical health      | 17          | 2                             | 10                       | 20                       |
| W4 Physical health      | 17          | 2                             | 10                       | 20                       |
| W1 Psychological health | 16          | 2                             | 8                        | 20                       |
| W2 Psychological health | 16          | 2                             | 10                       | 20                       |
| W3 Psychological health | 16          | 2                             | 9                        | 20                       |
| W4 Psychological health | 16          | 2                             | 8                        | 20                       |
| W1 Social relationships | 16          | 3                             | 7                        | 20                       |
| W2 Social relationships | 16          | 2                             | 8                        | 20                       |
| W3 Social relationships | 16          | 3                             | 9                        | 20                       |
| W4 Social relationships | 16          | 3                             | 4                        | 20                       |
| W1 Environment          | 17          | 2                             | 8                        | 20                       |
| W2 Environment          | 16          | 2                             | 10                       | 20                       |
| W3 Environment          | 16          | 2                             | 5                        | 20                       |
| W4 Environment          | 16          | 2                             | 6                        | 20                       |

## **5.6 Parent Stress Index Short Form**

Maternal stress levels were measured at baseline and across four timelines. Details are outlined in Table 5-5.

### **5.6.1 Defensive responding**

Data at wave 1 suggested low levels of parental distress with 70% of respondent scores ranging from 29-80 (median 14, IQR 10,16). The remaining 30% showed no distress. At wave 2 defensive responding results continued in the same trend with 27% of respondents obtaining scores at or below 10. At wave 3 the number of respondents obtaining scores at or below 10 increased to 34%. By wave 4 the median score in defensive responding returned to that seen at wave 2.

### **5.6.2 Parent-child dysfunctional interaction**

Data from wave 1 was skewed (median 15, IQR 9, 23). Data ranged from the 5<sup>th</sup> to the 99<sup>th</sup> percentile with two respondent mothers obtaining scores above the 95<sup>th</sup> percentile. At wave 2, one further respondent scored above the 95<sup>th</sup> percentile. In general, data indicated low to normal levels of stress for the majority of mothers in raising their children up to 2 years of age. Three outliers, as described exhibiting significant levels of stress at wave 1 and wave 2 had resolved by wave 3 when their children were 9 - 14 months old.

### **5.6.3 Difficult child**

Difficult child percentiles at wave 1 were negatively skewed (median 16, IQR 9, 23) ranging from the 1<sup>st</sup> percentile to the 88<sup>th</sup> percentile. At wave 2, one mother obtained a score above the 90<sup>th</sup> percentile. At wave 3, no parent was noted to be at risk as all scores fell between the 1<sup>st</sup> and 85<sup>th</sup> percentiles. At wave 4, the upper range rose again to the 97<sup>th</sup> percentile as two mothers scored above the 90<sup>th</sup> percentile.

### **5.6.4 Parental distress**

Parental distress outcome scores at wave 1 were from the 1<sup>st</sup> to 40<sup>th</sup> percentile, indicating that no mother was suffering from distress. By wave 2, parental distress scores remained

relatively unchanged. By wave 3 the median score increased (median 13, IQR 4, 18). At wave 4 parental distress scores improved to those seen at wave 1 and wave 2 indicating no parental distress.

### **5.6.5 Total stress**

The total stress score at wave 1 was negatively skewed (median 41, IQR 20,51). Scores ranged from the 1<sup>st</sup> to the 77<sup>th</sup> percentile. As no respondent scored above the 90<sup>th</sup> percentile, no clinically significant stress was detected among the sample at wave 1. At wave 2, scores rose to range from the 1<sup>st</sup> to the 98<sup>th</sup> percentile as one mother in the sample had moved into the realm of significant stress. This was noted to be due to the onset of clinical depression. Group scores returned to normal by wave 3 (1<sup>st</sup> to 55<sup>th</sup>) as her illness was treated and were within normal levels at wave 4.

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**Table 5-5: Parent Stress Index Short Form**

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| <b>Domain</b>                             | <b>Median</b> | <b>Interquartile Range</b> |
|---|---------------|----------------------------|
| W1 Defensive responding                   | 14            | 10,16                      |
| W2 Defensive responding                   | 13            | 10,16                      |
| W3 Defensive responding                   | 14            | 9,16                       |
| W4 Defensive responding                   | 13            | 10,16                      |
| W1 Parent-child dysfunctional interaction | 15            | 9,23                       |
| W2 Parent-child dysfunctional interaction | 14            | 12,17                      |
| W3 Parent-child dysfunctional interaction | 14            | 12,17                      |
| W4 Parent-child dysfunctional interaction | 14            | 12,18                      |
| W1 Difficult child                        | 16            | 9,23                       |
| W2 Difficult child                        | 16            | 13,21                      |
| W3 Difficult child                        | 15            | 14,22                      |
| W4 Difficult child                        | 19            | 14,24                      |
| W1 Parental distress                      | 10            | 8, 13                      |
| W2 Parental distress                      | 10            | 7, 12                      |
| W3 Parental distress                      | 13            | 4, 18                      |
| W4 Parental distress                      | 10            | 6, 11                      |
| W1 Total stress index                     | 41            | 20, 51                     |
| W2 Total stress index                     | 41            | 34, 49                     |
| W3 Total stress index                     | 40            | 33, 50                     |
| W4 Total stress index                     | 43            | 35, 56                     |

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### **5.7 Medical Outcomes Study Social Support Survey**

Analysis of data at wave 1 showed that 97% of respondents were supported by family and 3% by husband / partner only. Of note, not all mothers in receipt of family support felt that their husband / partner was also a source of support. Mothers reported the same level of support at waves 2 and 3. Data from wave 4 demonstrated an increase in the number of



mothers, from five to six, reporting only their partner as a source of support in rearing their child.

Respondent mothers reported up to forty close family members as a source of support, with an average of six family members providing support in raising their infant at wave 1 (range 0-40). Four outliers reported 20, 30 or 40 supports each. Removing these outliers an average of five family members were available to support mothers (range 0-15). Seven respondents (5%) reported that they did not have close relative support. At wave 2 and 3 a fall in those without close relative support was noted, falling from seven to four mothers. By wave 4, the number of mothers reporting no close relative support had further reduced to one.

Respondents reported an average of four close friends supporting them in raising their child (range 0-12, SD 2, 95% CI: 3.54 - 4.27) and two mothers (1.3%) reported that they did not have close friends to support them at wave one. At wave 2, two further respondents reported absence of close friends who could provide support in rearing their children. At wave 3, this figure fell back to three mothers and remained unchanged at wave 4. These findings show a marked difference in the number of close friends providing support following childbirth, see Figure 5-4, Figure 5-5 and Table 5-6.

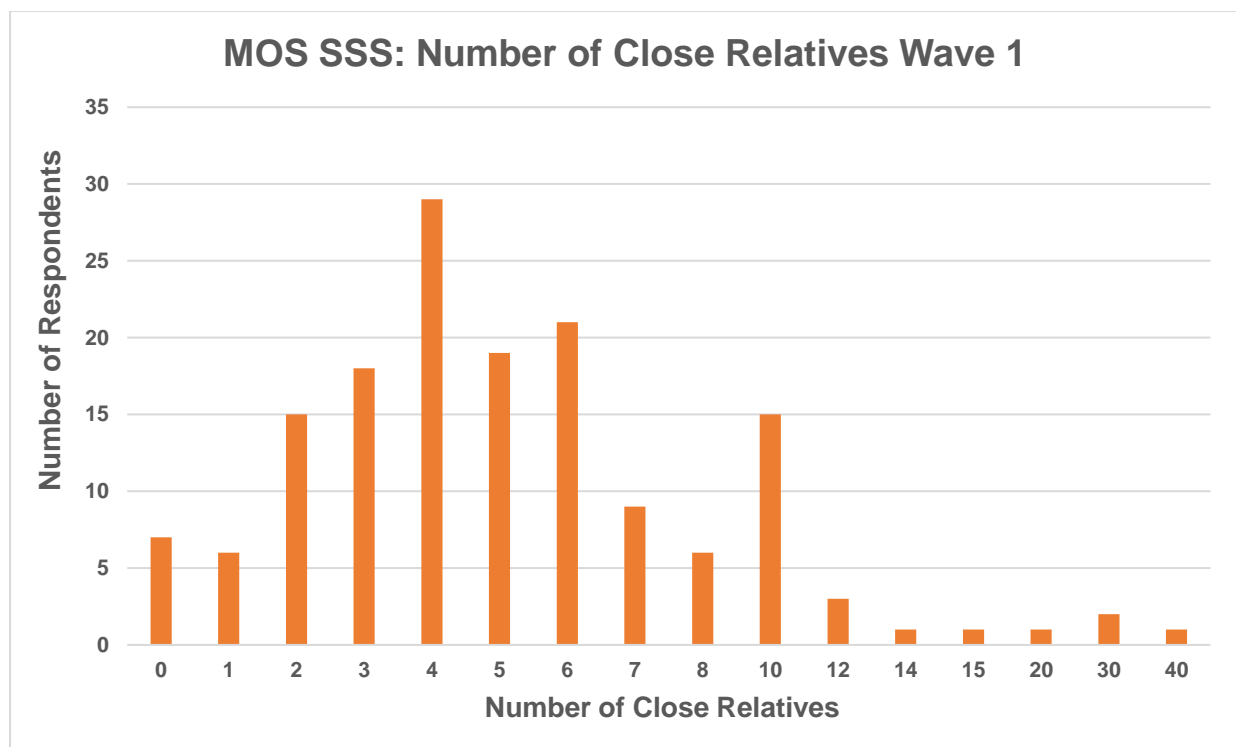
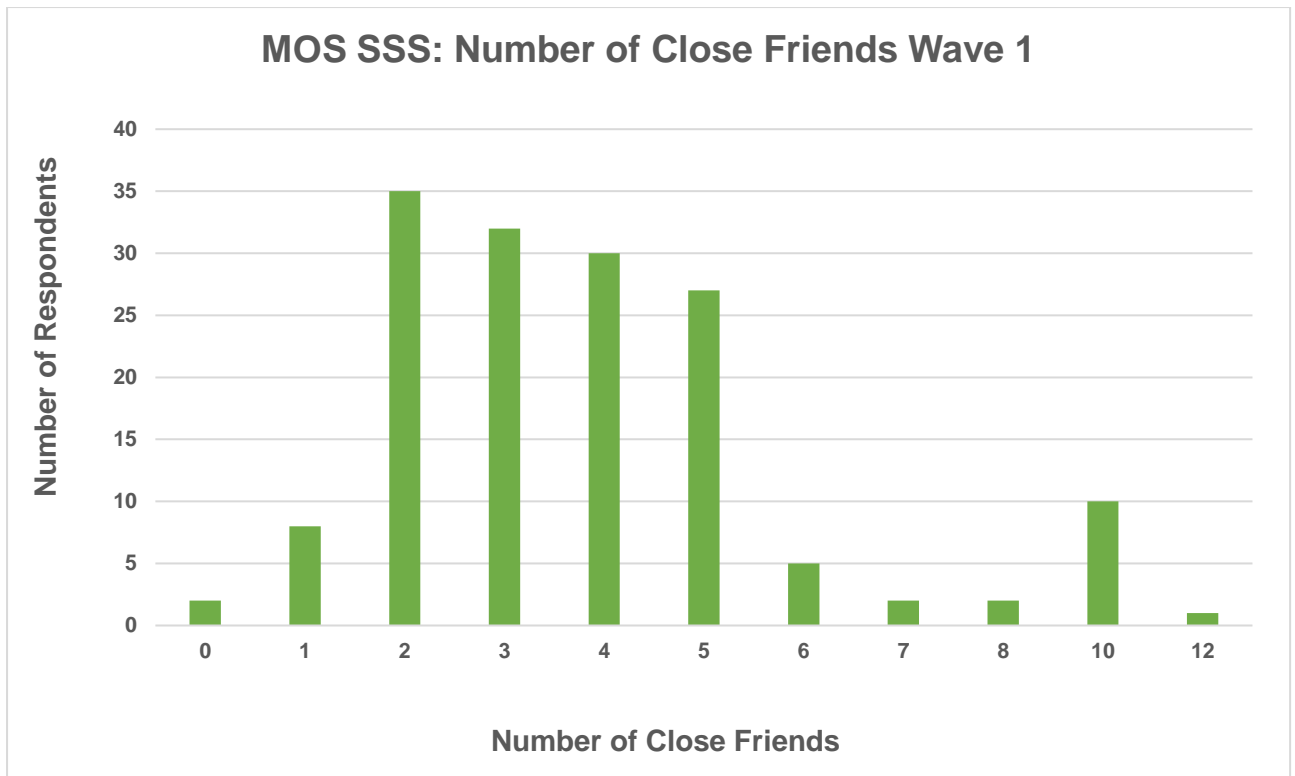


Figure 5-4: Number of Close Relatives Providing Support at Wave 1



**Figure 5-5: Number of Close Friends Providing Support at Wave 1**

**Table 5-6: MOS Social Support Survey**

| Source of support  | Median | Interquartile Range |
|--------------------|--------|---------------------|
| Close relatives W1 | 5      | 3, 7                |
| Close relatives W2 | 4      | 3, 6                |
| Close relatives W3 | 4      | 3, 7                |
| Close relatives W4 | 5      | 3,6                 |
| Close friends W1   | 4      | 2,5                 |
| Close friends W2   | 3      | 2, 5                |
| Close friends W3   | 4      | 2,5                 |
| Close friends W4   | 4      | 3,5                 |

### **5.7.1 Instrumental / tangible support**

Instrumental / tangible support refers to “material support, aid and reliable alliance” (Sherbourne & Stewart 1991, p. 709 & 711). Instrumental / tangible support was assessed using the questions:

How often is each of the following supports available to you if you need it?

- Someone to help you if you were confined to bed
- Someone to take you to the doctor if you needed it
- Someone to prepare your meals if you were unable to do it yourself
- Someone to help with daily chores if you were sick

Data on instrumental / tangible support received by 98% of respondent mothers indicated good degrees of support with scores ranging from 9 to 21. The response at wave 2 demonstrated that over 80% of mothers obtained good to very good instrumental / tangible support. By wave 4, 4.8% (n=7) of mothers reported low levels of instrumental / tangible support.

### **5.7.2 Affectionate support**

This type of support refers to “caring, love and empathy” (Sherbourne & Stewart 1991, p. 705 & 714). Affectionate support was measured by asking:

How often is each of the following supports available to you if you need it?

- Someone who shows you love and affection
- Someone to have a good time with
- Someone who hugs you

Affectionate support scores ranged from 5 to 15, with 99% of respondents scoring 10 to 15. This indicates that the majority of mothers receive good affectionate support. This figure fell at wave 2 as 50% of mothers were in receipt of good to very good affectionate support. This lower rate persisted across waves 3 and 4.

### **5.7.3 Positive interaction support**

Positive social integration support involves “spending time with others in leisure or recreational activities” (Sherbourne & Stewart 1991, p. 705 & 709).

Positive interaction support was assessed by asking:

How often is each of the following supports available to you if you need it?

- Someone to have a good time with
- Someone to get together with for relaxation
- Someone to do something enjoyable with
- Someone you can count on to listen to you when you need to talk

Reports on positive interaction support were positive with over 90% of respondents obtaining good support at wave 1. Waves 2, 3 and 4 median scores remained relatively unchanged showing a good level of positive interaction support to over 95% of mothers.

#### **5.7.4 Emotional / informational support**

Emotional / informational support was assessed by asking:

How often is each of the following supports available to you if you need it?

- Someone to confide in or talk to about yourself or your problems
- Someone to share your private worries and fears with
- Someone who understands your problems
- Someone to give you good advice about a crisis
- Someone to give you information to help you understand a situation
- Someone whose advice you really want
- Someone to turn to for suggestions about how to deal with a personal problem

Scores ranged from 10 to 35 for reports on emotional / informational support demonstrating that over 90% of respondents received the highest level of such support at wave 1. This degree of support remained stable across the two years of follow-up from wave 1 to wave 4.

Data from the Medical Outcomes Study Social Support Survey demonstrated that the lowest level of support received by respondents was affectionate support over the two year period of follow-up.

**Table 5-7: MOS Social Support Survey**

| Type of support         | Median | Interquartile Range | Minimum Score | Maximum Score |
|-------------------------|--------|---------------------|---------------|---------------|
| Instrumental W1         | 18     | 15, 20              | 8             | 21            |
| Instrumental W2         | 17     | 15,20               | 6             | 20            |
| Instrumental W3         | 17     | 15,20               | 7             | 20            |
| Instrumental W4         | 17     | 15,19               | 5             | 20            |
| Affectionate W1         | 15     | 13,15               | 5             | 15            |
| Affectionate W2         | 15     | 13,15               | 4             | 15            |
| Affectionate W3         | 15     | 13,15               | 4             | 16            |
| Affectionate W4         | 15     | 12,15               | 5             | 20            |
| Positive interaction W1 | 18     | 16,20               | 9             | 20            |
| Positive interaction W2 | 18     | 16,20               | 8             | 20            |
| Positive interaction W3 | 18     | 16,20               | 10            | 20            |
| Positive interaction W4 | 17     | 15,20               | 8             | 20            |
| Emotional W1            | 32     | 28,35               | 10            | 35            |
| Emotional W2            | 31     | 28,35               | 16            | 35            |
| Emotional W3            | 30     | 28,35               | 14            | 35            |
| Emotional W4            | 31     | 28,35               | 9             | 35            |

## 5.8 Summary of study findings

1. Prenatal history was uneventful for 86% (n=131) of respondent mothers.
2. Maternal physical health assessed by the Short Form 36 Health Survey demonstrated poor to below average scores for 37% of the sample at wave 1 with a small number of respondents (3%) obtaining worst scores. Scores improved at wave 2 and wave 3 but deteriorated again at the final measurement where a deterioration was noted for 12% of the sample.

3. Five percent (n=8) of mothers reported previously suffering from postnatal depression with seven mothers receiving medication to treat the condition. By wave 4, the number of mothers reporting postnatal depression had increased to 8% (n=12). The Short Form 36 Health Survey identified 22% (n=34) of mothers that may have been at risk of depression at wave 1, that is at 3 - 6 weeks postpartum. Data showed that the number of mothers at risk of depression rose from wave 3 (n=20) to wave 4 (n=22).
4. The WHO QOL-BREF (Orley 1996) demonstrated that the majority of mothers enjoyed good quality physical health (86%), psychological health (78%), social relationships (75%) and environment (82%) throughout the four timelines, these figures represent findings at wave 4.
5. Maternal stress was assessed using the Parent Stress Index Short Form (Abidin 1995). The majority of respondents were rated at normal to low levels of stress when their infants were aged 3 - 6 weeks. This remained stable at age 2 years as the data showed low to normal levels of stress for all respondents.

The types of supports available to respondent mothers were assessed using the MOS Social Support Survey (Sherbourne & Stewart 1991). Although the majority (97%, n=147) of the sample had support from family members, 3% (n=5) reported only their partner to support them in rearing their infant at wave 1. This improved to only 3.6% by wave 4. Ninety eight percent of respondent mothers indicated good degrees of instrumental / tangible support at wave 1 with 4.8% (n=7) of mothers reporting low levels of instrumental / tangible support at wave 4. Affectionate support scores demonstrated that the majority of mothers receive good affectionate support at wave 1. This figure fell at wave 2 as 50% of mothers were in receipt of good to very good affectionate which persisted to wave 4. The data demonstrate a good level of positive interaction support for over 95% of respondents.

## **5.9 Conclusion**

In this chapter maternal variables and those based on the Service Utilisation Form, WHO Quality of Life – BREF, Short Form 36 Health Survey, Parent Stress Index, Medical Outcomes Study Social Support Survey and from wave 1 to wave 4 were described.

## **Chapter Six: Results 3**

### **6.1 Introduction**

In the previous chapter maternal variables based on the Service Utilisation Form, Short Form 36 Health Survey, Parent Stress Index, Medical Outcomes Study Social Support Survey and WHO Quality of Life - BREF from wave 1 to wave 4 were described.

In this chapter details will be provided of the routine care and increased interventions group. Increased interventions in the form of increased PHN home visits and referrals to other professionals and support services accessed by the study sample will be examined.

### **6.2 Routine care and increased interventions**

In this study, increased interventions were identified as increased PHN home visits or PHN referral of mother or child to another professional or support service which a respondent mother accepted. One respondent did not receive the standard PHN first visit following hospital discharge by wave 1. The remainder of the sample (99.4%) had received the core first maternal and child home assessment. In this manner, all met criteria for routine care. However, a subset of 76% (n=115) were seen to access increased PHN home visits and / or referral and were identified as the intervention group. The remaining 24% received one PHN home visit and were considered to have normative health care and routine care needs. As a single visit was sufficient to meet their needs they constituted the routine care group.

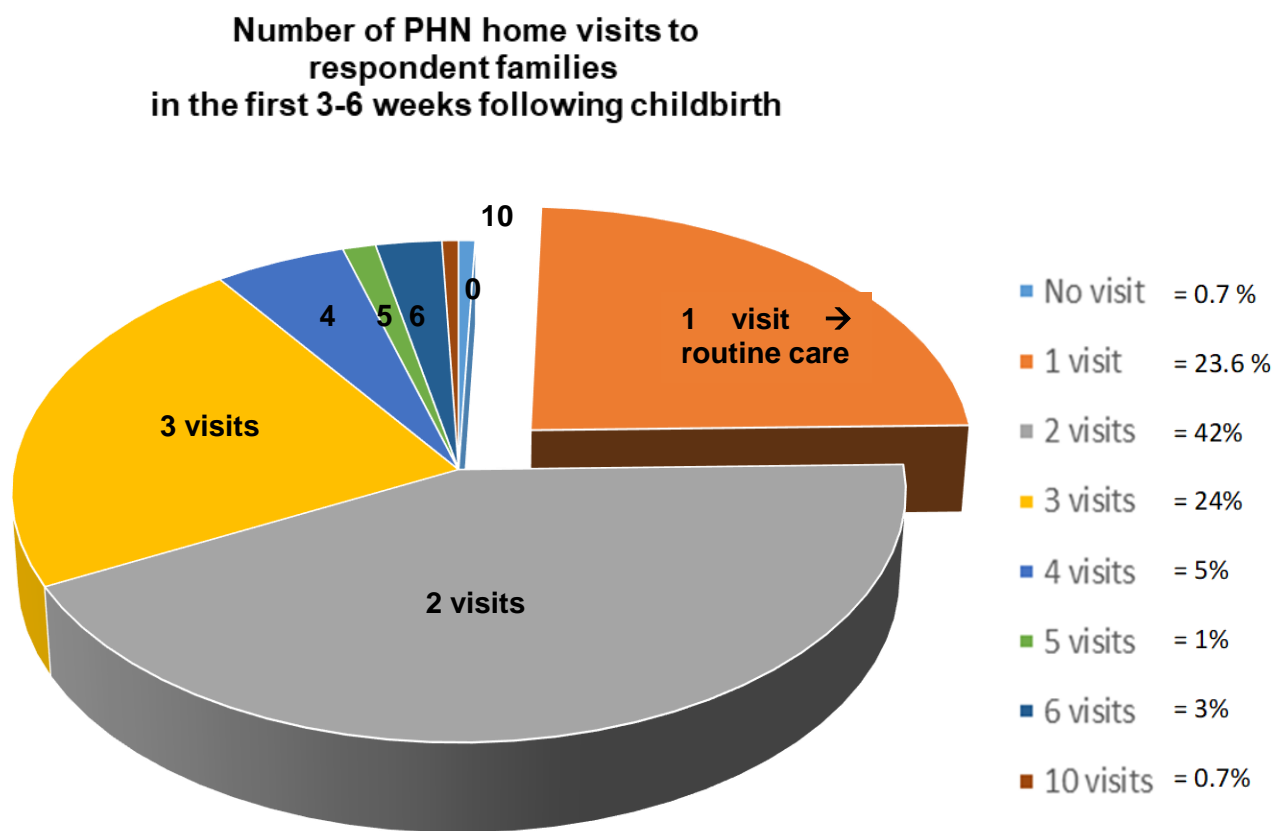
### **6.3 Increased interventions - PHN home visits**

The number of PHN home visits to mothers in the first three weeks following childbirth / hospital discharge varied significantly across the study sample, some receiving a single visit, others receiving up to ten. Most commonly, respondent mothers received two home visits from their PHN (42%), 24% received three home visits, 5% received four home visits, 1% received five home visits, 3% received six home visits and one respondent (0.7%) received 10 home visits. Sixty two percent of the increased home visits were to breastfeeding mothers and 38% were not breastfeeding.

The duration of each PHN visit to the family home varied greatly, some as short as ten minutes while others lasted over 60 minutes. The majority of mothers (66%) received a first

visit from their PHN lasting between thirty minutes and one hour, 23% of mothers receiving a visit over sixty minutes in duration. The duration of subsequent home visits was seen to decline.

At each wave of data collection, respondent mothers were asked if they had received a PHN home visit since the researcher's previous assessment. Only one respondent mother reported receiving PHN home visits beyond the first 3-6 weeks following childbirth. This was due to failure to thrive and required weekly weights by the PHN. She was seen weekly up to the age of one year and monthly thereafter.



**Figure 6-1: Number of PHN home visits to Respondent Families in the 3 - 6 Weeks Following Childbirth**



#### **6.4 Increased interventions - Referrals accepted to other professionals or support services**

At wave 1, 50% (n=76) of respondents accepted a referral through their PHN to another professional or support service. The largest number of accepted referrals were to the breastfeeding support group (42%), followed by the parent and toddler group (26%), lactation consultant (13%), physiotherapy (7%), voluntary agencies (5%) and one each to four other services.

Mothers were asked by the researcher at each wave of data collection if they had accepted a referral through their PHN since the researcher's previous visit. At wave 2, 40% (n=54) of respondent mothers had accepted a referral to another professional or support service. This represented a reduction of 10% in the PHN referral rate from wave 1 to wave 2. Referrals were primarily made to the parent and toddler group (35%), followed by physiotherapy (14%), area medical officer (4%), community parent (14%), breastfeeding support group (17%), family support worker (2%), child care worker (2%) and lactation consultant (11%).

At wave 3, 29% (n=44) of respondents were referred to another professional or support service. This indicated a fall in referrals to other professionals and support services by 21% from wave 1 allowing for the reduction in sample size. Referral to the parent and toddler group was the most frequent at 30%, followed by physiotherapy (21%), area medical officer (11%), community parent (11%), breastfeeding support group (10%), lactation consultant (5%) and other (10%).

At wave 4, 32% (n=47) were referred to another professional or support service indicating a reduction of 18% from wave 1. Referrals were primarily to speech and language therapy (30%), followed by breastfeeding support group (19%), other (15%), lactation consultant (13%), area medical officer (6%), physiotherapy (6%), parent and toddler group (4%), child care worker (2%), community parent (2%) and family support worker (2%).

Table 6-1 outlines the referral across each professional and support service across the four timelines. Breastfeeding support group, parent and toddler group and lactation consultant referral were the community services most availed of by respondents and their infants / children between birth and two years of age. It was unexpected to see that mothers continued to require PHN referral for breastfeeding support and education into the second year of breastfeeding. A noticeable trend can be seen in the requirement for parenting and child care support (child care worker, community parent, family worker) at wave 2 and 3, when children are aged between 4 and 14 months. Speech and language referrals also increased significantly after age 9 months, however this is to be expected as children do not

benefit from intervention in relation to language development prior to this time. It was also interesting to note the service which parent do not avail of during the first two years of their child's life, namely the early intervention team and home help service.

In summary, 115 respondent mothers received two or more PHN home visits following the birth of their child and a total of 221 referrals were accepted by respondents across the four timelines. A reduction in the number of PHN referrals accepted by respondents was seen at each assessment from wave 1 to wave 4. However, while the number of referrals decreased the overall cumulative number of referrals, made and accepted, reached 221.

**Table 6-1: Frequency of Referrals Accepted by Respondents**

| <b>Professional or support service</b> | <b>Wave 1</b> | <b>Wave 2</b> | <b>Wave 3</b> | <b>Wave 4</b> | <b>Total</b> |
|--|---------------|---------------|---------------|---------------|--------------|
| Area medical officer                   | 0             | 2             | 5             | 3             | 10           |
| Breastfeeding support group            | 32            | 9             | 4             | 9             | 54           |
| Child care worker                      | 1             | 1             | 0             | 1             | 3            |
| Community parent                       | 1             | 8             | 5             | 1             | 15           |
| Early intervention team                | 0             | 0             | 0             | 0             | 0            |
| Family support worker                  | 0             | 1             | 0             | 1             | 2            |
| Home help service                      | 0             | 0             | 0             | 0             | 0            |
| Lactation consultant                   | 10            | 6             | 2             | 6             | 24           |
| Occupational therapy                   | 1             | 0             | 0             | 0             | 1            |
| Parent & toddler group                 | 20            | 19            | 13            | 2             | 54           |
| Physiotherapy                          | 5             | 8             | 9             | 3             | 25           |
| Social worker                          | 1             | 0             | 0             | 0             | 1            |
| Speech & language therapy              | 0             | 0             | 2             | 14            | 16           |
| Voluntary agencies                     | 4             | 0             | 0             | 0             | 4            |
| Other                                  | 1             | 0             | 4             | 7             | 12           |

## 6.5 Comparing respondent outcomes following increased PHN home visits

In the above description of increased referrals to both breastfeeding support groups and lactation consultants were included. When assessing the data, it was felt that inclusion of mothers referred to breastfeeding orientated services introduced significant access and exposure bias. In the following analysis, referrals to a breastfeeding support group or lactation consultant have been discounted in an attempt to counterbalance this bias.

### 6.5.1 Cognitive development

The cognitive standard outcome data from wave 1 to wave 4 showed a reasonably normal distribution and for that reason t-test analysis and one way repeated measures ANOVA was the appropriate analysis used to compare child cognitive development standard outcome scores based on the DAYC measure following increased PHN home visits at wave 1. The cognitive standard outcome scores are presented in terms of having a mean of 100 and standard deviation of 15.

Child cognitive standard outcome scores following increased PHN home visits showed a reduction in mean cognitive standard scores from wave 1 to wave 4, (Wilk's Lambda = 0.94,  $F(3, 127) = 2.558$ ,  $p = 0.058$ , multivariate partial eta squared = 0.057).

Mauchly's test indicated that the assumption of sphericity had been violated ( $\chi^2(5) = 100.99$ ,  $p < 0.001$ ), therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.69$ ), (Cohen 1988). The results show that PHN increased home visits had a significant effect on children's cognitive development from the age of 3 - 6 weeks to 4 - 7.5 months.

The study found that child cognitive development outcomes following increased PHN home visits were not significantly different between groups ( $p = 0.555$ ) and cognitive development outcomes were not significantly different across four timelines within groups ( $p = 0.338$ ). However, when testing cognitive development outcomes between wave 1 and wave 2 significance was seen ( $p = 0.048$ ) as the mean score decreased from wave 1 to wave 2. The data demonstrated a slight decrease in mean standard scores from wave 2 to wave 3 and an increase from wave 3 to wave 4.

By comparison, the starting point for cognitive development outcome scores in those receiving routine PHN care was slightly higher (mean = 114.58, 95% CI: 113, 116, SD 2.5). It fell at wave 2 (mean = 113.15, 95% CI: 111, 116, SD 7.6) and decreased further at wave 3

(mean = 112.79, 95% CI: 109, 117, SD 11). A slight recovery was seen at wave 4 (mean = 113.61, 95% CI: 107, 119, SD 21). Figure 6-2 outlines cognitive development outcomes of respondents who received increased PHN home visits, compared to those who received routine PHN care. It can be concluded that cognitive development outcomes of children were not significantly different between groups ( $p = 0.555$ ) and were not significantly different across the four assessments ( $p = 0.338$ ) following increased PHN home visits. However, significance was found between wave 1 and wave 2 ( $p = 0.048$ ) in the same positive direction as the routine care group, see Figure 6-2.

## Cognitive Standard Outcomes

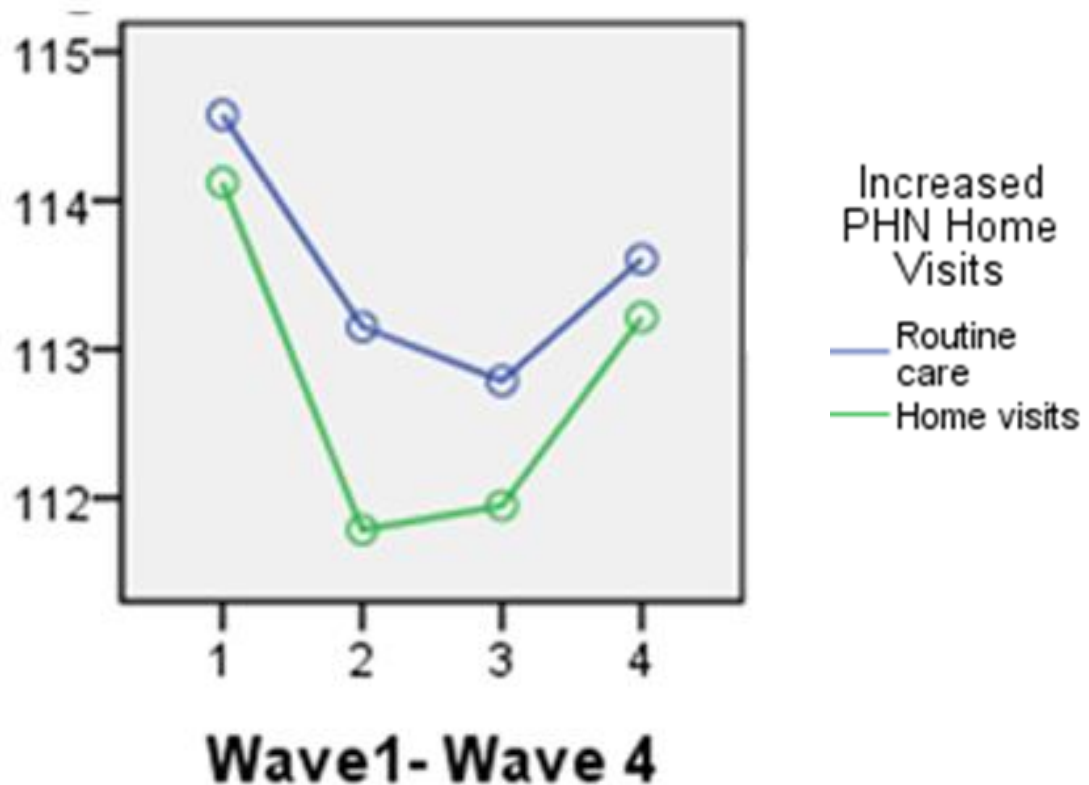


Figure 6-2: Cognitive development outcomes of children who received increased PHN home visits at wave 1 compared to those who received routine PHN care.

Figure 6.2 showed a reduction in outcome scores for both groups from wave 1 to wave 4 and suggests no statistically significant difference in cognitive development outcomes of respondents from wave 1 to wave 4 following increased PHN home visits received at wave 1. While no overall significance was found, significance was noted from wave 1 to wave 2 showing that increased home visits provided by PHNs had a positive effect in infant's cognitive development outcomes from the age of 3 - 6 weeks up to the age of 4 - 7.5 months.

### 6.5.2 Communication skills

The communication standard outcome scores based on the DAYC following increased PHN home visits showed a reasonably normal distribution across the four timelines.

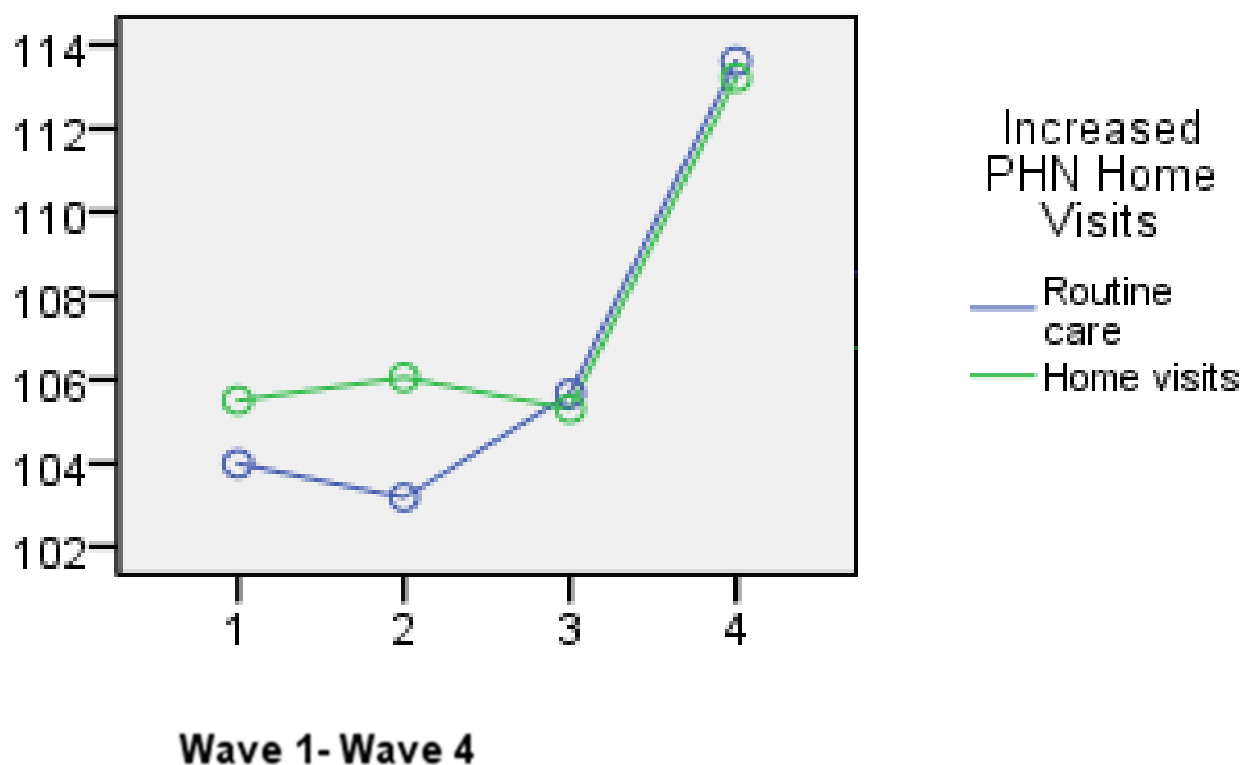
Following one way repeated measures ANOVA the data demonstrated a substantial increase in mean communication standard scores from wave 1 to wave 4 (Wilk's Lambda = 0.78,  $F(3, 127) = 12.066$ ,  $p < 0.001$ , multivariate partial eta squared = 0.222). This suggests a large effect size for standard communication skill outcomes based on Cohen's  $d$ . Mauchly's test indicated that the assumption of sphericity had been violated ( $\chi^2(5) = 66.27$ ,  $p < 0.001$ ), therefore degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ( $\epsilon = 0.82$ ). The results show that PHN increased home visits had a large effect size on respondent communication skills ( $F(2.46, 317.30) = 18.70$ ,  $p = <0.001$ ). These results suggest that increased PHN home visits had a significant effect on infant's communication skills at different time points from the age of 3 - 6 weeks up to 2 years.

The results showed that infant communication development outcome scores following increased PHN home visits were not significantly different between groups ( $p = 0.508$ ) but were significantly different from wave 1 to wave 4 ( $p < 0.001$ ). This statistically significant difference held following Bonferroni correction for multiple testing. However, when testing communication development outcomes between wave 1 and wave 2, no significant difference was found. The data demonstrated that the mean standard outcome scores decreased from wave 2 to wave 3. However, a substantial increase in outcome values was seen between wave 3 and wave 4.

By comparison, communication skill outcome scores for those who received routine PHN care were lower at wave 1 (mean = 104, 95% CI: 102, 106, SD 4.4), decreased further at wave 2 (mean = 103.18, 95% CI: 99, 108, SD 19) and increased at wave 3 (mean = 105.67, 95% CI: 103, 109, SD 9.1). A substantial increase was seen at wave 4 (mean = 113.61, 95%

CI: 109, 119, SD 21). Figure 6-3 shows comparison of communication skill outcome scores between those who received increased PHN home visits and those who received routine PHN care. It can be concluded that communication development outcomes of children were not significantly different between groups ( $p = 0.508$ ) but were significantly different within groups from wave 1 to wave 4 ( $p < 0.001$ ) following increased PHN home visits, see Figure 6-3.

## Communication Standard Outcomes



**Figure 6-3: Communication skills of children who received increased PHN home visits at wave 1 compared to those who received routine PHN care.**

Figure 6-3 shows that the mean outcome scores of infants who received routine PHN care increased from a slightly lower value at wave 1 to a substantially increased value at wave 4. Findings demonstrate that increased home visits provided by PHNs to respondents aged 3 -

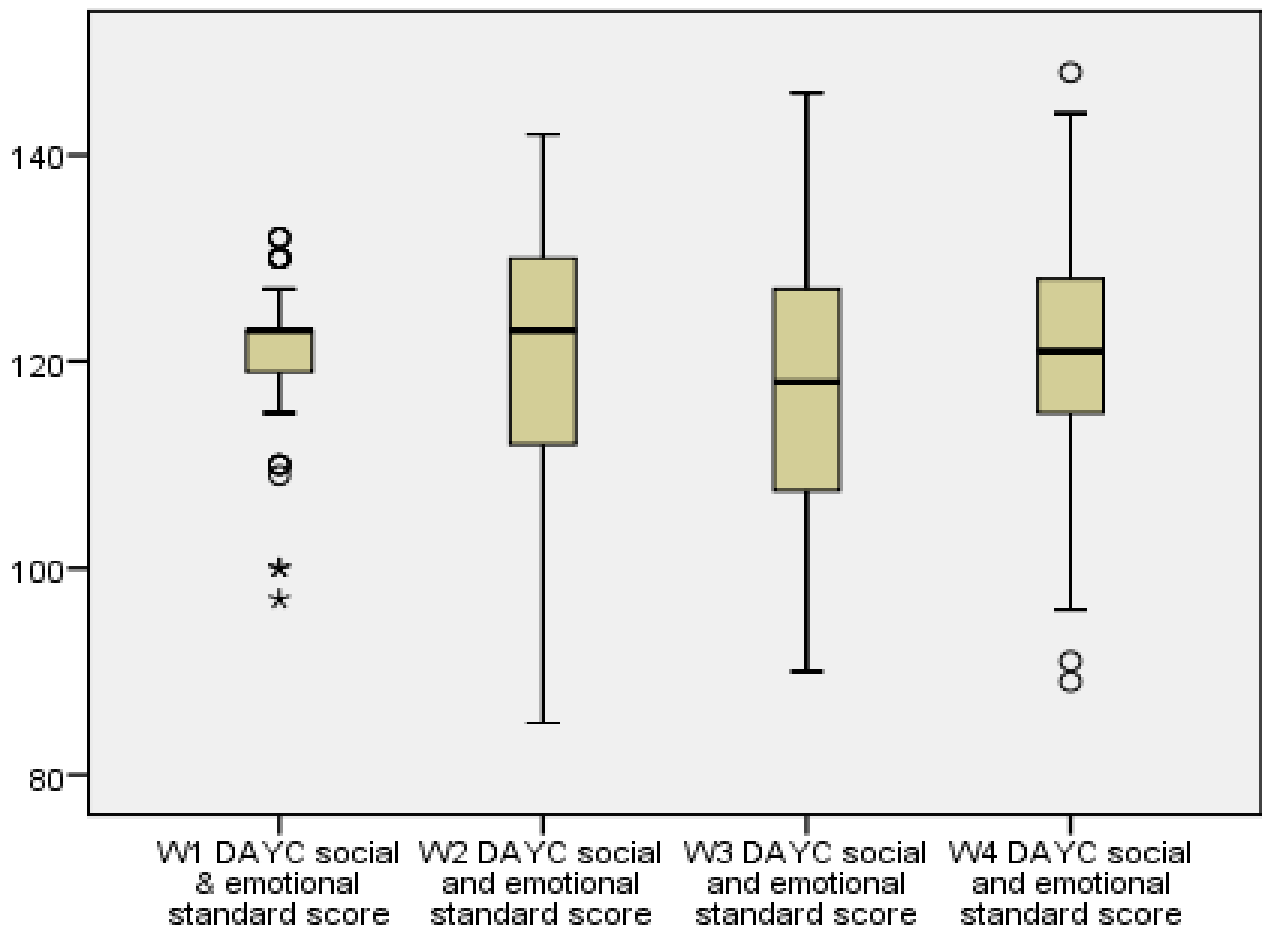
6 weeks had a large positive significant effect on their communication skills when they were aged from 4 - 7.5 months up to 2 years.

### 6.5.3 Social-emotional development

Following tests for normality, Mann-Whitney U non-parametric testing was used to evaluate the social-emotional outcome scores at wave 1 following increased PHN home visits. Mann-Whitney U revealed no statistically significant difference in social-emotional standard development outcome scores of infants (n=153) at wave 1 following increased PHN home visits. The median outcome scores were marginally higher for respondents who received increased PHN home visits compared to those who received routine PHN care. Results of the Mann-Whitney U test suggest that increased PHN home visits did not have an effect on the social-emotional development of infants when they were 3 - 6 weeks old.

Wilcoxon Signed Rank testing was carried out to identify a change in social-emotional development standard outcome scores from wave 1 to wave 2 following increased PHN home visits provided at wave 1. The sample size for wave 1 (n=153) infants and (n=136) at wave 2. The median scores for social-emotional development outcomes remained unchanged from wave 1 to wave 2. The Wilcoxon Signed Rank test revealed no statistically significant difference in social-emotional development outcomes following increased PHN home visits ( $Z = -0.793$ ,  $p = 0.428$ ,  $r = 0.047$ ). The findings suggest that increased PHN home visits at baseline did not have an effect on respondent infant's social-emotional development when they were aged 4 - 7.5 months.

Friedman non-parametric testing on social-emotional outcome scores indicated a statistically significant difference in the outcomes of children following increased PHN home visits from wave 1 to wave 4 ( $\chi^2(3) = 15.031$ ,  $p = 0.002$ ). The median values showed a decrease from wave 2 to wave 3 (n = 150) and an increase at wave 4 (n = 148). Friedman non-parametric testing indicated a positive statistically significant difference in social-emotional development outcomes of children at the age of 2 years following increased PHN home visits provided prior to wave 1 data collection ( $p = 0.002$ ), see Figure 6-4.



**Figure 6-4: Social-emotional box plots from wave 1 to wave 4.**

#### 6.5.4 Physical development

Child physical development standard outcome scores from wave 1 to wave 4 following increased PHN home visits was based on t-test analysis and one way repeated measures ANOVA. The mean score of 36 respondents who received routine care at wave 1 also decreased from a mean of 106.76 to a mean of 105.88 at wave 4 (Wilk's Lambda = 0.47,  $F(3, 127) = 48.082$ ,  $p < 0.001$ , partial eta squared = 0.532) suggesting a very large effect size. A reduction in physical development outcome scores up to wave 3 and an improvement at wave 4 can be seen in Figure 6-5.

Mauchly's test indicated that the assumption of sphericity had been violated ( $\chi^2(5) = 42.46$ ,  $p < 0.001$ ), therefore degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ( $\epsilon = 0.83$ ). The results show that PHN increased home visits had a very large

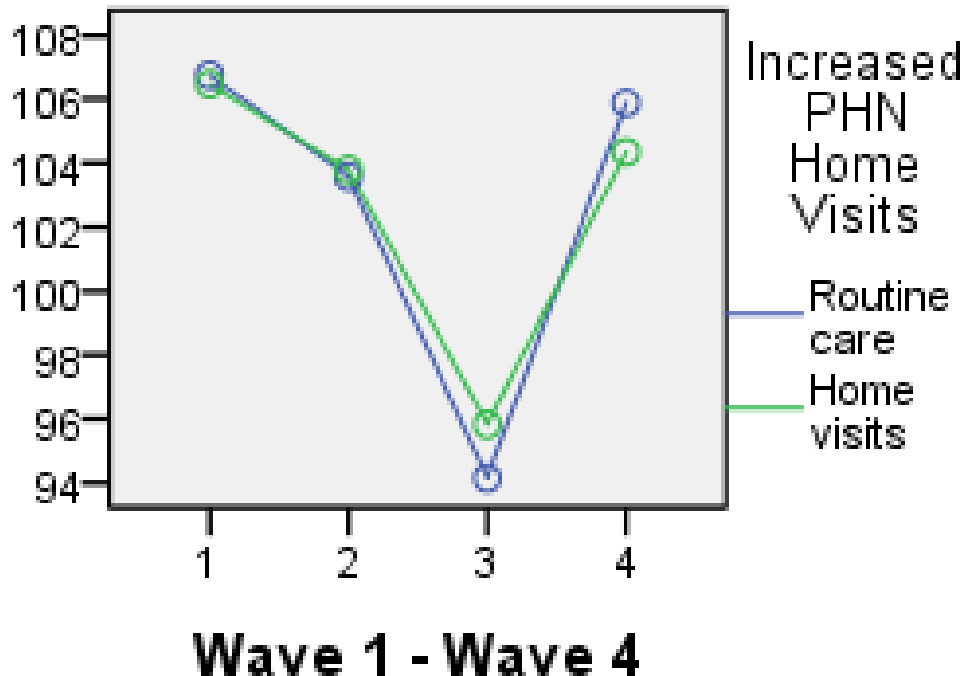


effect on respondent's physical development ( $F(2.49, 320.95) = 37.87$ ,  $p = <0.001$ ). These results suggest that increased PHN home visits had a significant effect on respondent's physical development outcomes from the age of 3 - 6 weeks to 2 years.

Physical development outcomes following increased PHN home visits were not significantly different between groups ( $p = 0.985$ ) but were significantly different across four timelines within groups ( $p < 0.001$ ). When testing physical development outcomes between wave 1 and wave 2, significance was found. The data demonstrated that mean scores showed a substantial decrease from wave 2 to wave 3 and a positive increase in value from wave 3 to wave 4.

Physical development outcome scores for those who received routine PHN care commenced at a slightly higher score (mean = 106.76, 95% CI: 105, 109, SD 6.0), decreased at wave 2 (mean = 103.58, 95% CI: 101, 106, SD 9.8), further decreased at wave 3 (mean = 94.15, 95% CI: 91,97, SD 10.6) but demonstrated a substantial recovery at wave 4 (mean = 105.88, 95% CI: 102,110, SD 11.2). It can be concluded that physical development outcomes of children were not significantly different between groups ( $p = 0.985$ ) but were significantly different across four timelines within groups following increased PHN home visits. Significance was found between wave 1 and wave 2 ( $p = 0.017$ ) between wave 2 and wave 3 ( $p < 0.001$ ) and between wave 3 and wave 4 ( $p < 0.001$ ), see Figure 6-5.

## Physical Development Standard Outcomes



**Figure 6-5: Physical development outcomes of children who received increased PHN home visits at wave 1 compared to those who received routine PHN care.**

Figure 6-5 shows mean score of 106.47 at wave 1 for infants who received increased PHN home visits. Scores decreased at wave 3 and made a substantial recovery at wave 4. When their outcome scores were compared to infants who received routine PHN care the data showed that their mean scores commenced marginally higher but also decreased at wave 3 and a recovery to slightly above the intervention group was noted at wave 4. Findings showed that increased home visits provided by PHNs to infants in this study had a very large significant effect on their physical development from age 3 - 6 weeks up to 2 years.

### 6.5.5 Adaptive behaviour

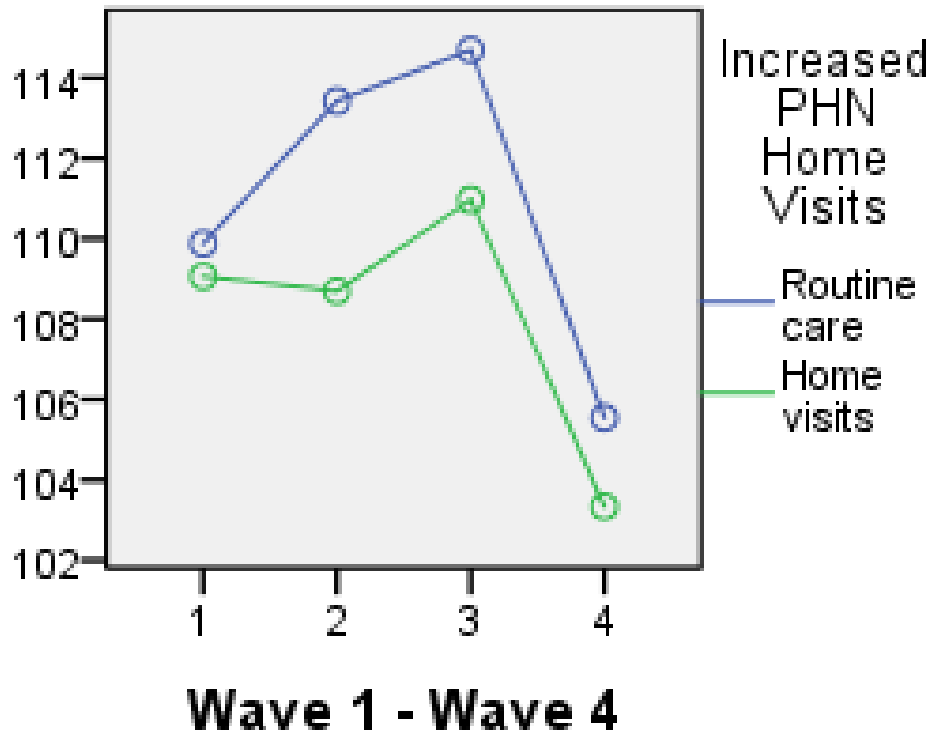
From wave 1 to wave 4 child adaptive behaviour standard outcome scores following increased PHN home visits showed a substantial decrease in mean values (Wilk's Lambda = 0.62,  $F(3, 127) = 26.364$ ,  $p < 0.001$ , partial eta squared = 0.384) suggesting a very large effect size. Mauchly's test indicated that the assumption of sphericity had been violated ( $\chi^2(5) = 100.39$ ,  $p < 0.001$ ) therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.65$ ).

PHN increased home visits showed a very large effect ( $F(1.94, 249.81) = 16.55$ ,  $p < 0.001$ ) on infant's adaptive behaviour outcomes at different time points from the age of 3 - 6 weeks to 2 years.

Adaptive behaviour outcome mean scores following increased PHN home visits were significantly different between groups ( $p = 0.013$ ) and across four timelines within groups ( $p < 0.001$ ). However, when looking specifically at outcome differences between wave 1 and wave 2 no significance was found, an increase was seen from wave 1 to wave 3 and a decrease at wave 4. Significance was seen only from wave 1 to wave 3 and from wave 1 to wave 4.

Adaptive behaviour development outcome mean scores for those who received routine PHN care were marginally higher at baseline (mean = 109.88, 95% CI: 109, 111, SD 1.9), increased at wave 2 (mean = 113.42, 95% CI: 108, 119, SD 15.2), increased again at wave 3 (mean = 114.70, 95% CI: 112, 117, SD 8.4) and demonstrated a substantial decrease at wave 4 (mean = 105.55, 95% CI: 103, 108, SD 8.8). It can be concluded that adaptive behaviour outcomes of children who received increased PHN visits were significantly different between groups ( $p = 0.013$ ) from wave 1 to wave 3 ( $p < 0.001$ ) from wave 2 to wave 4 ( $p < 0.001$ ) and wave 3 to wave 4 ( $p < 0.001$ ) to children who received routine PHN care, see Figure 6-6.

## Adaptive Behaviour Standard Outcomes



**Figure 6-6: Adaptive behaviour outcomes of infants who received increased PHN home visits at wave 1 compared to those who received routine PHN care.**

Figure 6-6 shows that respondent standard mean scores for those who received routine PHN care were higher at wave 1 than those who received increased PHN home visits. The intervention group commenced at a lower base than the routine care group. Findings demonstrated that increased home visits provided by PHNs in this study had a very large positive effect on children's adaptive behaviour over time. While no significance was found from age 3 - 6 weeks to 3 months, the study suggests that from 4 - 7.5 months to when children were aged 2 years increased PHN home visits had a positive significant effect on their adaptive behaviour outcomes.

## 6.6 Comparing respondent outcomes following increased PHN referral to other professionals and support services

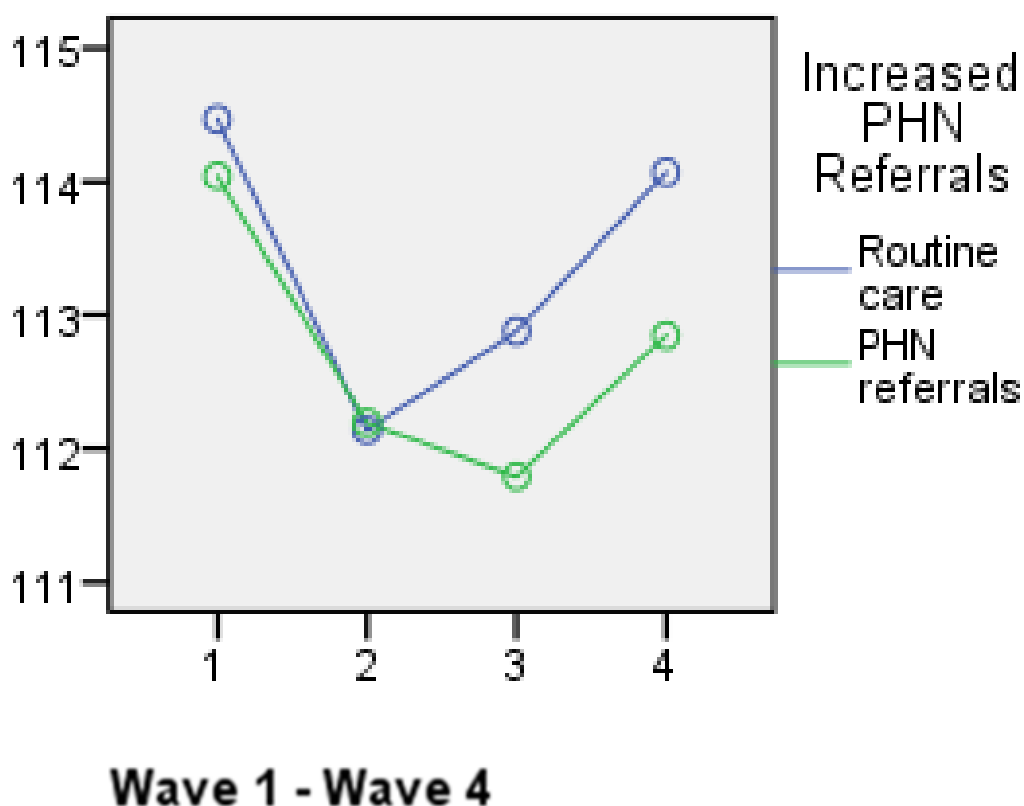
### 6.6.1 Cognitive development

The data demonstrated a reasonably normal distribution. Cognitive standard outcomes following increased PHN referrals demonstrated a fall in mean cognitive standard outcome scores from wave 1 to wave 4 (Wilk's Lambda = 0.91,  $F(3, 126) = 3.969$ ,  $p = 0.010$ , multivariate partial eta squared = 0.086). There was a moderate effect size for cognitive development as children showed a reduction in mean outcome scores from wave 1 to wave 4. Mauchly's test indicated that the assumption of sphericity had been violated ( $\chi^2(5) = 100.77$ ,  $p < 0.001$ ) therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.69$ ).

Child cognitive standard development outcomes following increased referrals were not significantly different between groups ( $p = 0.554$ ) or across four timelines within groups ( $p = 0.203$ ) following Bonferroni correction. However, a significant difference was noted on tests of cognitive development between wave 1 and wave 2 ( $p = 0.005$ ). The data demonstrated a slight decrease in mean standard outcome scores from wave 2 to wave 3 and an increase from wave 3 to wave 4.

Cognitive development outcome scores for those who received routine PHN care commenced at a slightly higher score (mean = 114.47, 95% CI: 114, 115, SD 3.7) decreased at wave 2 (mean = 112.14, 95% CI: 110, 114, SD 6.1), slightly improved at wave 3 (mean = 112.88, 95% CI: 110, 116, SD 10.8) and demonstrated a substantial recovery at wave 4 (mean = 114.07, 95% CI: 110, 118, SD 11.6). It can be concluded that cognitive development outcomes of respondents were not significantly different between groups ( $p = 0.554$ ) or across four timelines within groups ( $p = 0.203$ ) following increased referrals. However, significance was found between wave 1 and wave 2 ( $p = 0.005$ ). Data analysis suggests that increased PHN referrals had a moderate positive effect on infant cognitive development from age 3 - 6 weeks to 4 - 7.5 months, see Figure 6-7.

## Cognitive Development Standard Outcomes



**Figure 6-7: Cognitive development outcomes of children who received increased PHN referrals from wave 1 to wave 4 compared to those who received routine PHN care.**

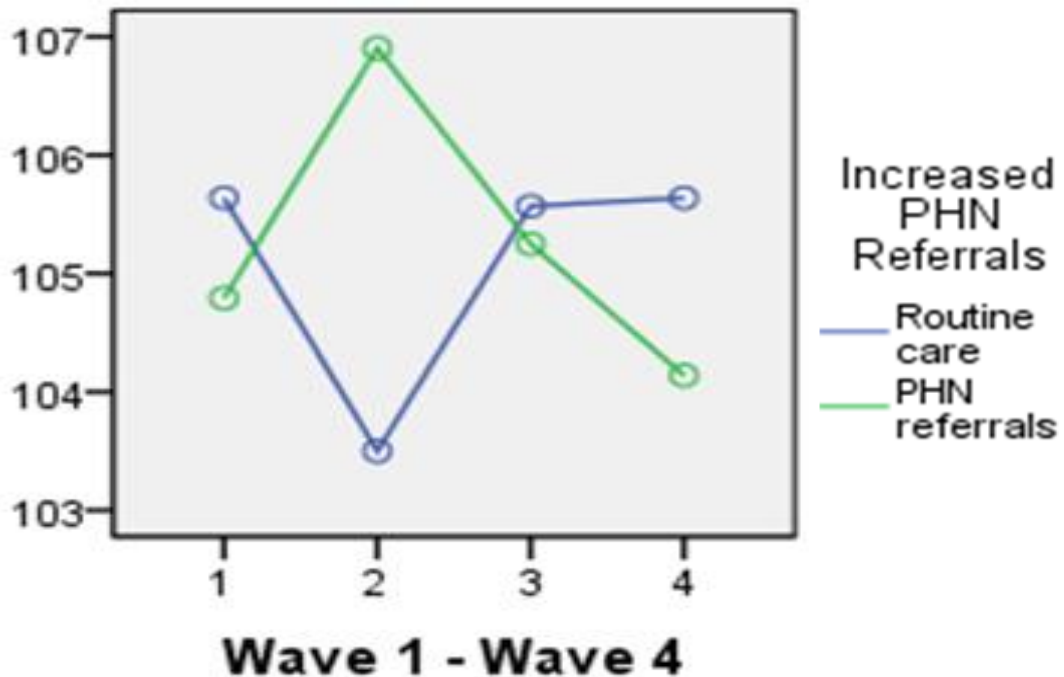
Figure 6-7 demonstrates that cognitive standard outcome scores for infants who received routine PHN care commenced at a higher level than the referral group and recovered to a better level by wave 4. Both groups showed an overall reduction in mean outcome scores from wave 1 to wave 4. Increased referrals provided by PHNs to other professionals and support services had a moderate statistically significant positive effect on infant's cognitive outcomes from 3 - 6 weeks up to 4 - 7.5 months.

### 6.6.2 Communication skills

T-testing and one way repeated measures ANOVA demonstrated a decrease in mean communication standard scores from wave 1 to wave 4 (Wilk's Lambda = 1.00,  $F(3, 126) = 0.067$ ,  $p = 0.977$ ), multivariate partial eta squared = 0.002 suggests no effect on standard communication skill outcomes of children following increased PHN referrals. Data analysis demonstrated that communication development outcome scores following increased PHN referrals were not significantly different between groups ( $p = 0.866$ ) or across four timelines within groups ( $p = 0.954$ ) following Bonferroni correction. No significant difference was found in communication skill outcomes between wave 1 and wave 2. Mean scores decreased slightly from wave 1 to wave 4, increased from wave 1 to wave 3 and decreased again from wave 3 to wave 4.

Communication skill outcome scores for children who received routine PHN care commenced at a higher baseline (mean = 105.64, 95% CI: 104, 107, SD 4.6) decreased at wave 2 (mean = 103.50, 95% CI: 100, 107, SD 14.7), increased substantially at wave 3 (mean = 105.57, 95% CI: 103, 108, SD 7.4) and increased further at wave 4 (mean = 105.64, 95% CI: 102, 109, SD 12.4). Figure 6-8 shows comparisons of communication skills between respondents who received increased PHN referrals and those who received routine care. It can be concluded that communication skill outcomes of children were not significantly different between the groups ( $p = 0.866$ ) or across four timelines within groups ( $p = 0.954$ ) following increased PHN referrals. Data analysis suggests that increased PHN referrals did not have a positive significant effect on respondent's communication skills, see Figure 6-8.

## Communication Standard Outcomes



**Figure 6-8: Communication development outcomes of children who received increased PHN referrals from wave 1 to wave 4 compared to those who received routine PHN care**

Figure 6-8 demonstrates that the communication skill outcomes of infants who received increased PHN referrals increased from wave 1 to wave 2, decreased at wave 3 and further decreased at wave 4. Respondents who received routine PHN care demonstrated a reduction in values from wave 1 to wave 2 but a steady increase from wave 2 to wave 4 was noted. Findings from the data suggest that increased referrals provided by PHNs to infants had no statistically significant effect in this study on their communication skills from age 3 - 6 weeks up to the age of 2 years.



### 6.6.3 Social-emotional development

Mann-Whitney U testing failed to demonstrate a significant difference in social-emotional standard development outcomes of infants at wave 1 following increased PHN referrals to other professionals and support services. The test revealed no statistically significant difference in the social-emotional standard outcomes following increased referrals at wave 1.

Wilcoxon Signed Rank testing was used to identify changes in social-emotional development standard outcomes of respondents at wave 1 and wave 2 following increased PHN referrals. This produced the same results as analysis following increased PHN home visits. Findings from the Wilcoxon Signed Rank test on social-emotional development outcomes of infants revealed that increased PHN referrals did not have a statistically significant effect on their social-emotional development from age 3 - 6 weeks up to 4 - 7.5 months ( $Z = -0.793$ ,  $p = 0.428$ ,  $r = 0.047$ ).

Friedman non-parametric testing on standard scores from wave 1 to wave 4 indicated a statistically significant difference in the social-emotional development outcomes of children following increased PHN referrals from wave 1 to wave 4. Friedman non-parametric testing on standard scores from wave 1 to wave 4 ( $\chi^2 (3) = 15.031$ ,  $p = 0.002$ ) demonstrated a decrease in median scores from wave 1 (median = 123, IQR 119, 123) to wave 3 (median = 118, IQR 107, 127) and an improvement at wave 4 (median = 121, IQR 115, 128). These results suggest a statistically significant difference in social-emotional development outcomes of children following increased PHN referrals at age 2 years.

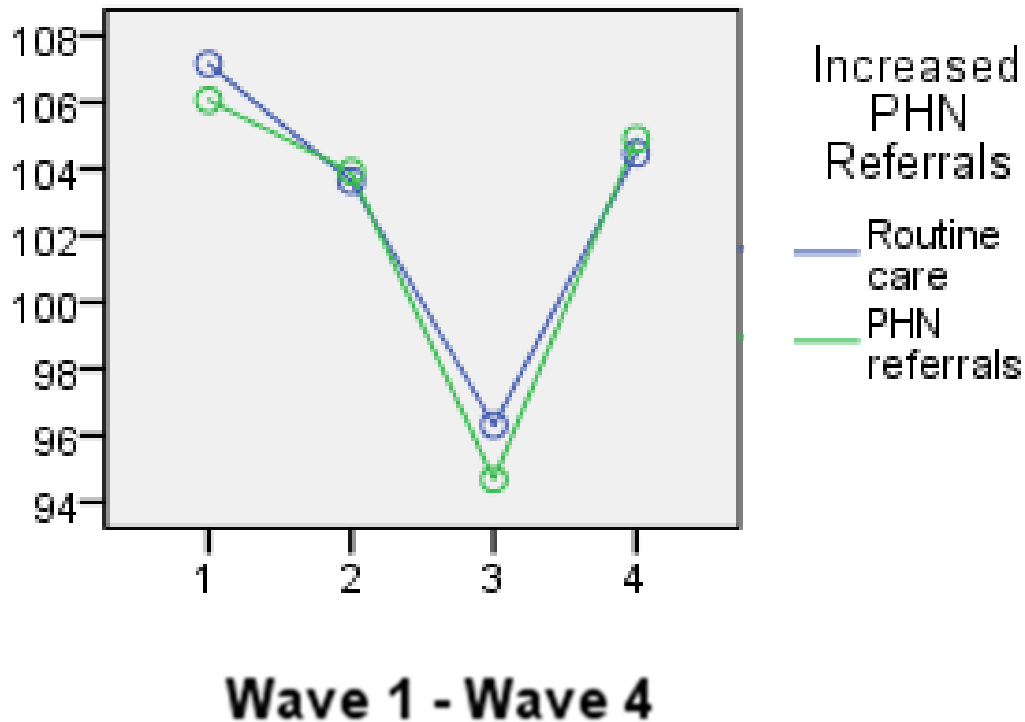
### 6.6.4 Physical development

Physical development standard outcomes of children decreased from wave 1 to wave 4 (Wilk's Lambda = 0.43,  $F (3, 126) = 55.87$ ,  $p < 0.001$ , partial eta squared = 0.571) suggesting a very large effect size. Mauchly's test indicated that the assumption of sphericity had been violated ( $\chi^2 (5) = 42.89$ ,  $p < 0.001$ ) therefore degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ( $\epsilon = 0.83$ ). The results show that PHN increased referrals had a very large significant effect on respondent's physical development ( $F (2.48, 317.64) = 43.39$ ,  $p < 0.001$ ). These results suggest that increased PHN referrals had a positive significant effect on infant's physical development outcomes from age 3 - 6 weeks to age 2 years.

Child physical development standard outcomes following increased referrals were not significantly different between groups ( $p = 0.572$ ). However, physical development outcomes were significantly different at certain time points across the four assessments within groups. Significance ( $p = 0.006$ ) was seen when testing physical development outcomes between wave 1 and wave 2. Mean standard outcome scores from wave 2 showed a substantial decrease to wave 3 ( $p < 0.001$ ) an increase from wave 3 to wave 4 ( $p < 0.001$ ). No significance was seen in mean outcome scores from wave 1 to wave 4 ( $p = 0.619$ ).

Physical development outcome scores for children who received routine care commenced at a higher baseline (mean = 107.15, 95% CI: 105, 109, SD 6.3), decreased at wave 2 (mean = 103.64, 95% CI: 101, 106, SD 7.5), decreased further at wave 3 (mean = 96.31, 95% CI: 94, 99, SD 9.4) and recovered at wave 4 (mean = 104.47, 95% CI: 102, 107, SD 10.9). It can be concluded that physical development outcomes of children were not significantly different between groups ( $p = 0.572$ ) but were significantly different across four timelines within groups following increased PHN referrals. Significance was found between wave 1 and wave 2 ( $p = 0.006$ ), between wave 1 and wave 3 ( $p < 0.001$ ), between wave 2 and wave 3 ( $p < 0.001$ ) and between wave 3 and wave 4 ( $p < 0.001$ ). Significance however was not seen between wave 1 and wave 4 ( $p = 0.619$ ), see Figure 6-9.

## Physical Development Standard Outcomes



**Figure 6-9: Physical development outcomes of children who received increased PHN referrals from wave 1 to wave 4 compared to those who received routine PHN care.**

Figure 6-9 demonstrates that respondents who received increased PHN referrals had a lower mean score at wave 1 compared to those who received routine care. Mean scores for this group continued to decrease to wave 3 in line with the routine care group but recovered at wave 4 to a higher level. Findings demonstrated that increased referrals provided by PHNs to children had a very large positive significant effect on physical development outcomes from the age of 3 - 6 weeks to 2 years.

### 6.6.5 Adaptive behaviour

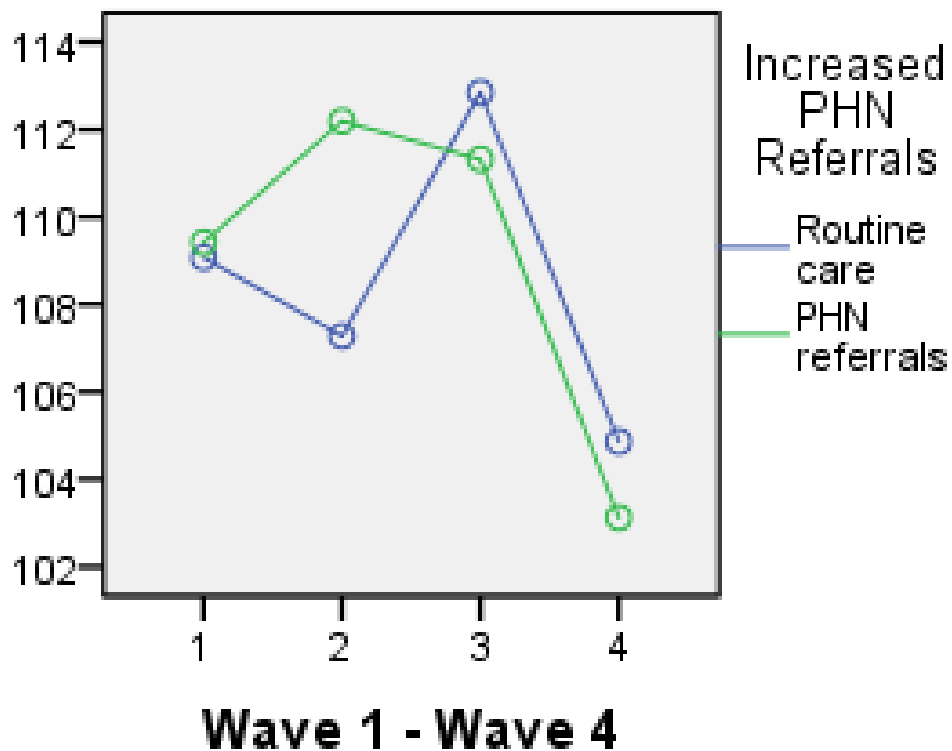
Child adaptive behaviour standard outcome scores fell from wave 1 to wave 4 following increased referrals (Wilk's Lambda = 0.57,  $F(3, 126) = 32.322$ ,  $p < 0.001$ , partial eta squared = 0.435) suggesting a very large significant effect. Mauchly's test indicated that the assumption of sphericity had been violated ( $\chi^2(5) = 95.04$ ,  $p < 0.001$ ) therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.66$ ). The results show that increased PHN referrals had a very large significant effect on children's adaptive behaviour ( $F(1.97, 251.71) = 19.66$ ,  $p < 0.001$ ). These results suggest that increased PHN referrals had a positive significant effect on infant's adaptive behaviour from the age of 3 - 6 weeks up to 2 years.

Adaptive behaviour standard outcome scores following increased PHN referrals were not significantly different between groups ( $p = 0.624$ ). However, adaptive behaviour outcomes were significantly different at certain time points within groups across four assessments ( $p < 0.001$ ).

A statistically significant difference was seen from wave 1 to wave 3 ( $p = 0.001$ ) and from wave 1 to wave 4 ( $p < 0.001$ ). Mean standard scores increased from wave 2 to wave 3 ( $p = 0.432$ ) and decreased from wave 3 to wave 4 ( $p < 0.001$ ).

Adaptive behaviour development outcome scores for those who received routine care commenced at a marginally lower score (mean = 109.01, 95% CI: 108, 110, SD 3.8) decreased further at wave 2 (mean=107.28, 95% CI: 103, 111, SD 15.0) and increased at wave 3 (mean = 112.85, 95% CI: 111, 115, SD 9.4). A substantial decrease was seen in mean outcome scores at wave 4 (mean = 104.86, 95% CI: 103, 107, SD 9.4). It can be concluded that adaptive behaviour outcomes of children were not statistically significantly different between groups ( $p = 0.624$ ) but were statistically significantly different from wave 1 to wave 3 ( $p = 0.001$ ), from wave 1 to wave 4 ( $p < 0.001$ ), from wave 2 to wave 4 ( $p < 0.001$ ) and from wave 3 to wave 4 ( $p < 0.001$ ) following increased PHN referrals, see Figure 6-10.

## Adaptive Behaviour Standard Outcomes



**Figure 6-10: Adaptive behaviour outcomes of children who received increased PHN referrals from wave 1 to wave 4 compared to respondents who received routine PHN care**

Figure 6-10 shows that infants in this study who received routine care had a slightly lower mean score at wave 1 than those who received increased referrals. The mean outcome scores of the increased referral group increased to wave 3 and substantially decreased at wave 4. By comparison the mean outcome scores of the routine care group decreased at wave 2, substantially increased at wave 3 and decreased again at wave 4. The data suggests that increased referrals provided by PHNs to children had a very large positive effect on adaptive behaviour outcomes when measured at age 3 - 6 weeks, 4 - 7.5 months, 9 - 14 months and 2 years.

## 6.7 Comparing respondent outcomes following increased combined PHN interventions

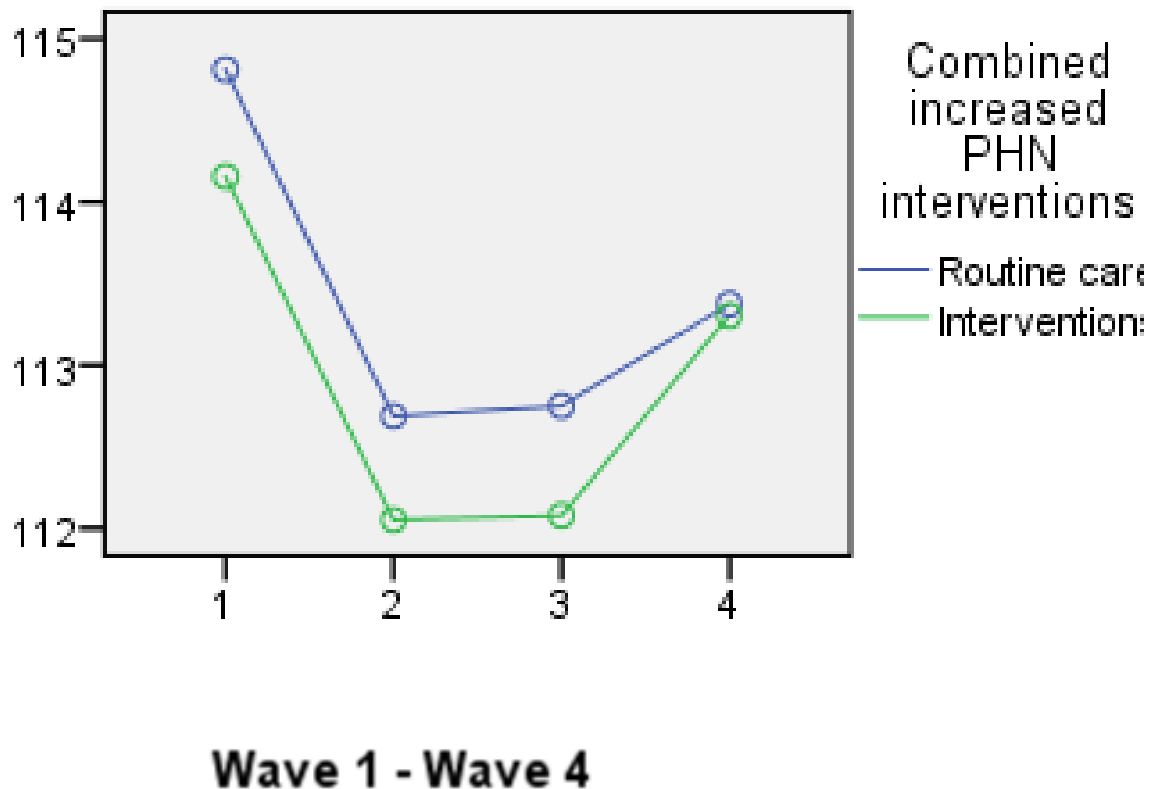
Combined increased interventions is the term, used in this study, to denote the interventions group, namely those infants / children and mothers who received increased PHN home visits and also accepted increased PHN referrals to other professionals or support services.

### 6.7.1 Cognitive development

Cognitive development outcomes of children were not significantly different between groups ( $p = 0.766$ ) or across four timelines between groups ( $p = 0.495$ ) following Bonferroni correction. Cognitive standard outcome scores from wave 1 to wave 4 following combined increased interventions showed a decrease in mean cognitive standard scores from wave 1 to wave 4 (Wilk's Lambda = 0.96,  $F(3, 127) = 1.789$ ,  $p = 0.153$ , multivariate partial eta squared = 0.041). Mean standard scores increased marginally from wave 2 to wave 3 ( $p = 1.000$ ) and further increased from wave 3 to wave 4 ( $p = 1.000$ ). A slight improvement was seen from wave 2 to wave 4 ( $p = 0.144$ ).

Cognitive development outcome scores for those who received routine care commenced at a slightly higher level (mean = 114.81, 95% CI: 113, 117, SD 2.4), decreased at wave 2 (mean = 112.69, 95% CI: 109, 116, SD 5.5), showed a slight improvement at wave 3 (mean = 112.75, 95% CI: 107, 118, SD 11.3) and continued to improve to wave 4 (mean = 113.38, 95% CI: 108, 110, SD 11.6) to marginally greater than respondents who received combined increased interventions. It can be concluded that cognitive development outcomes of children were not statistically significantly different between groups ( $p = 0.766$ ) or across four timelines within groups ( $p = 0.495$ ) following combined increased interventions. Data analysis suggests that increased PHN home visits combined with increased PHN referrals did not influence child cognitive development outcomes, see Figure 6-11.

## Cognitive Development Standard Outcomes



**Figure 6-11: Cognitive development outcomes of children who received combined increased PHN interventions from wave 1 to wave 4 compared to those who received routine PHN care**

Figure 6-11 shows that the mean scores of children who received combined increased PHN interventions decreased from wave 1 to wave 2, plateaued from wave 2 to wave 3 and improved from wave 3 to wave 4. Although the statistical trend was in the right direction, no statistically significant difference was found. By comparison the cognitive development outcome scores of children who received routine PHN care commenced at a slightly higher mean score and remained higher across four timelines. Their outcomes were also marginally better at wave 4. The data demonstrated no effect on combined increased PHN interventions on respondent cognitive outcomes.

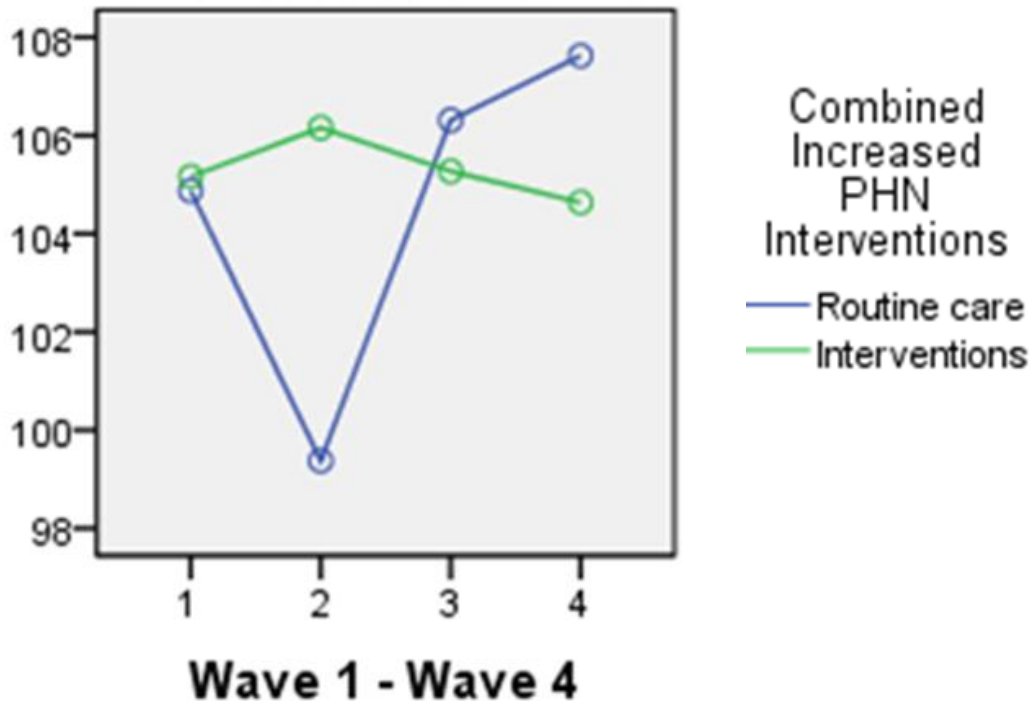
### 6.7.2 Communication skills

Communication skill standard outcome scores increased from wave 1 to wave 4 and across four assessments (Wilk's Lambda = 0.98,  $F(3, 127) = 0.966$ ,  $p = 0.411$ , multivariate partial eta squared = 0.022). Infant communication development outcomes following combined increased interventions were not significantly different between groups ( $p = 0.646$ ) or across four timelines within groups ( $p = 0.411$ ) following Bonferroni correction. Mean standard scores increased from wave 2 to wave 3 ( $p = 0.618$ ) and decreased from wave 3 to wave 4 ( $p = 1.000$ ). Communication skill outcomes improved from wave 1 to wave 2 ( $p = 0.974$ ) and decreased at waves 3 and 4. Again a statistical trend was noted but no statistical difference was found.

Communication skill outcome scores for those who received routine care commenced at a marginally lower level (mean = 104.88, 95% CI: 103, 107, SD 4.5), decreased at wave 2 (mean = 99.37, 95% CI: 93, 106, SD 25.1), demonstrated a substantial improvement at wave 3 (mean = 106.31, 95% CI: 102, 111, SD 6.8) and continued to improve at wave 4 (mean = 107.63, 95% CI: 101, 114, SD 10). It can be concluded that the communication development outcomes of children were not statistically significantly different between groups ( $p = 0.646$ ) or across four timelines within groups ( $p = 0.411$ ) following combined increased PHN interventions, see Figure 6-12.



## Communication Standard Outcomes



**Figure 6-12: Communication development outcomes of children who received combined increased PHN interventions from wave 1 to wave 4 compared to those who received routine PHN care**

Figure 6-12 shows that the mean standard communication skill outcome scores of infants who received combined increased interventions increased from wave 1 to wave 2 and decreased steadily from wave 2 to wave 4. By comparison those who received routine care showed a substantial decrease in mean values from wave 1 to wave 2 but an improvement at wave 4. When comparing the groups, the data did not demonstrate a significant effect of combined increased PHN interventions on infant's communication skills.

### 6.7.3 Social-emotional development

Mann-Whitney U testing did not reveal a statistically significant difference in social-emotional development at wave 1 following combined increased interventions, ( $U = 1472$ ,  $Z = -1.196$ ,  $p = 0.232$ ,  $r = 0.0958$ ). Mann-Whitney did not show an effect for combined increased PHN interventions provided prior to data collection at wave 1 on infant's social-emotional development age 3 - 6 weeks.

Wilcoxon Signed Rank test did not reveal a statistically significant difference in the social-emotional development outcomes of infants following combined increased interventions ( $Z = -0.793$ ,  $p = 0.428$ ,  $r = 0.10$ ).

A statistically significant positive difference in social-emotional development outcomes of children following combined increased interventions was seen at age 2 years. Friedman non-parametric testing on standard outcome scores from wave 1 to wave 4 showed  $\chi^2(3) = 15.03$  ( $p = 0.002$ ). Post-hoc testing provided a median score of 123 (IQR 119, 123) for wave 1, median of 123 (IQR 112, 130) for wave 2, median of 118 (IQR 107, 127) for wave 3 and median of 121 (IQR 115, 128) at wave 4.

### 6.7.4 Physical development

Physical development standard outcome scores from wave 1 to wave 4 following increased combined interventions demonstrated a reduction in mean outcome scores (Wilk's Lambda = 0.58,  $F(3, 127) = 30.970$ ,  $p < 0.001$ , multivariate partial eta squared = 0.422). Mauchly's test indicated that the assumption of sphericity had been violated ( $\chi^2(5) = 43.28$ ,  $p < 0.001$ ) and the degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ( $\epsilon = 0.83$ ). The Huynh-Feldt correction for physical development outcomes following combined increased interventions was  $F(2.48, 319.663) = 23.155$  ( $p < 0.001$ ). The results demonstrated that there was a large positive significant effect on respondent physical development outcomes following combined increased PHN interventions.

Data demonstrates that the physical development of children following combined increased interventions were not significantly different between groups ( $p = 0.844$ ), however they were significantly different across three measurements within groups, that is wave 2 to wave 4 ( $p < 0.001$ ). Mean standard scores decreased from wave 2 to wave 3 ( $p < 0.001$ ) and increased from wave 3 to wave 4 ( $p < 0.001$ ). However, physical development outcomes from wave 1 to wave 2 did not show a statistically significant effect ( $p = 0.159$ ).

Physical development outcomes of children who received routine care commenced at a higher baseline score (mean = 107.56, 95% CI: 104, 111, SD 6.9), decreased at wave 2 (mean=104.63, 95% CI: 101, 109, SD 7.5), saw a further reduction at wave 3 (mean = 93.63, 95% CI: 89, 98, SD 9.2) and demonstrated less of a recovery at wave 4 (mean = 103.69, 95% CI: 98, 109, SD 8.4). It can be concluded that while physical development outcomes of children were not significantly different between groups ( $p = 0.844$ ), they were significantly different at certain time points within groups across the four assessments; wave 1 to wave 3 ( $p < 0.001$ ), wave 2 to wave 3 ( $p < 0.001$ ) and wave 3 to wave 4 ( $p < 0.001$ ). Findings suggest that increased PHN home visits combined with increased PHN referrals had a large positive significant effect on children’s physical development at different time points from age 3 - 6 weeks to 2 years, see Figure 6-13.

## Physical Development Standard Outcomes

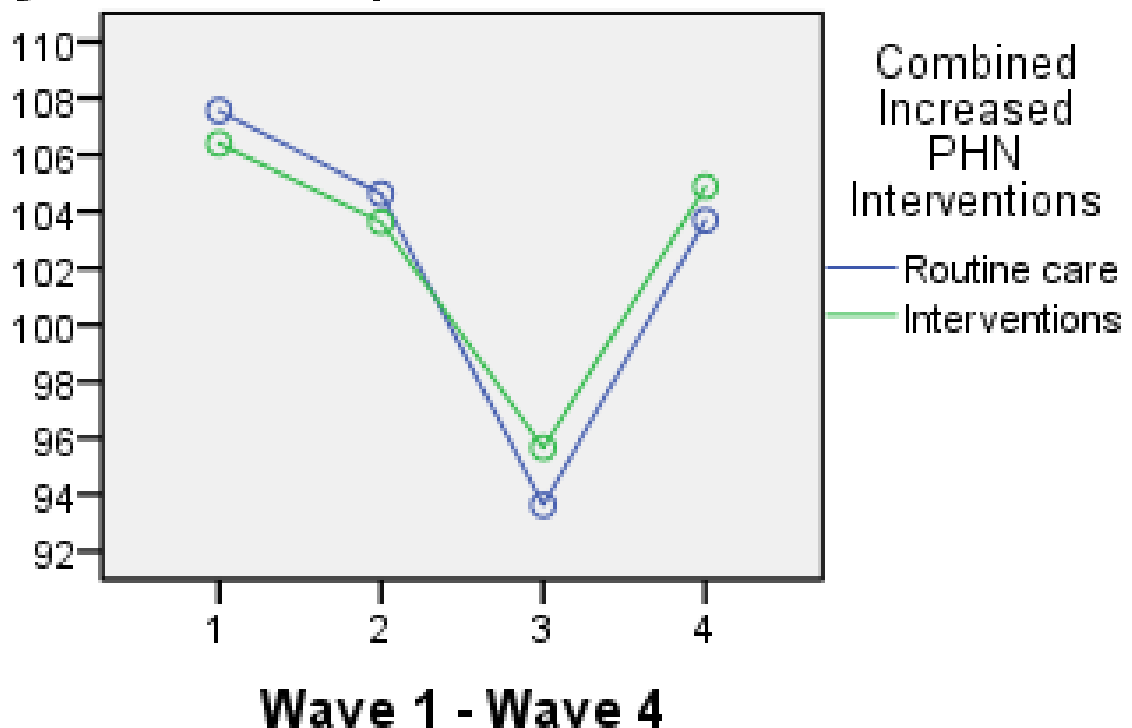


Figure 6-13: Physical development outcomes of children who received combined increased PHN interventions from wave 1 to wave 4 compared to those who received routine PHN care.

Figure 6-13 shows that the infants who received combined increased interventions commenced at a lower mean value than the group who received routine care, but their mean scores decreased less across four timelines. Better physical development outcomes were found for those who received combined increased PHN interventions compared to those who received routine PHN care can be seen.

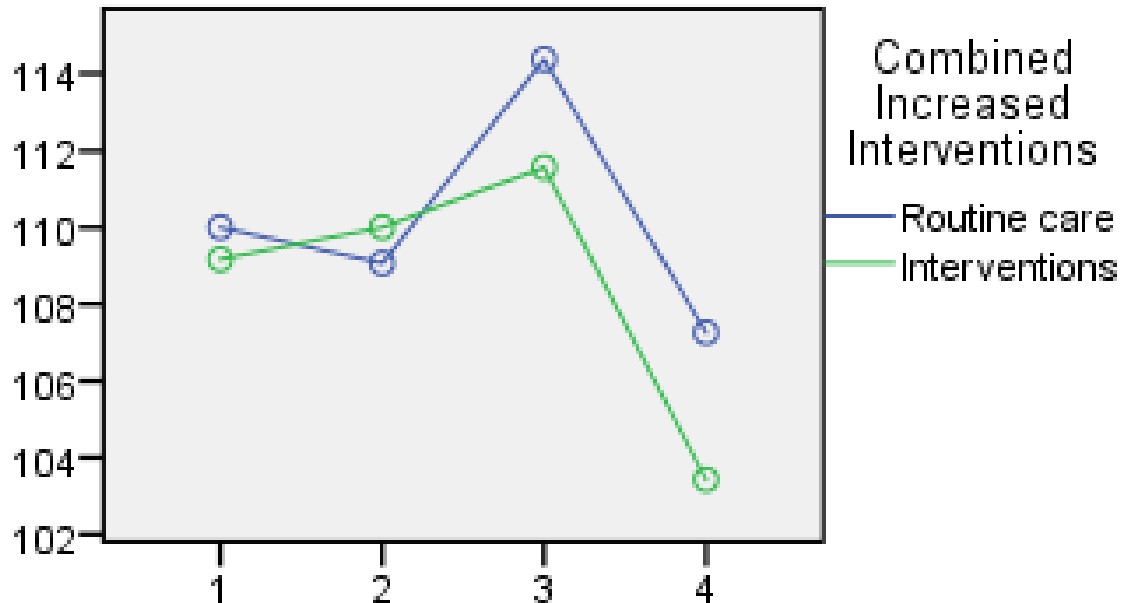
### 6.7.5 Adaptive behaviour

Infant adaptive behaviour from wave 1 to wave 4 following combined increased interventions showed a reduction in mean standard outcome scores (Wilk's Lambda = 0.74,  $F(3, 127) = 15.29$ ,  $p < 0.001$ ), multivariate partial eta squared (= 0.265) indicates a large effect size. Mauchly's test indicated that the assumption for sphericity had been violated ( $\chi^2(5) = 102.63$ ,  $p < 0.001$ ) and the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.64$ ). The Greenhouse-Geisser correction for adaptive behaviour outcomes following combined increased interventions was  $F(1.93, 248.28) = 8.53$  ( $p < 0.001$ ).

Adaptive behaviour outcomes following combined increased interventions were not significantly different between groups ( $p = 0.290$ ) however, outcomes were significantly different from wave 1 to wave 4 ( $p = 0.007$ ) following Bonferroni correction. Mean adaptive behaviour standard outcome scores increased from wave 2 to wave 3 ( $p = 0.254$ ) and decreased substantially from wave 3 to wave 4 ( $p < 0.001$ ). Adaptive behaviour effects were not significant from wave 1 to wave 2 ( $p = 1.000$ ), improved from wave 1 to wave 3 ( $p < 0.001$ ) and decreased from wave 3 to wave 4 ( $p < 0.001$ ).

Adaptive behaviour outcome scores for respondents who received routine care were higher at wave 1 (mean = 110, 95% CI: 108, 112, SD 1.0). Increased at wave 2 (mean = 110.71, 95% CI: 102, 118, SD 15.49), improved substantially at wave 3 (mean = 117.93, 95% CI: 113, 122, SD 9.3) but demonstrated a substantial decrease at wave 4 (mean = 107.93, 95% CI: 103, 112, SD 10.7). It can be concluded that the adaptive behaviour outcomes of children were not significantly different between the groups ( $p = 0.290$ ) but were significantly different across time points within groups from wave 1 to wave 3 ( $p < 0.001$ ), wave 1 to wave 4 ( $p = 0.007$ ) and wave 3 to wave 4 ( $p < 0.001$ ), see Figure 6-14.

## Adaptive Behaviour Standard Outcomes



**Figure 6-14: Adaptive behaviour outcomes of children who received combined increased PHN interventions from wave 1 to wave 4 compared to those who received routine PHN care**

Figure 6-14 demonstrates an increase in mean standard outcome scores of children who received combined increased interventions from wave 1 to wave 3 but a deterioration was noted at wave 4. By comparison the mean scores of those who received routine care commenced at a slightly higher score, increased at wave 2, improved at wave 3 and showed less deterioration at wave 4. The data demonstrated that increased PHN home visits combined with increased referrals accepted by respondents to other professionals and support services had a positive significant effect on infant adaptive behaviour development at different measurement times between age 3 - 6 weeks and 2 years.

### 6.8 Summary

The statistically significant effect size of increased PHN home visits on infant communication skills, physical development and adaptive behaviour from age 3 - 6 weeks to 2 years are outlined in Table 6-2. There was also a positive significant effect on child cognitive development ( $p = 0.048$ ) from wave 1 to wave 2.

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**Table 6-2: Summary of Increased PHN Home Visits from Wave 1 to Wave 4**

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| <b>Increased PHN home visits</b> | <b>Between groups</b> | <b>Time points across four waves</b> |
|----------------------------------|-----------------------|--------------------------------------|
| Cognitive development            | $p = 0.555$           | $p = 0.338$                          |
| *Communication skills            | $p = 0.508$           | * $p < 0.001$                        |
| *Physical development            | $p = 0.985$           | * $p < 0.001$                        |
| *Adaptive behaviours             | * $p = 0.013$         | * $p < 0.001$                        |

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\*The mean difference is significant at the 0.05 level.

Table 6-3 demonstrates a significant effect of increased PHN referrals on physical development and adaptive behaviour from age 3 - 6 weeks to 2 years. A positive significant effect is also seen from wave 1 to wave 2 in cognitive development ( $p = 0.005$ ) and in physical development from wave 1 to wave 2 ( $p = 0.006$ ), from wave 1 to wave 3 ( $p < 0.001$ ), from wave 2 to wave 3 ( $p < 0.001$ ) and from wave 3 to wave 4 ( $p < 0.001$ ). A significant effect was seen in adaptive behaviour outcomes from wave 1 to wave 3 ( $p = 0.001$ ), from wave 1 to wave 4 ( $p < 0.001$ ), from wave 2 and wave 3 to wave 4 ( $p < 0.001$ ).

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**Table 6-3: Summary of Increased PHN Referrals from Wave 1 to Wave 4**

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| <b>Increased PHN referrals</b> | <b>Between groups</b> | <b>Time points across four waves</b> |
|--------------------------------|-----------------------|--------------------------------------|
| Cognitive development          | $p = 0.554$           | $p = 0.203$                          |
| Communication skills           | $p = 0.866$           | $p = 0.954$                          |
| *Physical development          | $p = 0.572$           | * $p < 0.001$                        |
| *Adaptive behaviour            | $p = 0.624$           | * $p < 0.001$                        |

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\*The mean difference is significant at the 0.05 level.

Table 6-4 demonstrates a significant effect of increased combined PHN interventions on physical development and adaptive behaviour from age 3 - 6 weeks to 2 years.

**Table 6-4: Summary of Combined Increased Interventions from Wave 1 to Wave 4**

| <b>Combined Increased PHN interventions</b> | <b>Between groups</b> | <b>Time points across four waves</b> |
|---|-----------------------|--------------------------------------|
| Cognitive development                       | p = 0.766             | p = 0.495                            |
| Communication skills                        | p = 0.646             | p = 0.411                            |
| *Physical development                       | p = 0.844.            | *p < 0.001                           |
| *Adaptive behaviour                         | *p = 0.043            | *p = 0.007                           |

\*The mean difference is significant at the 0.05 level

### 6.8.1 Social-emotional development

Mann-Whitney U non-parametric testing was used to examine social-emotional development outcome scores at wave 1 following increased PHN home visits, increased referrals and combined increased PHN interventions. Testing did not show a significant difference at wave 1.

Wilcoxon Signed Rank testing was used to examine effects from wave 1 to wave 2. No significant difference was seen from wave 1 to wave 2 following increased PHN home visits, increased referrals or combined increased PHN interventions.

Friedman non-parametric testing examined for differences across four timelines and showed a statistically significant difference in social-emotional development following increased PHN home visits. A significant difference was also seen due to increased referrals and combined increased PHN interventions when children were aged 2 years. Table 6-5 summarises these results.

**Table 6-5: Summary of Effect on Social-Emotional Development from Wave 1 to Wave 4**

| <b>Intervention</b>                   | <b>Mann-Whitney U</b> | <b>Wilcoxon Signed Rank</b> | <b>Friedman Test</b> |
|---------------------------------------|-----------------------|-----------------------------|----------------------|
| *Increased PHN home visits            | p = 0.456             | p = 0.428                   | *p = 0.002           |
| *Increased PHN referrals              | p = 0.982             | p = 0.428                   | *p = 0.002           |
| *Combined increased PHN interventions | p = 0.232             | p = 0.428                   | *p = 0.002           |

\*The mean difference is significant at the 0.05 level

## 6.9 Summary of study findings

Child development and well-being outcomes were measured to determine what effect, if any, increased PHN home visits, that is more than one home visit following childbirth or increased PHN referrals accepted by respondents to other professionals and support services had on child development and well-being. No difference was found in the numerous primiparous or multiparous mothers who received increased PHN home visits and/or accepted increased referrals to other professionals and support services

### 6.9.1 Increased PHN home visits

Increased PHN home visits had a large positive significant effect on infant communication skills between the ages of 4 – 7.5 months and 2 years, had a very large significant effect on child physical development from age 3 - 6 weeks to 2 years and exerted an influence on adaptive behaviour leading to significant differences between groups and within groups at each timepoint over the first two years of life.

Increased PHN home visits had a significant effect on infant cognitive development between the ages of 3 - 6 weeks and 4 - 7.5 months. PHN home visits however, did not have a significant effect on the social-emotional development of respondent infants when aged 3 - 6



weeks old or between the ages of 4 and 7.5 months. A statistically significant difference was seen in child social-emotional development at age 2 years.

### **6.9.2 Increased PHN referrals to other professionals and support services**

Child cognitive development was not significantly affected by increased PHN referrals in the first two years of life. However, increased PHN interventions had a moderate positive effect on child cognitive development from age 3 - 6 weeks to 4 - 7.5 months. Increased PHN referrals did not impact upon child communication skills over the first two years of life and did not have a significant effect on social-emotional development from age 3 - 6 weeks to 4 - 7.5 months. A statistically significant difference in social-emotional development following increased PHN interventions was seen at age 2 years.

Increased referrals provided by PHNs had a very large positive effect on physical development from age 3 - 6 weeks to 2 years and increased PHN interventions had a very large positive effect on child adaptive behaviour from age 3 - 6 weeks to age 2 years.

### **6.9.3 Combined increased PHN interventions**

No statistically significant difference was seen in cognitive development outcomes between groups or across four timelines within groups following combined increased PHN interventions. This suggests that increased PHN home visits combined with increased PHN referrals did not have a significant effect on child cognitive development when compared to routine PHN care. No significant effect on child communication skills was demonstrated following combined increased PHN interventions comparing to routine PHN care. Combined increased PHN interventions did not have a significant effect on social-emotional development outcomes of infants aged 3 - 6 weeks or at age 4 - 7.5 months. However, a statistically significant difference was seen in social-emotional development at age 2 years.

Results indicate the physical development of children who received combined increased PHN interventions was better than those who received routine PHN care. Significance was found from wave 2 to wave 4. Increased PHN home visits combined with increased referrals were also seen to have a significant positive effect on child adaptive behaviour at each of the four assessments from age 3 - 6 weeks to 2 years.

## 6.10 Conclusion

In this chapter data analysis on routine care and increased interventions in the form of increased PHN home visits and referrals to other professionals and support services have been outlined. The influences of each intervention on cognitive development, communication skills, social-emotional development, adaptive behaviour and physical development from age 3 - 6 weeks to 2 years has been explored using statistical analysis of the data.

This study has shown the significant effect of increased PHN home visits and increased PHN referrals on child development and well-being outcomes. Findings of this study are in keeping with Bronfenbrenner's ecological theory of human development (1977) which identified the importance of service delivery, here seen as PHN home visits and referrals to meet the needs and goals of both mothers and children. It also fulfilled Peplau's theory of interpersonal relations in nursing (1997) which includes the PHNs role in assessing and identifying maternal felt needs to facilitate positive child development and well-being (Kertoy *et al.* 2012).

The next chapter presents, the purpose of the study, summary of the main study findings, discussion of findings, links to the theoretical frameworks underpinning the research, strengths, limitations, clinical and research recommendations.

## **Chapter Seven: Discussion & Conclusion**

### **7.1 Introduction**

The discussion is structured in line with the study hypotheses and the theoretical frameworks that underpin the research. The study was interested in determining the effects of increased PHN home visits and increased PHN referrals on five key areas of child development and well-being. In this chapter, the findings of this study in relation to child development and well-being outcomes, increased PHN home visits, increased PHN referrals and combined increased PHN interventions will be discussed.

### **7.2 Purpose of the study**

This study set out to measure the development and well-being longitudinal outcomes of children from birth to two years following increased PHN interventions. It attained its purpose and objectives which were to;

- Measure longitudinal child development and well-being outcomes in a cohort of 154 children from birth to two years.
- Measure the development and well-being outcomes of study respondents and their children age 3 - 6 weeks, age 4 - 7.5 months, age 9 - 14 months and age 23 - 24 months.
- Report the number of increased PHN home visits to postnatal mothers in the area of study.
- Document the nature and frequency of increased referrals accepted by respondents and their children to other professionals and support services across four timelines.
- Compare child development and well-being outcomes of children who received increased PHN home visits and / or increased PHN referrals to other professionals and support services to a group of children who received routine PHN care.

## 7.3 Parental study findings

### 7.3.1 Parental statistics

In depth analysis of parental profile was not undertaken in this study as the main focus of the researcher was on child development and well-being outcomes. The bank of parental data was acquired as part of the research in order to account for any bias or for outlier results that may occur as a result of confounding variables of parental origin.

The majority (73%) of parents in this study were married, a further 22% were cohabiting. The Growing Up in Ireland National Longitudinal Study of Children (2013) reported 82% of 9-month-old infants lived in a two parent family. A substantial number of respondents (71%) also lived in their own home. This was not unexpected in a rural study where home ownership is higher than urban areas. This is reassuring as previous literature strongly suggests better well-being for children living in traditional family structures such as with married parents in their own homes. Brooke (2004) noted appropriate accommodation as a fundamental requirement in promoting childhood well-being. This is in keeping with Wilkinson (1999) who concluded that a secure and stable home environment contributes to positive child physical and mental health. (Wilkinson 1999, McKeown *et al.* 2003, Brooke 2004, Brooks 2013).

The rate of unemployed persons in Ireland fell from 12.2% in 1995 to 7.2% in 2008 but increased to 15% in 2012 (CSO 2013). Unemployment levels among study respondents were relatively low at 5.2% and did not reflect the national average at that time.

The literature suggests that children in better income families demonstrate less psychological disturbance and better child well-being compared to lower income families (McKeown *et al.* 2003, Brooks 2013). The Growing Up in Ireland National Longitudinal Study of Children (2013) showed that 32% of families were experiencing financial difficulty when their children were aged 9 months. Findings in this sample demonstrated a smaller percentage in financial difficulty at 9 - 14 months (8%). The Report from the Central Statistics Office (2011) showed that up to 8% of Irish children were at risk of poverty in 2010. More respondents found it difficult to manage their household budget when children were aged two years compared to when they were infants. Sixty four percent of the study sample had 1 - 5 older children. The literature does highlight a negative impact of increasing family size on family finances (Williams *et al.* 2013a). Factors to consider include the increase in cost of goods and services by 2.6% and 31.1% respectively from 2003 to 2012 (CSO 2013).

Furthermore, over 20% of respondent mothers had not returned to employment by the time their child was 2 years old.

### **7.3.2 Maternal demographics**

Respondent mothers ranged in age from 19 years to 47 years (mean age 33 years, SD 3.17). This was in keeping with the age group of mothers giving birth at the time of recruitment in 2011 and 2012 (CSO 2011, 2012).

Sixty seven percent (n=102) of mothers had obtained a University degree with a further 19% (n=29) completing a training course. The findings of this study are in keeping with national figures where the mother of 1 in 3 children are educated to third level (Department of Children and Youth Affairs 2013). Previous literature suggests a positive association between maternal education, employment and child well-being (Brooks 2013).

### **7.3.3 Maternal support**

The findings of this study indicate mothers received the lowest level of support in the areas of affectionate, instrumental / tangible support. Previous research has linked low levels of such support with increased risk of postnatal depression (Leahy-Warren *et al.* 2011, Glavin & Leahy-Warren 2013). Instrumental, emotional and appraisal support have been shown to have a positive influence on maternal self-confidence and self-esteem as well as prevention of postnatal depression at 6 and 12 weeks postpartum (Austerberry *et al.* 2004, Leahy-Warren *et al.* 2011, Glavin & Leahy-Warren 2013). Leahy-Warren *et al.* (2011) strongly suggest that health care professionals and especially nurses be mindful of the importance of sourcing emotional and functional support from family members and peers of postnatal mothers to prevent postnatal depression at 12 weeks postpartum. When respondents were aged 2 years low levels of support more than doubled most notably in the area of affectionate support. Despite the complexity of the various components of social support, a consistent finding in the literature is that quality in personal relationships is crucial to the social support equation (Roberts *et al.* 2001). To help alleviate parental stress in the postnatal period support from partner, own mother, family and peers has been previously described as the preferred and most frequently available forms of social support (Dolan & Holt 2002, Coyne 2007, Glavin & Leahy-Warren 2013).

#### **7.3.4 Parental stress outcomes**

Maternal stress was assessed in this study using the Parent Stress Index Short Form (Abidin 1995). The majority of respondents described normal or low levels of stress when their infants were 3 - 6 weeks old. Stress remained relatively low across the four assessments up to and including 2 years of age. Possible factors mediating stress in this study could include a reduction in the number of fathers unemployed by wave 4, the high rates of married parents, relatively low degrees of financial distress at 8%, maternal ratings of good quality of life and low rates of child ill health. Williams *et al.* (2013a) linked economic hardship and unemployment to parental stress.

#### **7.3.5 Maternal quality of life satisfaction**

The World Health Organization Quality of Life-BREF (Orley 1996) demonstrated that the majority of mothers in this study enjoyed good quality physical, psychological and social quality of life across four timelines from birth to two years. The WHO QOL-BREF findings in relation to mental health were in keeping with maternal reports of postnatal depression and SF 36 mental health outcome data. By contrast, physical health outcomes based on the Short Form 36 Health Survey (Ware & Kosinski 2001) were poorer for 12% (n=17) respondents. In this light it is important to remain mindful of the mothers, though low in number, who did not describe good quality of life and consider steps that can be taken to improve their well-being. Leahy-Warren *et al.* (2011) has highlighted the importance of social support for mothers in the postnatal period and up to when their children are aged 2 years. This supports the importance of good social contact through PHN referral of mothers and children to appropriate professionals and support services. The importance of fostering family as well as peer support the need for professionals to gain an in-depth understanding of the link between maternal health, wider social supports and economic environment are identified in the literature as enhancing health and well-being of both mother and child (Jack 2000, Dolan & Holt 2002, Leahy-Warren *et al.* 2011, Glavin & Leahy-Warren 2013).

The findings of this study indicate that respondents received a substantial number of increased home visits (76.1%) and referrals to other professionals and support services (n=221). While the majority of respondents and their children overall did well, future research is required to establish which interventions are most effective in ensuring mothers are well supported and child development and well-being is protected.

### 7.3.6 Maternal physical and mental health

The majority of mothers (86.2%, n=131) at wave 1 reported good health during pregnancy with the remaining 13.8% (n=21) requiring hospitalisation. Twenty nine percent (n=39) reported suffering from medical conditions due to pregnancy or childbirth. Brown and Lumley (2000) in an Australian study of 1336 respondents suggests that both physical and emotional health problems impact on maternal recovery up to one year postpartum. In a study by Kahn *et al.* (2000) in the United States of America involving a random sample of 8060 postnatal women, with a response rate of 89%, demonstrated that 7.5% of respondents reported fair to poor physical health, with the greatest number of mothers on low household income. Fifteen percent of those on the lowest income reported fair to poor physical health when compared to 2% in a higher income bracket. The scarcity of studies and lack of information related to health of Irish women in the postpartum period has been highlighted by Daly *et al.* (2012). They identified that morbidities as experienced by women following childbirth have not formally been recorded and called for the issue to be addressed. This study is an early step in adding to available information in the area.

Respondent mothers reported mostly good physical and mental health based on the Short Form 36 Health Survey (Ware & Kosinski 2001). There were some marked changes in reporting of quality of maternal physical and mental health with a strong correlation with the child's age at the time of maternal report. Within 3 - 6 weeks of childbirth, 37% of mothers rated their physical health as poor or below average and 3% (n=5) rated their health as very poor. A small group of 15% (n=22) to 19% (n=29) reported poorer quality mental health across all four timelines. Eight percent (n=12) mothers were identified as having postnatal depression, the cause of poor mental health is unknown for the remaining 17 mothers. These findings are consistent with previous literature demonstrating the importance of support for mothers to promote positive mental health, effective treatment of mental illness and possibly prevention of postnatal depression (Dolan & Holt 2002, Leahy-Warren *et al.* 2011, Glavin & Leahy-Warren 2013). Robust maternal physical and psychological health, maternal satisfaction with being a parent, being married and good parenting skills help, encourage and support child development and well-being (McKeown *et al.* 2003, Glavin & Leahy-Warren 2013, Brooks 2013).

Of the eight mothers (5%) with postnatal depression (PND), seven had received medication to treat the condition by the fourth visit. When children were 2 years old an increase was seen in the total number of mothers reporting postnatal depression (n=12). The frequency of postnatal depression reported by this sample is much lower than the recognised prevalence rates in Irish mothers. It is estimated that 11% - 29% of women experience depression in the

first year following childbirth (Affonso *et al.* 2000, Gale & Harlow 2003, Leahy-Warren & McCarthy 2007, Glavin & Leahy-Warren 2013). Reasons for this reduced rate are multiple, including reduced recognition of mental illness by consulting professionals during this period, underreporting by the study sample or stigma associated with the diagnosis of depression and disclosure of same. It is difficult to accurately assess if the higher levels of quality of life and the levels of social support demonstrated in this study contributed to lower rates of postnatal depression (PND) as no literature on PND was found that tracked PND in mothers up to when their children were 2 years of age. Previous studies were mainly undertaken up to 6 weeks and 12 months postpartum.

The high figure of 15% (n=22) of mothers reporting low mental health scores at two years following childbirth is worrying in light of the commonly held belief that onset of postnatal depression is within the first four to six weeks following childbirth and diagnosis only occurs within the first year (World Health Organisation 1992, Davies *et al.* 2003, Leahy-Warren *et al.* 2011, American Psychiatric Association 2013). The reporting of increased rates of depression greater than 12 months postpartum would suggest that assessment of postnatal depression at a single time point, early in the postpartum period, is not sufficient. Other researchers have also called for an expansion in the period of assessment for postnatal depression (Affonoso *et al.* 2000, Glavin & Leahy-Warren 2013). Mothers in the prenatal and postnatal period can easily be overlooked when there are no obvious signs of physical or mental health problems (Emmanuel & Sun 2013). It is important to note that poor mental health outcomes may be related to miscarriage, further pregnancy or further childbirth as described for 18% of respondents. However, this study shows that mothers remain at risk of mental illness for at least two years following childbirth. This is clinically relevant and demonstrates a need for public health nurses to remain in contact with mothers for this period and possibly beyond to reduce the risk of mental illness and its associated sequelae for mother, child and family.

Maternal physical health had improved markedly at 9 - 14 months but deteriorated again at two years as 12% again rated their physical health as very poor to below average. While poor physical health in the early postpartum period can be attributed to pregnancy or childbirth, a deterioration at two years was unexpected. Reviewing the data, it became clear that the mothers reporting low physical health scores had recently been pregnant or had another baby.

The marked deterioration of maternal health in the early postpartum period and during subsequent pregnancies highlights the significant physical impact pregnancy and childbirth have on a mother's physical health.



## **7.4 Child findings**

### **7.4.1 Infant weight**

In Ireland statistics on premature births are collected by the Central Statistics Office. The report on premature births in Ireland for 2012 showed that 6% of births occurred at less than 37 weeks gestation (Prematurity in Ireland 2014). The majority of infants (97%) were born at term, which is after 37 weeks gestation. A birth weight of 2.5 kg is regarded as below average and termed low birth weight (Department of Children and Youth Affairs 2013). No child in this study recorded a low birth weight as weights ranged from 2.8 kg to 4.5 kg (mean 3.5 kg, SD 0.5 kg). Findings in this study are in keeping with the Growing Up in Ireland National Longitudinal Study of Children (2011) which found an average birth weight of 3.5 kg. The majority of child weights improved steadily from 3 - 6 weeks to 2 years and in line with expectation, child weights averaged at the 50<sup>th</sup> percentile or above when children were 2 years old. One child who was still exhibited signs of failure to thrive at age of 2 years, was being monitored and weighed monthly by their PHN.

### **7.4.2 Infant feeding**

Breastfeeding rates in Ireland are amongst the lowest in Europe. Tarrant *et al.* (2009), Denny (2011), Williams *et al.* (2013a) and Leahy-Warren *et al.* (2013) suggest that breastfeeding rates are improving and a steep socio-economic gradient can be seen in relation to the initiation and continuation of breastfeeding as mothers with a higher level of education were more likely to breastfeed. While a substantial amount of research has been undertaken to understand the reasons breastfeeding rates vary between countries Tarrant *et al.* (2011) suggest more in-depth research on the factors influencing initiation and discontinuation of breastfeeding. Studies in this area focus primarily on factors which are difficult or impossible to change such as male sex of child, child admission to the Intensive Care Unit, financial difficulties, single parents and maternal education. Reasons given by mothers for discontinuation of breastfeeding in previous literature were poor milk supply, fatigue, lack of breastfeeding support, maternal illness, pain, infant too hungry and returning to work (Tarrant *et al.* 2009, Tarrant *et al.* 2011, Leahy-Warren *et al.* 2013). Interestingly, no difference was seen in relation to type of feeding by gender in this study as 52% (n=26) of the male sample and 48% (n=24) of the female sample were exclusively breastfed.

Reasons identified by Irish mothers reported in this study for discontinuation of breastfeeding which were not reported in previous literature included;

- Infant reflux
- Infant vomiting
- Difficulty expressing milk
- Nipple pain due to tongue tie

This supports suggestions by Tarrant *et al.* (2011) on the need for more in depth research on the difficulties encountered by breastfeeding mothers in Ireland

### **7.4.3 Child health**

It is difficult to compare the current study to national and international data due to differences in age groups of children being reported and the definitions of injuries. The Growing Up in Ireland national study reported rates of accidental injuries that required hospitalisation as being 15 - 16 % of 3-year-old children in the Republic of Ireland in 2011 (Williams *et al.* 2013).

National data on children aged 1 - 5 years admitted to hospital in the Republic of Ireland in 2011, suggested that the most commonly reported illness at that time were respiratory illness (12.4%) followed by poisoning or accidental injury (9.2%), (Department of Children and Youth Affairs 2012).

The rates reported by other studies in the Republic of Ireland were considerably lower than those found in this study as 33% (n=50) of the sample were seen in the Emergency Department from age 3 - 6 weeks to 2 years. The findings in this study are more in keeping with the work of Pearce *et al.* (2012), who reported up to 36% of accidental injuries from 9 months to 3 years based on data from the Millennium Cohort Study in the UK. The findings of the study are also consistent with a prospective Canadian longitudinal study by Dudani *et al.* (2010) who did not find a link between childhood behavioural problems and childhood accidental injury. Further research is required to examine other risk issues such as environmental factors and parental / carer supervision as childhood accidental injuries are considered preventable (Dudani *et al.* 2010).

#### **7.4.4 Childcare**

Very little research is available in relation to childcare arrangements for Irish children. This study demonstrated a natural progression from parental care in early infancy to community based care from 9 - 24 months. This is interesting given the high economic impact of community based care such as crèche and childminder and may link with the financial burden experienced by mothers when children were assessed age 9 - 24 months. The Growing Up in Ireland National Longitudinal Study of Children (2013) found that Irish grandmothers played a significant role in caring for their grandchildren (Williams *et al.* 2013). This contrasts with the role of grandmothers in this study where 0.6% (n=1) was found to be providing child care when the child was aged of 9-14 months. Future research on the factors influencing a parent's choice of childcare would lend considerably to this question.

### **7.5 Public health nursing related findings**

The influence of increased PHN home visits, increased PHN referrals and combined increased PHN interventions on the development and well-being of children (n=154) across four timelines were assessed as the main outcomes of this study. When interpreting the data, the routine care group are noted to be considered healthy and well by their PHNs as they did not receive increased home visits and fulfilled the definition of low priority or low risk. However, the intervention group were considered to have more clinical needs by their PHN and were offered extra home visits and / or referral to other professionals or support services.

#### **7.5.1 Increased PHN home visits**

As far back as 1898 Barnard emphasised the importance of nurses visiting mothers and infants in their homes highlighting this as a very important time to support mothers and encourage a positive relationship with their new child. Jean Piaget theorised cognitive development as the infant / child's ability to adapt to and understand their environment. It refers to the child's mental process, level of understanding and ability to interpret a situation which allows them to communicate their needs effectively (Smith *et al.* 2003). Other factors at play in child cognitive development are the parent-child interactive process which influences later child development, infant's gestational age and the mother's level of education (Voress & Maddox 1998, Barnard 1989, Reinsnyder *et al.* 2005, Maitre *et al.* 2013). Comparing cognitive standard outcomes scores between the intervention group and

routine care group, it is evident that the intervention group were more vulnerable at wave 1. Results indicate that increased PHN home visits exert a positive significant effect on infant cognitive development from age 3 - 6 weeks to 4 - 7.5 months. An increase is seen in superior to very superior scores in cognitive development from 4% (n=6) at 3 - 6 weeks to 39% (n=58) at age 2 years.

Child cognitive development and communication skills are inextricably linked. This study found that increased PHN home visits had a large significant effect on infant communication skills at different time points from age 3 - 6 weeks to age 2 years. These findings demonstrated that the communication outcomes of children were quite varied across four timelines. At age 3 - 6 weeks, up to 90% of infants scored as average, by 4 - 7.5 months communication scores improved ranging from average to very superior. Their communication scores continued to improve as they progressed in age with a minimal number obtaining scores below average. Although the majority of children (n=148) obtained scores between average and very superior at age 2 years, a cumulative 8% (n=12) obtained very poor to below average scores. If one allows for the number of infants born prematurely (3%, n=5) and those reported to have complex needs (2.4%, n=4), a remaining 2% (n=3) of children at two years of age scored poor to below average in communication skills. Also considering that infants born prematurely should have attained milestones on par with their peers by the age of 2 years. This has implications for (n=7) children's interactions with others, relationships with others and ability to communicate their needs.

Both cognitive development and communication skills show lower scores for the intervention group than for the routine care group despite receiving increased PHN supportive visits. The author suggests that increased PHN home visits played a substantial role in enhancing infant's communication ability as they progressed from age 3 - 6 weeks to 2 years. Given high cognitive development scores, a likely important component in child communication may be that poor communication skills are unlikely to be identified before the age of 9 months where (n=2) children were referred by their PHN to speech and language therapy and at the age of 18-24 months assessment a further number (n=14) were assessed by their PHN as requiring referral. Child hearing is considered as part of the assessment by the speech and language therapist when the referral is received and the PHN receives a full report on the assessment.

Literature though dated suggests that while cognitive development, communication skills, social-emotional development and adaptive behaviour are different concepts they are inextricably linked and lead to adult-like knowledge and adaption to one's environment (Flavell 1979, p. 906, Parke 1979, Yarrow 1979). Cognitive development is a prerequisite to

speech sounds and communication (Maitre *et al.* 2013). Cognitive understanding is identified as being a prerequisite for emotional response. Social-emotional development is identified as complementing communication skills, language development, problem solving, social learning and personality development. This study has replicated previous literature findings by identifying social-emotional development, cognitive development and communication development as interlinked with mean and median outcome scores moving in a positive direction over four timelines. Furthermore, 73% of children lived with married parents and over 50% were cared for in their own home up to age 9 – 14 months. Brooks (2013) identified parental marital status as important in the Growing Up in Ireland National Longitudinal Study of Children data where married status was seen as protective in promoting child development and well-being. Increased PHN home visits were not seen to significantly affect child social-emotional development until children were two years old. This study would suggest that parental marital status, parent-provided childcare in the early months and increased PHN home visits within 3 – 6 weeks of childbirth facilitate social-emotional development when a child is aged 2 years.

Adaptive behaviour is closely linked to the four other areas of child development; social-emotional development, cognitive ability, communication skills and physical development. Positive adaptive behaviour is supported by secure attachment to a primary caregiver, a sense of belonging that promotes confidence and the ability to self-regulate emotional responses (Nixon *et al.* 2013). While there may be other contributing factors, higher levels of adaptive behaviour allow an infant to better adapt to his / her physical environment, develop age appropriate skills and be able to communicate and respond to others.

Comparing the routine care group and intervention group, it is clear that adaptive behaviour scores for the routine care group commenced at a higher level and progressed higher than the intervention group up to age 14 months but demonstrated a substantial decline to age 2 years. This mirrors the work of Darrah *et al.* (2003) in relation to variation in the trajectories of child development. As both groups followed the same direction of development in relation to attainments and disimprovements, the importance of increased PHN home support visits were demonstrated by maintaining the intervention group in line with the routine care group. This study indicates that increased PHN home visits had a very large positive significant effect on infant adaptive behaviour outcomes from age 3 - 6 weeks to 2 years.

The trajectories of physical development for both groups clearly follow the same direction starting high, falling at 9 - 14 months and showing a substantial improvement for both groups at age 2 years. The routine care group however, gained slightly on the intervention group. The data showed that increased PHN home visits had a very large positive significant effect

on child physical development from 3 - 6 weeks old to 2 years of age. However, eight children remained below average at 2 years of age. This is interesting as from a clinical perspective all children, including those born prematurely, would be expected to attain similar or equal scores to full-term infants by age 2 years (Williams *et al.* 2013). To see that eight children (although low in number) remained significantly delayed in relation to physical development despite increased PHN home visits is an area that would warrant further research to identify contributing factors for these delays.

### **7.5.2 Increased PHN referrals to other professionals and support services**

This study revealed a significant impact following increased PHN referrals to other professionals and support services on child cognitive development from age 3 - 6 weeks to 4 - 7.5 months. Increased PHN referrals did not have a significant effect on child communication skills from age 3 - 6 weeks to 2 years. Also increased PHN referrals did not have a significant effect on child social-emotional development from 3 - 6 weeks to 7.5 months. A statistically significant difference was seen at 2 years. While the study findings in relation to PHN referrals appear unusual given the significant impact of increased home visits, they are in keeping with other study findings. A child's speech is an expression of communication skills. As 1.3% (n=2) of children were referred to speech and language therapy at age 9 - 14 months and a further 10% (n=14) were referred at 2 years, data suggests that increased PHN referrals and support services interventions did not have an effect on child communication skills. The lack of an obvious effects on child communication outcomes may be accounted for due to the short time period elapsed between onset of intervention therapy and completion of study participation.

Increased PHN referrals were shown to exert a very large positive effect on infant adaptive behaviour from 3 - 6 weeks to age 2 years. Likewise, PHN increased referrals had a very large positive effect on infant physical development from age 3 - 6 weeks to 2 years. It is very difficult to interpret these conflicting findings as research on the impact of PHN referrals to other services is not available in the literature. Due to sample size it is important to note that there may be other contributing factors. Given the considerable benefits of multidisciplinary team working identified by Buckley (2002) and Buckley *et al.* (2006) for professionals, it would be valuable to expand this area of research. Questions could include the reason for referral, timing of referral, intensity of treatment received and maternal satisfaction with outcome. This would allow a better understanding of the variable effect noted in this study

and provide suggestions on ways to gain better value for mothers and children through multidisciplinary working.

### **7.5.3 Combined increased PHN interventions**

The work of Rutter & Rutter (1993), Glascoe (2001) and Darrah *et al.* (2003) advises caution in relation to assumptions about child milestones at early developmental and well-being assessments. Their recommendation that future research should focus on longitudinal child outcomes was achieved by this study. The study did not find the combination of increased PHN home visits and increased PHN referrals to influence infant cognitive development or communication skills from age 3 - 6 weeks to 2 years compared to those who received routine PHN care. A statistically significant difference was found in physical development and adaptive behaviour scores of infants following increased combined PHN interventions from age 3 - 6 weeks to 2 years, along with social-emotional development at the age of 2 years.

This study did not find a difference in the numbers of primiparous or multiparous mothers who received increased PHN home visits and / or accepted increased referrals to other professionals and support services. This is contrary to previous research and would indicate that PHNs base their assessment on need rather than targeting first-time mothers. These findings are interesting given the bulk of earlier studies which focus on nurse-led home visiting programmes targeted at prenatal, first-time and vulnerable mothers (Shyne *et al.* 1963, Gutelius *et al.* 1977, Stanwick *et al.* 1982, Olds *et al.* 1997, Olds *et al.* 2004, Kitzman *et al.* 1997, Kitzman *et al.* 2000).

## 7.6 Unexpected findings

A number of unexpected findings arose over the course of data collection and data analysis in this study. These included;

- The significant level of physical illness reported by respondent mothers following childbirth.
- The high number of children attending Emergency Departments due to accidental injuries from age 9 months to 2 years.
- Unexpectedly, the study found that mothers who were partially breastfeeding received on average more PHN home visits than mothers who were exclusively breastfeeding or formula feeding.
- The number of respondents who received increased PHN home visits in the first six weeks following childbirth (76.1%) was much higher than expected. National guidelines on child health surveillance which are based on Best Health for Children recommends a single PHN home visit to new mothers within 24 - 48 hours of notification of hospital discharge (Denyer *et al.* 1999). This significant number of increased home visits required from the Irish PHN service has not been previously noted in the literature. It does however, support both Irish and international literature on the increased workload involved for each PHN in supporting postnatal mothers (Begley *et al.* 2004, Hanafin & Cowley 2005, Borrow *et al.* 2011, Giltenane *et al.* 2015).
- Almost all (99%) of new mothers were seen within the specified timelines for a PHN first visit. This is a considerable accomplishment on behalf of Irish PHNs given the large volume of literature describing large caseloads and heavy workloads. It does however, also lend weight to the ONMSD (2012) report suggesting PHNs sacrifice other areas of their clinical practice in order to meet child development and well-being health assessments within the specified target timelines.

## 7.7 Strengths of the study

This study was the first to examine the development and well-being outcomes of children from birth to two years in a longitudinal manner. The Influence of the Irish public health nurse in promotion of child development and well-being outcomes in the first two years of life was also assessed during this study. This study was the first study of its kind to examine these factors in conjunction with each other.



This study examined a large cohort of children using quantitative measures across four time points. The eight measures consisted of six psychometrically robust measures and two study-specific questionnaires designed specifically for this study. These specially selected and designed measures were used to measure maternal and child outcomes as part of this study. This is the first study, to the researcher's knowledge, that used all five subsets of the DAYC (Voress & Maddox 1998). The tools are seen to complement each other as some overlap in areas of measurement. For example, the DAYC supports the biographic / demographic questionnaire and the Short Form 36 Health Survey is complemented by the World Health Organization Quality of Life-BREF. The use of a substantial number of measures lends strength to the study design as recognised by Shonwald *et al.* (2009) by increasing the effectiveness of the study in measuring desired variables. Maternal, paternal and parental data were also gathered to ensure accurate representation of the study sample.

A pilot study was conducted prior to the main study to establish face validity of the eight selected measures as a single assessment pack. The choice of measures was guided by respondent feedback during this process.

Randomisation at the outset of this study could be considered both a strength and a weakness. Randomisation is generally used to reduce selection bias in participant recruitment in randomised controlled trials. In this study it also functioned to slow the recruitment process to ensure child assessments were undertaken at the correct time points by the researcher.

This study saw a very low attrition rate of 5%, well below accepted rates of up to 20% (Desmond *et al.* 1995).

This study addressed a gap in previous research by focusing on the influence of increased home visits and referrals to other professionals and support services, by assessing these factors in a longitudinal manner at structured follow-up periods, by using both subjective and objective measures, by addressing these questions in a sample from a range of diverse cultures, by using middle-range practice theory in a large cohort and by using reliable and valid measures.

## 7.8 Limitations of the study

As part of a detailed literature review undertaken prior to this study, it was important to ensure that there was a sound theoretical framework for the study. Through this literature review, the researcher ensured that appropriate measures were selected and sourced all available information relating to child health, development and well-being, maternal health and well-being and PHN interventions. A notable difficulty in the development of this study was the unavailability of a similar study for comparison purposes.

This study examined a large cohort of infants using quantitative measures across four time points. The large sample size lends to the power of the study and reliability of the analysis. While the researcher acknowledges that a number of outcomes may have reached statistical significance if a larger sample had been measured, the human resources and considerable financial cost involved in such a study would make it difficult to undertake.

A limitation of the randomisation process is the possibility that mothers and children randomised out of the sample may have displayed greater or lesser social and care needs influencing the findings of the study.

A further limitation is the combination of quantitative and qualitative methods not being used which would have contributed to study findings in relation to the PHN's assessment and what he /she identified as requiring such a substantial number of increased home visits.

As this study was the first study to use this combination of measures to assess the influence of PHN interventions, a possible limitation is the unknown biases this may have introduced. Likewise, previously devised biographic and demographic questionnaire were not available for the purposes of this study and specifically designed and piloted tools were used. Attempts were made to reduce possible bias introduced by this process by structuring the questionnaire design according to Frazer and Lawley (2000) which advises framing research questions in a manner that is easily understandable to the reader.

The cohort under investigation were seen to be mainly from middle income families, well-educated, married parents living in private homes in rural areas or large towns. Data was also restricted to two HSE areas due to the geographical restrictions imposed by a single researcher gathering all data. This may reduce the generalisability of the data.

The researcher was a PHN working in rural clinical practice. This may have impacted upon the choice of research setting and data disclosed by respondents. In an attempt to reduce this possible bias, the researcher identified herself as a PHN in the first stage of the recruitment process and at each assessment thereafter. Some may view the profession of

the researcher as a strength. Begley *et al.* (2004) argue in favour of practitioner research and recommend researchers research their area of practice to identify service needs. Mulhall (1997) also advocated for practitioner research as those who do not conduct research often fail to effectively apply research findings to clinical practice.

This study gathered data on paternal demographics, physical health and mental health which could not be analysed as part of this PhD. The study focused on the objectives of the study which were maternal and infant / child variables, as previous research demonstrates the significant impact maternal health and well-being has on child development and well-being. Future analysis of the influence of paternal variables on child outcomes and PHN interventions could yield valuable and original results.

In-depth analysis of the intervention group was not an objective of this study. This is a limitation as some families availed of more than one PHN referral. As an increased referral rate could signify greater social or care needs, it would be valuable to review this group in future analysis aiming to establish a link, if any, between the type of referral required and child development and well-being outcomes.

## **7.9 What this study adds to current literature on child development and well-being**

- Statistical analysis supported the first study hypothesis showing increased PHN home visits had a significant effect on child development and well-being. The most significant difference was seen in adaptive behaviour followed by physical development and communication skills across four timelines and on child social-emotional development at age two years.
- Analysis also upheld the second study hypothesis showing increased PHN referrals to other professionals and support services had a significant effect on child development and well-being in the areas of physical development and adaptive behaviour skills across four timelines and social-emotional development at age two years.
- Combined home visits and PHN referral to professionals and support services improved physical development and adaptive behaviour in infants from birth to two years, as well as social-emotional development at age two years.

## **7.10 Clinical and research recommendations**

This study contributes to the literature by highlighting the important role PHNs provide through home visiting and referrals to professionals and support services in supporting mothers in the first six weeks following childbirth. It also shows the significant effect that early interventions have on two year outcomes of young children. These findings have implications for public health nursing practice, strategic planning, Irish policy and future research.

### **7.10.1 Clinical recommendations**

As identified from the literature the broad scope of the PHN's preventative and health promotion role with all age groups from birth to old age requires revision if PHN's are to have sufficient time to provide such a sizeable number of home support visits to postnatal mothers. The current blueprints for public health nursing practice, Best Health for Children: Developing a Partnership with Families and Best Health for Children Revisited recommending one PHN home visit following notification of postnatal hospital discharge need to be reviewed in light of the increased number of PHN home visits required by respondents in this study. This would ensure mothers and children receive the quality service they require to meet the child's needs which was identified in the Report of the Expert Advisory Group on the Early Years Strategy (DoCYA 2013). This document cautioned that the lack of allocated time for PHN home visiting services would have a negative impact of the efficacy on the services that PHNs provide. Work has commenced by the Department of Health and Children on enhancing children's services in both the community and hospital setting in identifying the need for a greater skill mix of specialist nursing posts.

Emmanuel and Sun (2014) warn of the tendency for health professionals to overlook postnatal mothers when there is no obvious mental health concern. Given the insidious onset of mental illness in this group and the high rates of mental health symptoms at two years postpartum the study recommends PHN's are trained to be vigilant and competent in addressing the mental health needs of postnatal mothers for up to two years. The incorporation of measures such as the Edinburg Postnatal Depression Scale to assess maternal health as part of the national child surveillance programme would be a valuable diagnostic addition to the role of the PHN.

This study showed that a significant number of mothers availed of referrals to members of the multi-disciplinary team and community services within two years of childbirth. A smooth assessment, referral and review process needs to be established to ensure optimal capture of need and early intervention for this group. The current waiting time of up to 18 months of vital services such as speech and language therapy in some HSE areas could lead to a significant delay in child development during a period of substantial growth and child outcome potential.

The number of children seen in the Emergency Department due to accidental injury was seen to rise sharply from age 14 months to 2 years. As accidents are preventable parents need PHN support and education in home safety and accident prevention. PHN's need training and expertise in this area but also sufficient time to provide education to the parents who are on their caseload. A national policy-driven approach in this regard would be very useful. The incidence of Emergency Department presentation is likely to have decreased during working hours since the introduction of free GP care for children under 6 years by the Department of Health and Children in July 2015.

### **7.10.2 Research recommendations**

Research is required to improve understanding of the incidence, contributing factors and nature of physical ill health among mothers in the early postpartum period. Such research is vital to ensure appropriate assessment and treatment as unrecognised physical illness has been shown by this study to be associated with reduced quality of life.

Future research could provide a better understanding of the effect of one core visit as required by the current national child health surveillance programme to determine if a more optimal number of core visits could be recommended.

PHN's, are the only healthcare professional mandated to visit the family home. Increased research on the family home environment and maternal needs in the postnatal period would add significantly to the currently available literature as data within the home setting on child, maternal and family needs are acutely lacking. Such increased information could facilitate a review of interventions available to families in the postpartum period and ensure more effective use of resources.

Previous literature emphasises the positive impact of breastfeeding on child cognitive development and social-emotional development (Leahy-Warren *et al.* 2013). Previous studies however have concentrated on the first year following childbirth, the benefits of

breastfeeding and the rates of discontinuation. Findings from this study suggest that when breast feeding continues beyond the first year, breast feeding mothers may continue to experience challenges that require intervention and support. Further research into the second year of life and beyond would help to establish a fully comprehensive understanding of breastfeeding among Irish mothers.

Future research should be undertaken on the incidence, risk factors and nature of accidental injuries sustained by children aged 14 months to 2 years. This would help focus PHN-led education and prevention programmes in the area of child safety.

Parental choice of childcare is an under-researched area of child health and development. The reasons underlying parents' choice of particular childcare arrangements would be beneficial at local and national level.

Finally, a significant recommendation from the study is a need to expand the limits of the research and conduct a national review to look at the impact of PHN interventions in the postpartum period on a larger sample from a variety of social economic and geographical backgrounds in the four HSE areas.

## **7.11 Conclusion**

The purpose of this quantitative prospective cohort study was to measure the development and well-being longitudinal outcomes of a sample of 154 children, from birth to two years of age, following increased PHN home visits within the first six weeks following hospital discharge and increased PHN interventions in the form of referrals accepted by respondents to other professionals and support services. Data were recorded and compared to respondents who received routine PHN care. This study measured five areas of child development and well-being which were cognitive development, communication skills, social-emotional development, adaptive behaviour and physical development based on the Development Assessment of Young Children (Voress & Maddox 1998). Hypothesis testing using t-tests and one-way repeated measures ANOVA were used to summarise the relationship between increased PHN home visits, increased PHN interventions and child development and well-being outcomes.

Analysis was based on descriptive and exploratory testing, t-testing, cross-tabulation and repeated measures ANOVA across four timelines. Respondent mothers ranged in age from 19 to 47 years (mean age 33 years). Gestational age of infants ranged from 33 to 42 weeks. Birth weights ranged from 2.8 to 4.5 kg (mean birth weight 3.5 kg). While the majority of

respondents experienced good health, the data indicated poor physical health for 12% (n=17) and poor mental health for 15% (n=22) when children were aged 2 years.

Statistical analysis supported the first study hypothesis showing increased PHN home visits exerted a positive significant effect on child development and well-being when compared to respondents who received routine care. The most significant difference was seen in the area of physical development, communication skills and adaptive behaviour. Analysis also upheld the second study hypothesis, supporting the positive significant effect of increased PHN referral rates to other professionals and support services when compared to the group who received routine PHN care. A statistically significant effect was seen in the areas of physical development, adaptive behaviour skills and social-emotional development. Combining the influence of both increased PHN home visits and increased referral rates, the study revealed a statistically significant improvement in respondent social-emotional development, physical development and adaptive behaviour. No correlation was found between increased home visits and maternal mental health, number of siblings, infant feeding type, marital status, housing type, budget, parental education and parental employment. Data analysis revealed poor maternal physical health to be the main indicator for PHNs when determining a need for increased home visits. This is interesting given the high rates of poor mental health and poor quality social relationships among the study sample.

The findings of this study have implications for PHN practice at a national level, suggesting that current guidelines on the number of core visits to postnatal mothers should be revised considering the necessity for increased postnatal visits in line with this study's findings. Recent publications regarding staff shortages and PHNs being unable to maintain basic child health surveillance programmes due to these shortages are of significant concern and would need to be addressed to ensure PHNs are available to postnatal mother to provide them with increased home visits and increased interventions where necessary.

A particular strength of this quantitative research was its longitudinal design. It was difficult to say how this study compared internationally due to the lack of national and international research in the area. This study has contributed to the paucity of research and is the first, to the researcher's knowledge, that revealed child development and well-being outcomes at different time points following public health nursing increased home visits and PHN referral to other professionals, supports and services.

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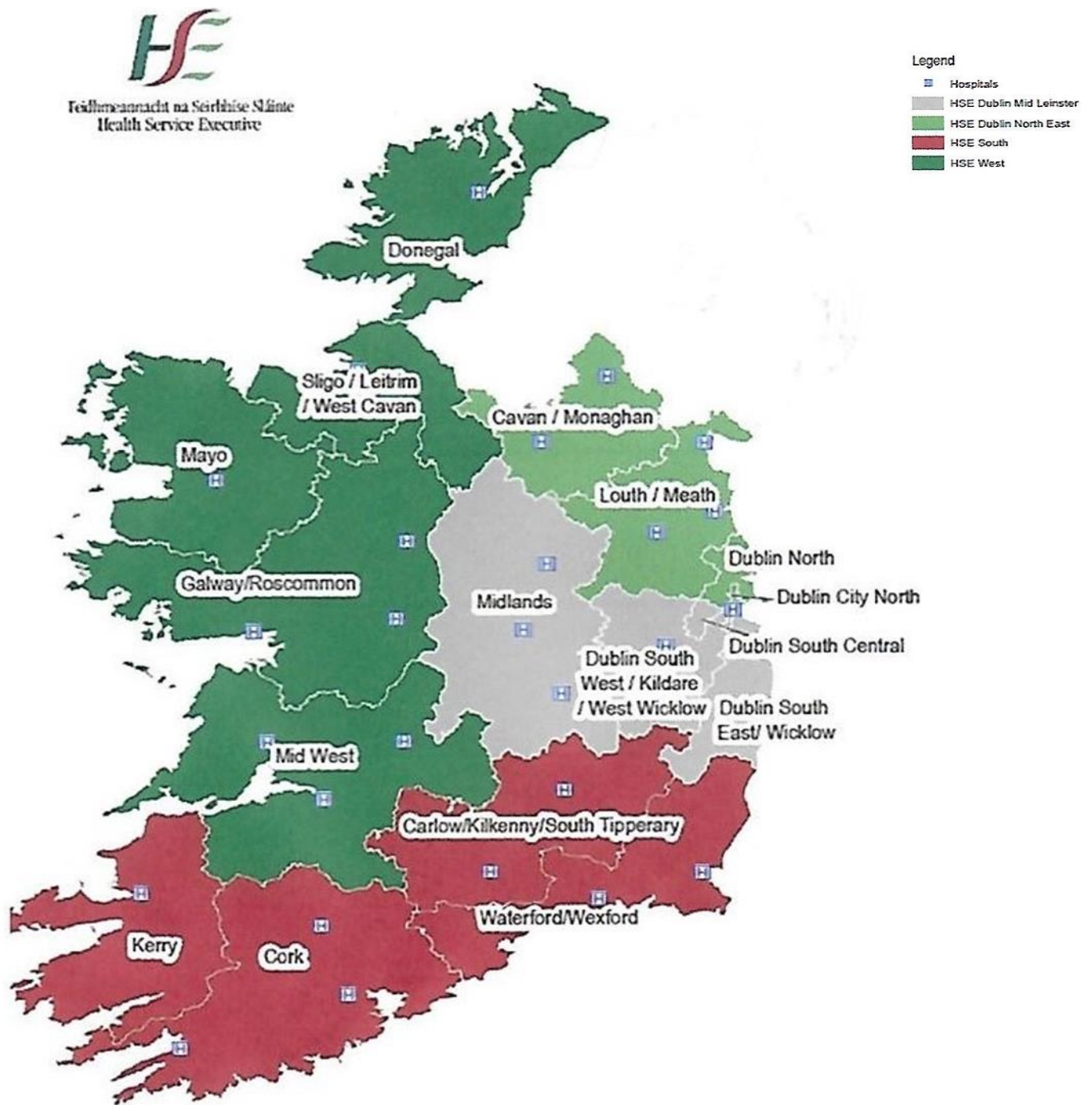
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# Appendix 1: Map of Health Service Executive (HSE) Areas



## Appendix 2: Recruitment of the study sample

### *Congratulations on the birth of your baby*



You are being offered an opportunity to take part in a longitudinal study where the development and well-being of your baby up to the age of 2 years will be measured by a researcher who is a Public Health Nurse.

This is a comprehensive study on your child's development and well-being that takes into account the effectiveness of supports and services available to Public Health Nurses to offer your child and other children in your area.

The study is being conducted by Mary O'Rourke a Public Health Nurse (PHN) and PHN researcher in conjunction with Trinity College Dublin and Monica Sheehan Director of Public Health Nursing HSE South. A group of 150 children will be chosen at random from those of you who return the participation acceptance card within one week of receiving it. A prompt return is important as the study has to commence within the first month of the baby's birth.

If you would like to participate and learn more about this study, please complete the enclosed participation acceptance card and return it in the self addressed envelope. I will then contact you with further details of the study. Your experience really counts and will greatly contribute to the development and well-being of other children.

Please be assured that both you and your child's identity in this study will remain anonymous.

For more information please contact [morourk@tcd.ie](mailto:morourk@tcd.ie) or  
Phone 086 7872386

Thank you

*Mary O'Rourke*



The researcher who has obtained ethical approval will carry photographic ID and your local Director of Public Health Nursing has given permission for this study.



# Participation Acceptance Card

**Re: Measuring the Development and Well-being Outcomes of Children Receiving Public Health Nurse Interventions.**

I would like to participate in this study

YES

Name \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Contact Phone Number \_\_\_\_\_

The Best Time to Contact Me is

\_\_\_\_\_

My Baby's Date-of-Birth is

\_\_\_\_\_



## **PARENT INFORMATION LEAFLET AND CONSENT FORM FROM BIRTH TO 18 – 24 MONTHS**

### **STUDY TITLE:**

*Measuring the development and well – being longitudinal outcomes of children from birth to two years following public health nurse interventions.*

### **INVESTIGATOR:**

Ms. Mary O’ Rourke

You are being invited to participate in a research study. Thank you for taking time to read this.

### **BACKGROUND INFORMATION:**

I am a Public Health Nurse and I work in the Castleisland Community Area in County Kerry. I am very interested in finding out if the interventions you and your child received from your public health nurse are effective in promoting child development and well-being. In particular I would like to know if there is a specific service that you received that would best promote the development and well-being of children. I am undertaking this study as a PhD student at Trinity College and I would like you to consider taking part.

### **WHAT DOES THIS STUDY INVOLVE?**

Taking part will involve talking to me four times. The first one will take place within the first or second month following the birth of your baby and the following three will take place after your routine child health development checks which will be twice in the first year and again when your child is 18-24 months old. I am happy to arrange to meet you at a time and place convenient to you.

As is normal procedure in undertaking research of this kind I must make you aware that as a public health nurse if you reveal anything that makes me concerned for you or your child I am obliged to report it the Assistant Director of Public Health Nursing in your area and I will keep you fully informed.

### **WHY WAS YOUR CHILD SELECTED?**

Your child was selected because the child’s birthday falls between June 1<sup>st</sup> 2011 and December 1<sup>st</sup> 2011. The main topics to be covered in the questionnaires that you will be requested to answer are based on your child’s development, your health, demographics and the interventions you and your child received from your public health nurse taking approximately 60 minutes.

### **WHAT ARE THE BENEFITS OF TAKING PART?**

The information obtained on both you and your child will provide further knowledge of key interventions in promoting child development and well-being. This will be submitted to all Directors of Public Health Nursing for their consideration.

### **ARE THERE ANY RISKS INVOLVED IN PARTICIPATION?**

The study procedures involve no foreseeable risk or harm to you or your family. Should you choose to participate in this study with your permission your General Practitioner (GP) will be notified of your child's participation if any adverse outcomes arise during the study. If you have any concerns in relation to this study, you are free to contact

Mary O' Rourke PHN at Castleisland Health Centre, Kerry, Health Service Executive South [morourk@tcd.ie](mailto:morourk@tcd.ie) or phone 066 7141377

Professor Catherine Comiskey, [ccomiske@tcd.ie](mailto:ccomiske@tcd.ie) Dr. Honor Nicholl, [nichollh@tcd.ie](mailto:nichollh@tcd.ie) and Dr. Naomi Elliot, [elliottn@tcd.ie](mailto:elliottn@tcd.ie) School of Nursing and Midwifery, Trinity College Dublin.

### **CAN I WITHDRAW FROM THE STUDY?**

Your participation in this study is completely voluntary. You are free to withdraw from the study at anytime without an explanation. If you decide to withdraw from this study, it will not affect your child's care by your public health nurse.

### **CONFIDENTIALITY:**

You and your child's identity will remain confidential. Each participant will only be identifiable by a number. Your child's name will not be published or disclosed to anyone.

### **PRINCIPAL INVESTIGATORS:**

Mary O' Rourke PHN, Castleisland Health Centre, Kerry, Health Service Executive South. Professor Catherine Comiskey, Dr. Honor Nicholl and Dr. Naomi Elliot, School of Nursing and Midwifery, Trinity College Dublin.

### **HAS THIS STUDY BEEN REVIEWED BY AN ETHICS COMMITTEE?**

The School of Nursing and Midwifery, The Faculty of Health Sciences Research Committee at Trinity College Dublin and the Health Service Executive Western Area Research Ethics Committee has reviewed and approved this study.

### **CONTACT DETAILS**

My contact details should you require further information, prior to commencement or during the study period.

Mary O' Rourke, Public Health Nurse, Health Centre, College Rd., Castleisland, Co. Kerry. Office: 066 – 7141377.

Mobile: (086) 7872386.

[morourk@tcd.ie](mailto:morourk@tcd.ie)

**PLEASE TICK YOUR APPROPRIATE RESPONSE**

- I have read and understood the Participant Information leaflet Yes      No
- I have had the opportunity to ask questions and discuss the study Yes      No
- I have received satisfactory answers to my questions Yes      No
- I have received enough information about this study Yes      No
- I understand the benefits and risks involved in taking part in this study Yes      No
- I understand that I am free to withdraw from the study at any time without giving a reason and without this affecting my child's future public health nursing care Yes      No
- I agree to my public health nurse fill out a questionnaire based on my child's health and development Yes      No
- I agree to take part and for my child to take part in this study Yes      No
- I agree to my child's GP be notified that my child is taking part in this study Yes      No
- I have received a copy of this consent form Yes      No

Participant's Name in print: \_\_\_\_\_ Date: \_\_\_\_\_

Participant's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

PHN Name in print: \_\_\_\_\_ Date: \_\_\_\_\_

PHN Signature: \_\_\_\_\_ Date: \_\_\_\_\_

I understand that:

Confidentiality will be maintained by adhering to the following procedures,

(a) Access to information gathered will be restricted to the research team.

(b) Data from the study will be analysed and results presented such that individual subjects cannot be identified by their responses.

(c) Material retained once the study is complete will not be used in future unrelated studies without your specific permission.

## **Appendix 3: Description of measures removed at First phase of pilot study**

### **Family Global Health and Well-Being Scale**

The Family Global Health and Well-Being Scale (Anon 2010) is a self-report measure describing emotional relationships and functioning within the family at a specific point in time. The instrument uses forty self-report measures to assess family functioning in the areas of physical and emotional health, family satisfaction, self-esteem, availability of social support and community services. Responses are assessed on the basis of a five point Likert scale.

### **Family Support and Natural Ecology Chart**

The Family Support and Natural Ecology Chart (Anon 2010) is a measure based on the Adaptabilities from Learning Environments Programme. It is divided into eight categories: category one represents supports children receive from their parents, two; lists supports from grandparents, three; outlines support of aunts, uncles and cousins, four; takes account of friends, five; looks at advocacy and support group, six; lists formal agencies such as therapists and health providers, seven; includes school supports and category eight; allows the respondent to include others who may be sources of support such as volunteers and mentors. Respondents are asked to list up to eight persons or groups in each category who support them in rearing their children. Each category is then ranked on a scale from 1 to 5, 5 being the most supportive and one the least supportive. The respondent is finally requested to circle the three most important supports to the family.

### **Mental Health Integration Form**

The Mental Health Integration Form (Intermountain Health Care 2004-2009) is a parental screening and family rating scale which requests a respondent's views on family and support systems which was not used in the main study. The measure can be used to understand a respondent's mental health outlook, the family's style of managing stress and the family's response to difficult health problems (Intermountain Health Care 2004-2009).

## Appendix 4: Measures Used in Study



### *Measuring the development and well-being of children from birth to two years*

This research is measuring the child development and well-being from birth to two years. It is comparing the development and well-being outcomes of children receiving routine public health nurse interventions with those who have been allocated extra public health nursing interventions, supports and services.

#### PARENT QUESTIONNAIRE

Please complete the following questions in relation to your family and the services both you and your child received through your public health nurse.

I would like to assure you that **ALL THE INFORMATION PROVIDED BY YOU IS TREATED IN THE STRICTEST CONFIDENCE AND IS ONLY AVAILABLE TO THE RESEARCHER AND SUPERVISORS OF THE STUDY AT TRINITY COLLEGE DUBLIN**

You will have received an information sheet which outlines details of this study.

|  |
|--|
| <p>1. What is your Nationality?</p> <p>Mother: <input style="width: 150px; height: 20px;" type="text"/></p> <p>Father: <input style="width: 150px; height: 20px;" type="text"/></p>  |
| <p>1.2. What is your Child's Nationality? <input style="width: 150px; height: 20px;" type="text"/></p>   |
| <p>1.3. Marital Status: (Please tick the answer that is correct for you):</p> <p> <input type="checkbox"/> Single                <input type="checkbox"/> Living with partner                <input type="checkbox"/> Married                <input type="checkbox"/> Separated<br/> <input type="checkbox"/> Divorced                <input type="checkbox"/> Other                <input style="width: 150px; height: 20px;" type="text"/><br/> <i>Please Explain</i> </p> |
| <p>1.4. <u>Including this child</u> how many children <b>under</b> 18 years live with you? <input style="width: 50px; height: 20px;" type="text"/></p> <p>1.5. <u>Including this child</u> how many children <b>over</b> 18 years live with you? <input style="width: 50px; height: 20px;" type="text"/></p>   |
| <p>1.6. Parent Age:</p> <p>Mother <input style="width: 20px; height: 20px;" type="text"/> Years      <input style="width: 20px; height: 20px;" type="text"/> Ht      <input style="width: 20px; height: 20px;" type="text"/> Weight</p> <p>Father <input style="width: 20px; height: 20px;" type="text"/> Years      <input style="width: 20px; height: 20px;" type="text"/> Ht      <input style="width: 20px; height: 20px;" type="text"/> Weight</p>                      |

1.7. Where do you live? Your own house  Flat  Social Housing   
 Rented Accommodation  Other  N/A   
*Please Explain*

1.8. Using the following scale, please state how you manage your current budget:

*Not at all*      *A little*      *Adequately*      *Well*      *Very Well*  
 1       2       3       4       5

### **Father of the child**

1.9. Employment:

Are you employed professionally       Self employed  
 Skilled worker       Recently unemployed  
 Long-term unemployed       Home maker  
 Student

1.10 Level of Education

Primary       Secondary       Training Course  
 Institute of Technology Graduate       University Graduate

1.11. Do you smoke?  Yes       No

1.12. How often do you take a drink containing alcohol?

never       monthly or less       two to four times a month  
 four to more times per month       two to three times per week

1.13 Do you use illicit drugs?  Yes       No  
 Sometimes       Not any more

1.14 Are you suffering from any medical condition?  Yes       No

If the answer is **yes** please specify  N/A

1.15 Have you been diagnosed with any mental illness  Yes  No

1.16 If the answer to the last question is YES, how long are you on medication for your mental illness

Weeks  Months  Years N/A

**Mother of the child**

1.17 Employment:

- |  |  |
|--|--|
| <input type="checkbox"/> Are you employed professionally | <input type="checkbox"/> Self employed       |
| <input type="checkbox"/> Skilled worker                  | <input type="checkbox"/> Recently unemployed |
| <input type="checkbox"/> Long-term unemployed            | <input type="checkbox"/> Home maker          |
| <input type="checkbox"/> Student                         |  |

1.18 Level of Education

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> Primary                          | <input type="checkbox"/> Secondary           | <input type="checkbox"/> Training Course |
| <input type="checkbox"/> Institute of Technology Graduate | <input type="checkbox"/> University Graduate |  |

1.19. Do you smoke?  Yes  No

1.20. How often do you take a drink containing alcohol?

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> never                        | <input type="checkbox"/> monthly or less             | <input type="checkbox"/> two to four times a month |
| <input type="checkbox"/> four to more times per month | <input type="checkbox"/> two to three times per week |  |

1.21 Do you use illicit drugs?  Yes  No  
 Sometimes  Not any more

1.22 Are you suffering from any medical condition?  Yes  No

If the answer is **yes** please specify  N/A

1.23. Is there any medical condition that you suffer due to pregnancy or the birth of your baby? (For example stress incontinence, high blood pressure, varicose veins, or other).

Yes  No

If the answer is **yes** please specify  N/A



1.24 Have you ever been diagnosed with Post Natal Depression?  Yes  No

1.25 Have you ever been treated for Post Natal Depression?  Yes  No

1.26 If the answer is YES, for how long were you on medication for Post Natal Depression  
 Months N/A

1.27 If the answer is YES, are you now off of medication for Post Natal Depression  
 Yes  No  N/A

1.28 Did you receive any services from your Public Health Nurse before your baby was born?  Yes  No

If the answer is yes please specify

**This section may be completed by mother / father of the child**

1.29 Is there any family history of

|                           |                              |                             |
|---------------------------|------------------------------|-----------------------------|
| Childhood deafness        | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Dislocation of hips       | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Eye problems in childhood | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

1.30 Any illnesses in the family that you feel are important to mention  Yes  No

1.30.1 If the answer is yes please specify  N/A

1.31. Have you accepted a referral through your public health nurse to any of the following services?

|                               |                              |                             |
|-------------------------------|------------------------------|-----------------------------|
| General Practitioner (GP)     | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Occupational Therapist        | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Physiotherapist               | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Area Medical officer          | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Community Parent              | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Speech and Language therapist | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Mother & Toddler Group        | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Lactation Consultant          | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Family Support Worker         | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Child Care worker             | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Breastfeeding support group   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Home Help service             | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Social Worker                 | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Early Intervention Team       | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| BCG clinic                    | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Voluntary Agencies            | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Other

N/A

1.32. Have any supports or services been offered to you through your public health nurse that you did not accept?  Yes  No

1 If the answer is **yes** please specify

N/A

1.33 In your opinion did the service you receive from your public health nurse meet your child's needs?  Yes  No

If the answer is **No**, please specify

N/A

1.34. Is there a specific service you would have liked your child to receive?

Yes  No

If the answer is **Yes** please specify

N/A

1.35 If the answer to question 34 is **Yes**, do you know if the service you would have liked your child to receive is available in your area?

Yes  No  Not Applicable

1.36 Does your child attend?

Nursery  Playschool  
 Childminder  Crèche  None

1.37 Is transport to child services offered to you by your public health nurse a problem for you?  Yes  No

1.37.1 If the answer is **yes** please specify

N/A

1.38. Do you have family members to support you rearing this child?

Yes  No

If the answer is **yes**, from the following list please tick the family members who support you with your child

- |  |  |  |
|--|--|--|
| <input type="checkbox"/> Spouse                | <input type="checkbox"/> Partner         | <input type="checkbox"/> Maternal Parents      |
| <input type="checkbox"/> Paternal Parents      | <input type="checkbox"/> Mothers Sister  | <input type="checkbox"/> Mothers Brother       |
| <input type="checkbox"/> Fathers Sister        | <input type="checkbox"/> Fathers Brother | <input type="checkbox"/> Maternal Grandparents |
| <input type="checkbox"/> Paternal Grandparents | <input type="checkbox"/> Aunts           | <input type="checkbox"/> Uncles                |

1.39. Would you like to offer any further comments in relation to public health nursing services that your child received? *Please write in block capitals.*

|  |
|--|
|  |
|  |
|  |

**THANK YOU VERY MUCH FOR COMPLETING THIS QUESTIONNAIRE. THE RESULTS AND RECOMMENDATIONS OF THIS RESEARCH WILL BE FORWARDED TO THE DEPARTMENT OF HEALTH AND CHILDREN. A COPY OF THE FINDINGS OF THIS STUDY WILL BE MADE AVAILABLE TO YOU.**





## *Measuring the health and wellbeing of children from birth to two years*

### FIRST ASSESSMENT

The main objective of this study is to measure and compare the development and well-being outcomes of children receiving routine Public Health Nurse (PHN) interventions with those who are receiving extra public health nursing interventions, supports and services. A leaflet explaining interventions, supports and services is attached and can be removed from the back page

I would greatly appreciate if you could spare some time to answer questions on your baby's first month since birth.

I would like to assure you that **ALL THE INFORMATION PROVIDED BY YOU IS TREATED IN THE STRICTEST CONFIDENCE.**

You will have received an information sheet which outlines in more detail the objectives of this study.

1. Today's Date:    1.1.1 No:   
DD MM YYYY

1.2. Child's First Name:

1.3. Child's gestational age:

1.4. Date of Birth:     
DD MM YYYY

1.5. Sex: Male  Female

1.6. County:

1.7. Home Visit  Visit to Health Centre  Coffee Shop

1.8. Prenatal History: Uneventful  Hospitalised  Pre-eclampsia

1.9. Birth Place: Home  Hospital

1.10. Birth Weight  Kg

1.11. Length  Cm

1.12. Type of Delivery: SVD  C-Section  Breech  Forceps   
Assisted Vacuum

**BIRTH:**

1.13. Birth: Single  Multiple

1.14. No of older children living with you

**FIRST RESEARCH VISIT:**

1.15. Infant age:  Weeks

1.16. Weight  Kg

1.17. Length  Cm

1.18. **Physical Observations: Please tick the answer that is correct:**

**Skin** Appears Satisfactory  Yes  No

**Colour** Appears Satisfactory  Yes  No

**Movement** Appears Satisfactory  Yes  No

1.19. **FEEDING: Please tick the answer that is correct:**

**Breast**  **Partial Breast**  **Formula**  
 **Cows Milk**  **Goats Milk**  **Other**

1.20. Did you have contact with a Public Health Nurse PHN during your pregnancy with this child? Yes  No

1.21. How many home visits has your PHN made to this child and your family within the baby's first month following birth?

0  1  2  3  4  5  6 +

1.22. **Please tick the approximate** length of time per visit from your PHN in *minutes*?

**Visit One**

0-10  11-20  21-30  31-40  41-50  51-60  60 +

**Visit Two**

0-10  11-20  21-30  31-40  41-50  51-60  60 +

**Visit Three**

0-10  11-20  21-30  31-40  41-50  51-60  60 +

**Visit Four**

0-10  11-20  21-30  31-40  41-50  51-60  60 +

1.23. **Please tick** which of the following interventions your PHN has provided you with?

- |   |                              |                             |
|---|------------------------------|-----------------------------|
| Education on breastfeeding  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Education on infant feeding   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Education on preparing infant feeds   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Education on child safety environment   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Education about general care of your child such as bathing, skin care, sleeping etc   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Advice on parenting e.g. caring for yourself as a couple, getting rest, spending time together as a couple, organising a baby sitter, asking for help when needed etc | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Advice on managing infant colic   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Advice on social support  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Advice on passive smoking   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Advice on the dangers of alcohol  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Advice on the dangers of drugs  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Advice on your diet   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Advice on infant emotional health   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on infant growth and development  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on childhood immunisation   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on sudden infant death syndrome   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on postnatal exercises  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on postnatal depression   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on family planning  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on family support services  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on home safety  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on car safety   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on fire safety  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

1.24. Are there any **other interventions** you would like to mention that you received from your public health nurse to promote the development and well-being of this child?  
Yes  No

If the answer is **yes** please specify

N/A

1.25. Have you any **further comments** you would wish to offer in relation to public health nursing support that you have received concerning this child?  Yes  No

If the answer is **yes** please comment

1.26. Are there other services **you would have liked** to obtain through your public health nurse?  Yes  No

If the answer is *yes* please comment

N/A

1.27. If the answer to the previous question is YES, do you know if the service you would have liked is available in your area?

Yes     No     Don't Know     Not Applicable

Q1.28. Have you received Health Promotion Literature from your Public Health Nurse

Yes     No

**THANK YOU VERY MUCH FOR COMPLETING THIS QUESTIONNAIRE. THE INFORMATION OBTAINED FROM THIS RESEARCH WILL BE FORWARDED TO THE DEPARTMENT OF HEALTH AND CHILDREN. A COPY OF THE FINDINGS OF THIS STUDY WILL BE MADE AVAILABLE TO YOU.**





*Measuring the development and well-being of children from birth to two years*

**SECOND ASSESSMENT**

The main objective of this research is to measure and compare the development and well-being outcomes of children receiving routine public health nurse interventions with those who are receiving extra public health nursing interventions, supports and services. A leaflet explaining interventions, supports and services is attached and can be removed from the back page.

I would greatly appreciate if you could spare some time to answer questions in relation to your child's health and development **at 4-7.5 months of age.**

I would like to assure you that **ALL THE INFORMATION PROVIDED BY YOU IS TREATED IN THE STRICTEST CONFIDENCE.**

You will have received an information sheet which outlines in more detail the objectives of this study.

1.1 Today's date:    Q1.1.1 No:   
 DD MM YYYY

1.2 Child's First Name:

1.3 Date of Birth:     
 DD MM YYYY

1.4 County:

1.5 Home visit:  Visit to Health Clinic:  Coffee Shop:

**SECOND RESEARCH VISIT:**

1.6 Child's Age  Months

1.7 Weight with clothes  Kg

1.8 Height  cm

---

**1.9 Did you attend the standard two week and six week GP check-up after the birth of your baby:**

GP health visit      **Two weeks**  Yes     No     Not Available  
                                  **Six weeks**  Yes     No     Not Available



### 1.10 Physical observations:

*Please tick the answer that is correct:*

|                                      |                              |                             |
|--------------------------------------|------------------------------|-----------------------------|
| Colour appears satisfactory          | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Alert/Smiles                         | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Holds head erect for several seconds | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Visually alert                       | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

### 1.11 FEEDING: *Please tick the answer that is correct:*

|                                    |   |                                  |
|------------------------------------|---|----------------------------------|
| <input type="checkbox"/> Breast    | <input type="checkbox"/> Partial Breast | <input type="checkbox"/> Formula |
| <input type="checkbox"/> Cows Milk | <input type="checkbox"/> Goats Milk     | <input type="checkbox"/> Other   |

If no longer breastfeeding please indicate Age when stopped breastfeeding:

Weeks

1.11.1 At what age was your baby introduced to solid food.  Weeks

1.11.2 How many hours at night does your baby sleep?  Hours

### CHILD HEALTH

1.12 Please tick the following interventions you have received through your PHN at the 3 month developmental assessment.

|  |                              |                             |
|--|------------------------------|-----------------------------|
| Education on breastfeeding                   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Education on bottle feeding                  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Education on weaning                         | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Education on preparing infant feeds          | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Education on child safety environment        | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Advice on infant emotional health            | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Advice on managing infant colic              | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on childhood immunisation        | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on infant growth and development | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

### 1.13 Parent and family health

|  |                              |                             |
|--|------------------------------|-----------------------------|
| Advice on family diet                  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on postnatal exercises     | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on postnatal depression    | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on family support services | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on home safety             | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on car safety              | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Information on fire safety             | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Other, please specify  N/A

1.14 Are your child's immunisations up to date?  Yes  No

1.15 Have you any further comments you would like to offer in relation to interventions, supports and services you *would like to receive* through your public health nurse to promote the health and wellbeing of your child?

Yes  No  Not Needed

If your answer is *yes* please specify.

1.15.2.V2 N/A

1.16 If the answer to question 15 is *yes* is the *intervention or service* available through your public health nurse in your area?  Yes  No  Don't Know

1.17 If your child *requires extra services through your public health nurse* is the specific service that meets your child's needs available to you in your area?

|                     |                              |                             |                                     |                                     |
|---------------------|------------------------------|-----------------------------|-------------------------------------|-------------------------------------|
| Creche              | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't know | <input type="checkbox"/> Not needed |
| FamilySupportWorker | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't know | <input type="checkbox"/> Not needed |
| Psychologist        | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't know | <input type="checkbox"/> Not needed |
| Child Care Worker   | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't know | <input type="checkbox"/> Not needed |
| Respite Care        | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't know | <input type="checkbox"/> Not needed |

1.18 If you require extra services for your child, what service/services do you consider best suit your child's needs?

N/A

1.19 If the specific service to meet your child's needs is **not available** in your area, were you able to *avail of an alternative service* through your public health nurse?

Yes  No  Not Needed

Please specify

N/A

1.20 Are there any other interventions, supports or services you would like to mention that you or your child received from your public health nurse  Yes  No

If the answer is *yes* please specify

N/A

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*Measuring the development and well-being of children from birth to  
two years*

**It will be necessary to fill out a questionnaire at each Child Health  
Developmental Milestone**

The main objective of this research is to measure and compare the development and well-being outcomes of children receiving routine public health nurse interventions with those who are receiving extra public health nursing interventions, supports and services. A leaflet explaining interventions, supports and services is attached and can be removed from the back page

**THIRD ASSESSMENT**

I would greatly appreciate if you could spare some time to answer questions in relation to your child's health and development **at 9-14 months of age.**

I would like to assure you that **ALL THE INFORMATION PROVIDED BY YOU IS TREATED IN THE STRICTEST CONFIDENCE.**

You will have received an information sheet which outlines in more detail the objectives of this study.

|                              |                     |   |   |   |              |   |   |
|------------------------------|---------------------|---|---|---|--------------|---|---|
| 1.1                          | Today's date:       | <input style="width: 30px; height: 20px;" type="text"/>     | <input style="width: 30px; height: 20px;" type="text"/> | <input style="width: 30px; height: 20px;" type="text"/>     |              | 1.1.1 No:   | <input style="width: 100%; height: 20px;" type="text"/> |
|                              |                     | DD  | MM  | YYYY  |              |   |   |
| 1.2                          | Child's First Name: | <input style="width: 90%; height: 20px;" type="text"/>      |   |   |              |   |   |
| 1.3                          | County:             | <input style="width: 90%; height: 20px;" type="text"/>      |   |   |              |   |   |
| 1.4                          | Home visit:         | <input style="width: 20px; height: 20px;" type="checkbox"/> | Visit to Health Clinic:                                 | <input style="width: 20px; height: 20px;" type="checkbox"/> | Coffee Shop: | <input style="width: 20px; height: 20px;" type="checkbox"/> |   |
| <b>THIRD RESEARCH VISIT:</b> |                     |   |   |   |              |   |   |
| 1.5                          | Child's Age         | <input style="width: 30px; height: 20px;" type="text"/>     | Months  |   |              |   |   |
| 1.6                          | Weight with clothes | <input style="width: 30px; height: 20px;" type="text"/>     | Kg  |   |              |   |   |
| 1.7                          | Height              | <input style="width: 30px; height: 20px;" type="text"/>     | cm  |   |              |   |   |

**1.8 Physical observations: Please tick the answer that is correct:**

- |                             |                              |                             |
|-----------------------------|------------------------------|-----------------------------|
| Colour appears satisfactory | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Alert/Smiles                | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Visually alert              | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Transfers objects           | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Fine pincher grasps         | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Baby's hearing              | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Child babbles               | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Child waves bye bye         | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

**1.9 FEEDING: Please tick the answer that is correct:**

- |                                    |   |                                  |
|------------------------------------|---|----------------------------------|
| <input type="checkbox"/> Breast    | <input type="checkbox"/> Partial Breast | <input type="checkbox"/> Formula |
| <input type="checkbox"/> Cows Milk | <input type="checkbox"/> Goats Milk     | <input type="checkbox"/> Other   |

Please indicate Age when stopped breastfeeding:

Months

**CHILD HEALTH**

1.10 Please tick the following interventions you have received through your PHN at the 7-9 month developmental assessment.

- |  |                              |                             |
|--|------------------------------|-----------------------------|
| Education on continuing formula feeding                          | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Education on mashed diet for child                               | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Education on introduction of iron rich food into child's diet    | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Education on introduction of child's feeding cup and finger food | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Education on infant emotional health                             | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Education on child safety environment                            | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Education on care of child's teeth                               | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Education child growth and development                           | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

**1.11 Maternal and family health**

- |   |                              |                             |
|---|------------------------------|-----------------------------|
| Advice on family social support services              | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Advice on passive smoking                             | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Advice on the importance of parent good mental health | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Advice on the dangers of alcohol                      | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Advice on the dangers of drugs                        | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Advice on smear test                                  | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Information on family entitlements                    | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Information on family planning                        | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Information on stress incontinence                    | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

1.12 Are your child's immunisations up to date?  Yes  No

1.13 Are there **other interventions you received through your public health nurse** (since my last visit) to promote the health and well-being of this child? Yes  No

If the answer is **yes** please give list.

N/A

1.14 Were you satisfied with the Public Health Nursing Support that you have received regarding your child? Satisfied  Not Satisfied

If the answer is 'Not Satisfied' to the above please state why

N/A

1.15 Are there **other services** you would have liked to obtain through your public health nurse? Yes  No

If the answer is 'Yes', Please specify.

N/A

If the answer is **yes** do you know if the service **you would have liked** is available in your area? Yes  No  Don't know  Not Applicable

1.16 If your child **requires extra services through your public health nurse** is the specific service that meets your child's needs available to you in your area?

|                     |                              |                             |                                     |                                     |
|---------------------|------------------------------|-----------------------------|-------------------------------------|-------------------------------------|
| Creche              | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't know | <input type="checkbox"/> Not needed |
| FamilySupportWorker | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't know | <input type="checkbox"/> Not needed |
| Psychologist        | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't know | <input type="checkbox"/> Not needed |
| Child Care Worker   | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't know | <input type="checkbox"/> Not needed |
| Respite Care        | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't know | <input type="checkbox"/> Not needed |

1.17 If you require extra services for your child, what service do you consider **best suits** your child's needs?

Please specify

N/A

1.18 If the specific service to meet your child's needs **is not available** in your area were you able to avail of an alternative service through your public health nurse?

Yes  No  Not Needed

Please specify

N/A

1.19 Have you any further comments about the supports or service you received through your public health nurse for this child? Yes  No

If the answer is yes please specify

N/A

**THANK YOU VERY MUCH FOR COMPLETING THIS QUESTIONNAIRE. THE RESULTS AND RECOMMENDATIONS OF THIS RESEARCH WILL BE FORWARDED TO POLICY DEVELOPMENT IN THE DEPARTMENT OF HEALTH AND CHILDREN. A COPY OF THE FINDINGS OF THIS STUDY WILL BE MADE AVAILABLE TO YOU.**





*Measuring the development and well-being of children from birth to  
two years*

**For this research, it will be necessary to fill out a questionnaire at each  
Child Health Developmental Milestone**

The main objective of this study is to measure and compare the development and well-being outcomes of children receiving routine public health nurse interventions with those who are receiving extra public health nursing interventions, supports and services. A leaflet explaining interventions, supports and services is attached and can be removed from the back page.

**FOURTH ASSESSMENT**

I would greatly appreciate if you could spare some time to answer some questions in relation to your child's health and development **at 23 – 24 months of age.**

I would like to assure you that **ALL THE INFORMATION PROVIDED BY YOU IS TREATED IN THE STRICTEST CONFIDENCE.**

You will have received an information sheet which outlines in more detail the objectives of this study.

1.1 Today's date:    1.1.1 No:  
DD MM YYYY

1.2 Child's First Name:

1.3 County:

1.4 Home visit:  Visit to Health Clinic:  Coffee Shop:

**FOURTH RESEARCH VISIT:**

1.5 Child's Age  Months

1.6 Weight with clothes  Kg

1.7 Height  cm

**1.8 FEEDING: Please tick the answer that is correct:**

Breast  Partial Breast  Formula  
 Cows Milk  Goats Milk  Other

Please indicate Age when stopped breastfeeding: Months

**1.9 Posture and Large Movements:** Walks up steps one hand held  Yes  No

**1.10 Vision and Fine Movements:**

Builds 3 – 4 blocks  Yes  No

Builds 6 – 7 blocks  Yes  No

Diagnosed with a squint  Yes  No

**1.11 Hearing and Speech:**

Understands simple orders  Yes  No

Joins 2 – 3 words in sentences  Yes  No

Many intelligible words  Yes  No

Speech is clear and distinct  Yes  No

**1.12 Social Play and Behaviour:**

Watches others play  Yes  No

Asks for drinks, food  Yes  No

Asks to go to the toilet  Yes  No

**1.13 Please tick the answer that is correct for you:**

Which of the following interventions has your PHN provided you with?

Education about care of the child  Yes  No

Information on child health and development  Yes  No

Information on crèche facilities  Yes  No

Information on social support services  Yes  No

Advice on child safety environment  Yes  No

Other public health nursing interventions involved in promoting the health and wellbeing of your child, example?  N/A

1.14 Are your child's immunisations up to date?  Yes  No

1.15 Are there other interventions you received from your public health nurse (since my last visit) to promote the health and wellbeing of this child?  Yes  No

If the answer is **yes** please give list.

N/A

1.16 Are there other services you would have liked to obtain through your public health nurse?  Yes  No  Not Needed

Please specify.

N/A



1.17 If the answer to question 9 is **yes** do you know if the service you would have liked your child to receive is available in your area? Yes  No   
 Don't know  Not Applicable

1.18 In relation to public health nursing support that you have received concerning this child have you any further comments? Yes  No

If 'Yes', Please comment

N/A

1.19 If your child **requires extra services through your public health nurse** is the specific service that meets your child's needs available to you in your area?

- |                       |                          |     |                          |    |                          |            |                          |            |
|-----------------------|--------------------------|-----|--------------------------|----|--------------------------|------------|--------------------------|------------|
| Creche                | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Don't know | <input type="checkbox"/> | Not needed |
| Family Support Worker | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Don't know | <input type="checkbox"/> | Not needed |
| Psychologist          | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Don't know | <input type="checkbox"/> | Not needed |
| Child Care Worker     | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Don't know | <input type="checkbox"/> | Not needed |
| Respite Care          | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Don't know | <input type="checkbox"/> | Not needed |

1.20 If you require extra services for your child, what service do you consider **best suits** your child's needs?

Please specify

N/A

1.21 If the specific service to meet your child's needs **is not available** in your area were you able to avail of an alternative service through your public health nurse?

- Yes  No  Not Needed

If the answer is **yes** please specify

N/A

1.22 In relation to public health nursing support that you have received concerning this child have you any further comments? Yes  No

If the answer is **yes** please specify

N/A

**THANK YOU VERY MUCH FOR COMPLETING THIS QUESTIONNAIRE. THE RESULTS AND RECOMMENDATIONS OF THIS RESEARCH WILL BE FORWARDED TO POLICY DEVELOPMENT IN THE DEPARTMENT OF HEALTH AND CHILDREN. A COPY OF THE FINDINGS OF THIS STUDY WILL BE MADE AVAILABLE TO YOU.**



## Appendix 5: Summary of study variables

| <b>Child characteristics</b>                          |             |   |
|---|-------------|---|
| Gender  | Categorical | 0 = male, 1 = female  |
| County of residence                                   | Categorical | 1 = Cork, 2 = Kerry, 3 = Limerick   |
| Gestational age                                       | Scalar      | Measured in weeks   |
| Age at assessment                                     | Scalar      | Measured in weeks   |
| Type of feeding                                       | Categorical | 0 = breast, 1 = partial breast, 2 = formula, 3 = cow's milk, 4 = goat's milk, 5 = other               |
| Birth weight  | Scalar      | Measured in kilograms   |
| Weight at assessment                                  | Scalar      | Measured in kilograms   |
| Length at assessment                                  | Scalar      | Measured in centimeters   |
| Maternal opinion of baby's general health since birth | Categorical | Service Utilisation Form  |
| Type of childcare                                     | Categorical | 0 = nursery, 1 = playschool, 2 = childminder, 3 = crèche, 4 = none                                    |
| <b>Maternal characteristics</b>                       |             |   |
| Prenatal history                                      | Categorical | 0 = uneventful, 1 = hospitalized, 2 = pre-eclampsia, 3 = symphysis pubis dysfunction                  |
| Age at assessment                                     | Scalar      | Measured in years   |
| Nationality   | String      | Converted to categorical  |
| Type of delivery                                      | Categorical | 1 = spontaneous vaginal delivery, 2 = caesarean-section, 3 = breech, 4 = forceps, 5 = assisted vacuum |

---

**Maternal characteristics**

---

|   |             |   |
|---|-------------|---|
| Mother's opinion of her own physical health                   | Scalar      | Short Form 36 Health Survey   |
| Mother's opinion of her own mental health                     | Scalar      | Short Form 36 Health Survey   |
| Mother's opinion of her own general health since baby's birth | Categorical | Service Utilisation Form  |
| Maternal rating of level of recent stress                     | Scalar      | Parent Stress Index SF  |
| Maternal rating of recent quality of life                     | Scalar      | WHO QOL-BREF  |
| Current medical illness                                       | String      | Converted to categorical  |
| History of medical condition due to pregnancy                 | String      | Converted to categorical  |
| Current diagnosis of postnatal depression                     | Categorical | 0 = no, 1 = yes   |
| Employment  | Categorical | 0 = professional, 1 = self-employed, 2 = skilled worker, 3 = recently unemployed, 4 = longterm unemployed, 5 = homemaker, 6 = student |
| Level of education  | Categorical | 0 = primary, 1 = secondary, 2 = training course, 3 = IT graduate, 4 = university graduate   |
| Marital status  | Categorical | 0 = single, 1 = partner, 2 = married, 3 = separated, 4 = divorced, 5 = widowed  |
| Housing / accommodation                                       | Categorical | 0 = own house, 1 = own flat, 2 = social housing, 3 = rented accommodation, 4 = other  |
| Ability to currently manage household budget                  | Categorical | 1 = not at all, 2 = a little, 3 = adequately, 4 = well, 5 = very well   |

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**Paternal characteristics**

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|                         |             |   |
|-------------------------|-------------|---|
| Nationality             | String      | Converted to categorical  |
| Age at assessment       | Scalar      | Measured in years   |
| Employment              | Categorical | 0 = professional, 1 = self-employed, 2 = skilled worker, 3 = recently unemployed, 4 = longterm unemployed, 5 = homemaker, 6 = student |
| Level of education      | Categorical | 0 = primary, 1 = secondary, 2 = training course, 3 = IT graduate, 4 = university graduate   |
| Current medical illness | String      | Converted to categorical  |
| Current mental illness  | String      | Converted to categorical  |

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**Maternal supports**

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|   |             |                           |
|---|-------------|---------------------------|
| Sources of family support                   | String      | Converted to categorical  |
| Number of close friends providing support   | Categorical | MOS Social Support Survey |
| Number of close relatives providing support | Categorical | MOS Social Support Survey |
| Tangible supports                           | Categorical | MOS Social Support Survey |
| Affectionate support                        | Categorical | MOS Social Support Survey |
| Positive interaction                        | Categorical | MOS Social Support Survey |
| Emotional / informational support           | Categorical | MOS Social Support Survey |

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**Increased interventions**

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|  |             |  |
|--|-------------|--|
| Number of public health nurse visits               | Scalar      | How many visits has your public health nurse made to this child and your family within the baby's first month following birth?   |
| Average duration of each public health nurse visit | Scalar      | 0 = 0-10 minutes, 1 = 11-20 minutes, 2 = 21-30 minutes, 3 = 31-40 minutes, 4 = 41-50 minutes, 5 = 51-60 minutes, 6 = 60+ minutes |
| In possession of PHN health center phone number    | Categorical | 0 = no, 1 = yes  |
| In possession of PHN mobile phone number           | Categorical | 0 = no, 1 = yes  |

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**Referrals accepted**

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|                             |             |   |
|-----------------------------|-------------|---|
| Area medical officer        | Categorical | Have you accepted a referral through your public health nurse to any of the following services? |
| Breastfeeding support group | Categorical | 0 = no, 1 = yes   |
| Child care worker           | Categorical |   |
| Community parent            | Categorical |   |
| Dietician                   | Categorical |   |
| Early intervention team     | Categorical |   |
| Family support worker       | Categorical |   |
| Home help service           | Categorical |   |

|                             |             |  |
|-----------------------------|-------------|--|
| Lactation consultant        | Categorical | Have you accepted a referral through your public health nurse to any of the following services?<br><br>0 = no, 1 = yes |
| Occupational therapy        | Categorical |  |
| Parent & toddler group      | Categorical |  |
| Physiotherapy               | Categorical |  |
| Social worker               | Categorical |  |
| Speech and language therapy | Categorical |  |
| Voluntary agencies          | Categorical |  |
| Other                       | Categorical |  |

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**Child development outcome measures**

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|                              |        |  |
|------------------------------|--------|--|
| Adaptive behaviour skills    | Scalar | Development Assessment of Young Children |
| Cognitive development        | Scalar |  |
| Communication skills         | Scalar |  |
| Physical development         | Scalar |  |
| Social-emotional development | Scalar |  |

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## Appendix 6: Correspondence relating to Ethical Approval Application



THE UNIVERSITY OF DUBLIN  
TRINITY COLLEGE

SCHOOL OF MEDICINE  
FACULTY OF HEALTH SCIENCES

**Professor Dermot Kelleher, MD, FRCPI, FRCP, F Med Sci**  
Head of School of Medicine  
Vice Provost for Medical Affairs

**Ms Fedelma McNamara**  
School Administrator

Ms Mary O'Rourke  
Kilconlea Upper,  
Abbeyfeale,  
Co Limerick

Trinity College, Dublin 2, Ireland  
Tel: +353 1 896 1476  
Fax: +353 1 671 3956  
email: [medicine@tcd.ie](mailto:medicine@tcd.ie)  
email: [medschadmin@tcd.ie](mailto:medschadmin@tcd.ie)

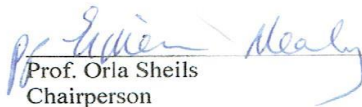
Wednesday, 21 July 2010

Study: Comparing health and wellbeing longitudinal outcomes of non-vulnerable and vulnerable children following public health nurse interventions

Dear Applicant (s),

Further to a meeting of the Faculty of Health Sciences Ethics Committee held in June 2010, we are pleased to inform you that the above project has been approved without further audit.

Yours sincerely

  
Prof. Orla Sheils  
Chairperson  
Faculty of Health Sciences Ethics Committee

Cc  
Prof Catherine Comiskey / Dr Naomi Elliott  
School of Nursing & Midwifery, 24 D'Olier Street, Trinity College, Dublin 2

Schools of the Faculty: Medicine, Dental Science, Nursing and Midwifery, Pharmacy and Pharmaceutical Sciences



Tel: + 353-21-490 1901  
 Fax: + 353-21-490 1919

Coláiste na hOllscoile Corcaigh, Éire  
**University College Cork, Ireland**

COISTE EITICE UM THAIGHDE CLINICIÚIL  
**Clinical Research Ethics Committee**

Lancaster Hall,  
 6 Little Hanover Street,  
 Cork,  
 Ireland.

Our ref: ECM 4 (s) 07/09/10

16th August 2010

Professor Catherine Comiskey  
 Director of Research  
 School of Nursing and Midwifery  
 Trinity College Dublin  
 24 D'Olier Street  
 Dublin 2

**Re: Comparing health and wellbeing: longitudinal outcomes of non-vulnerable and vulnerable children following public health nurse interventions.**

Dear Professor Comiskey

Expedited approval is granted to carry out the above study in:

- HSE South and HSE West.

The following documents were approved:

- Application Form
- Study Protocol
- Information Letters for Parents
- Participant Acceptance Card
- Information Letters for Director, Public Health Nurse and Doctor
- Parent Information Leaflet/Consent for Parents of Children between 18 and 24 months and between 36 and 48 months
- Public Health Nurse Information & Consent Form
- Parent Questionnaires
- Biographical Family Data Form
- Public Health Nurse Questionnaire.

We note that the co-investigators involved in this study will be:

- Dr Honor Nicholl, Mary O'Rourke and Dr Naomi Elliott.

Yours sincerely

Dr Michael Hyland  
 Chairman  
 Clinical Research Ethics Committee  
 of the Cork Teaching Hospitals





## FW: Requesting amendement - June 10

2 messages

**Eimear Mealy** <CASEYEI@tcd.ie>  
To: Mary O Rourke <morourk@tcd.ie>  
Cc: Eimear Mealy <CASEYEI@tcd.ie>

28 March 2011 17:22

Hi Mary,

The Chair has approved your amendment request.

Eimear Mealy  
Senior Executive Officer  
School of Medicine  
Chemistry Building  
Trinity College  
Dublin 2

Ph: + 353 1 896 1727

Fax. +353 1 671 3956

Email: [eimear.mealy@tcd.ie](mailto:eimear.mealy@tcd.ie)

Web: [www.medicine.tcd.ie/](http://www.medicine.tcd.ie/)

**From:** Mary O Rourke [<mailto:morourk@tcd.ie>]  
**Sent:** Monday, March 21, 2011 10:56 AM  
**To:** Eimear Mealy  
**Subject:** Requesting amendement

Dear Eimear,

I am requesting an amendment from the Ethics Committee for measurement instruments.

I have attached a letter to the Chairperson, a copy of my previous application and a copy of each of the two new measurement instruments.

If you need any further information please let me know.



Mary O Rourke <morourk@tcd.ie>

## FW: Application for amendment

2 messages

**Eimear Mealy** <CASEYEI@tcd.ie>  
To: Mary O Rourke <morourk@tcd.ie>

19 May 2011 12:07

Dear Mary,

The Chair has approved this amendment request.

Eimear Mealy  
Administrative Officer  
(Support to School Administrator)  
School of Medicine  
Chemistry Building  
Trinity College  
Dublin 2

Ph: + 353 1 896 1727

Fax: +353 1 671 3956

Email: [eimear.mealy@tcd.ie](mailto:eimear.mealy@tcd.ie)

Web: [www.medicine.tcd.ie/](http://www.medicine.tcd.ie/)

**From:** Mary O Rourke [<mailto:morourk@tcd.ie>]  
**Sent:** Wednesday, April 27, 2011 5:36 PM  
**To:** Eimear Mealy  
**Subject:** Application for amendment

Dear Eimear,

I am requesting an amendment from the Ethics Committee for a measurement instrument.

I have attached a letter to the Chairperson, a copy of my previous application and a copy of the new measurement instrument.

If you require any further information please let me know.

**Appendix 7: Child Development Outcome Scores from Wave1 to Wave 4 based on DAYC measure**

| <b>Cognitive Development Outcome Scores from Wave1 to Wave 4</b> |             |                           |               |                            |                          |
|--|-------------|---------------------------|---------------|----------------------------|--------------------------|
| <b>Time</b>  | <b>Mean</b> | <b>Standard Deviation</b> | <b>Median</b> | <b>Interquartile Range</b> | <b>Data Distribution</b> |
| Wave 1   | 114         | 3.4                       | 115           | 112, 115                   | slight negative skew     |
| Wave 2   | 112         | 7                         | 111           | 107, 115                   | slight positive skew     |
| Wave 3   | 113         | 11                        | 115           | 100, 121                   | slight negative skew     |
| Wave 4   | 114         | 14.2                      | 115           | 103, 125                   | slight negative skew     |

| <b>Communication Development Outcomes from Wave 1 to Wave 4</b> |             |                           |               |                            |                          |
|---|-------------|---------------------------|---------------|----------------------------|--------------------------|
| <b>Time</b>   | <b>Mean</b> | <b>Standard Deviation</b> | <b>Median</b> | <b>Interquartile Range</b> | <b>Data Distribution</b> |
| Wave 1  | 105         | 4.5                       | 103           | 103, 109                   | slight positive skew     |
| Wave 2  | 105         | 12.7                      | 105           | 98, 114                    | normal distribution      |
| Wave 3  | 105         | 8.6                       | 105           | 100, 112                   | normal distribution      |
| Wave 4  | 105         | 12.6                      | 106           | 97, 112                    | slight negative skew     |

| <b>Social-emotional Development Outcomes from Wave 1 to Wave 4</b> |             |                           |               |                            |                          |
|--|-------------|---------------------------|---------------|----------------------------|--------------------------|
| <b>Time</b>  | <b>Mean</b> | <b>Standard Deviation</b> | <b>Median</b> | <b>Interquartile Range</b> | <b>Data Distribution</b> |
| Wave 1   | 121         | 5.6                       | 123           | 119, 123                   | slight negative skew     |
| Wave 2   | 121         | 11.5                      | 123           | 112, 130                   | slight negative skew     |
| Wave 3   | 119         | 12                        | 118           | 107, 127                   | slight negative skew     |
| Wave 4   | 121         | 12                        | 121           | 115, 128                   | normal distribution      |

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**Adaptive Behaviour Outcomes from Wave1 to Wave 4**

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| <b>Time</b> | <b>Mean</b> | <b>Standard Deviation</b> | <b>Median</b> | <b>Interquartile Range</b> | <b>Data Distribution</b> |
|-------------|-------------|---------------------------|---------------|----------------------------|--------------------------|
| Wave 1      | 109         | 3.6                       | 110           | 110, 110                   | slight negative skew     |
| Wave 2      | 110         | 15                        | 110           | 110, 110                   | normal distribution      |
| Wave 3      | 112         | 8.2                       | 112           | 105, 117                   | normal distribution      |
| Wave 4      | 105         | 8.7                       | 103           | 100, 107                   | slight positive skew     |

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**Physical Development Outcomes from Wave 1 to Wave 4**

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| <b>Time</b> | <b>Mean</b> | <b>Standard Deviation</b> | <b>Median</b> | <b>Interquartile Range</b> | <b>Data Distribution</b> |
|-------------|-------------|---------------------------|---------------|----------------------------|--------------------------|
| Wave 1      | 106         | 6.2                       | 105           |                            | slight positive skew     |
| Wave 2      | 104         | 8                         | 101           |                            | positive skew            |
| Wave 3      | 96          | 9                         | 97            |                            | slight negative skew     |
| Wave 4      | 105         | 11                        | 108           |                            | negative skew            |

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## Appendix 8 : Parental Nationality

| <b>Parental Nationality</b> |                |                |
|-----------------------------|----------------|----------------|
| <b>Nationality</b>          | <b>Mothers</b> | <b>Fathers</b> |
| American                    | 1 (0.6%)       | 2 (1.3%)       |
| Australian                  | 1 (0.6%)       | 1 (0.6%)       |
| Bangladeshi                 | 1 (0.6%)       | 2 (1.3%)       |
| British                     | 2 (1.3%)       | 1 (0.6%)       |
| Dutch                       | 1 (0.6%)       | 1 (0.6%)       |
| English                     | 5 (3.3%)       | 3 (1.9%)       |
| Estonian                    | 2 (1.3%)       | 1 (0.6%)       |
| Filipino                    | 1 (0.6%)       | 0 (0%)         |
| French                      | 0 (0%)         | 1 (0.6%)       |
| German                      | 2 (1.3%)       | 1 (0.6%)       |
| Greek                       | 0 (0%)         | 1 (0.6%)       |
| Irish                       | 124 (81.5%)    | 129 (84.9%)    |
| Malaysian                   | 1 (0.6%)       | 1 (0.6%)       |
| Nigerian                    | 1 (0.6%)       | 0 (0%)         |
| Polish                      | 7 (4.6%)       | 4 (2.7%)       |
| Portuguese                  | 0 (0%)         | 1 (0.6%)       |
| Welsh                       | 2 (1.3%)       | 0 (0%)         |
| South African               | 1 (0.6%)       | 1 (0.6%)       |
| Ghana                       | 0 (0%)         | 1 (0.6%)       |
| Slovak                      | 0 (0%)         | 1 (0.6%)       |