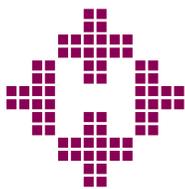


Next Steps in the Provincial Evaluation of the *BabyFirst* Program: Measuring Early Impacts on Outcomes Associated with Child Maltreatment

October 2007



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We thank the University of Manitoba, Faculty of Medicine, and Health Research Ethics Board for their review of this project. MCHP complies with all legislative acts and regulations governing the protection and use of sensitive information. We implement strict policies and procedures to protect the privacy and security of anonymized data used to produce this report and we keep the provincial Health Information Privacy Committee informed of all work undertaken for Manitoba Health.

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EXECUTIVE SUMMARY

Background

The maltreatment of children presents a significant threat to healthy child development. Given the devastating impact of maltreatment on children, it is imperative to attempt to prevent the occurrence of child abuse and neglect. Numerous prevention programs have been developed, generally aimed at high-risk populations, in an attempt to reduce the incidence of maltreatment. One of the most widespread interventions is home visiting programs, which seek to reduce risk factors and promote protective factors associated with child maltreatment. Given that substantiated child maltreatment rates are highest during infancy, most home visiting programs target this developmental period.

Since 1999, the Healthy Child Manitoba Office has been funding and coordinating the province-wide *BabyFirst* (now known as Families First) program, a targeted, multiyear home visiting program for families with newborns living under conditions of risk. An important program goal is the prevention of child maltreatment. Supervised by public health nurses, paraprofessional home visitors work with families to ensure physical health and safety, to support secure attachment and positive parent-child relationships, to promote healthy growth, development and learning, and to build community connections.

Eligibility for the program is determined through a two-stage screening process, the first stage involving a brief screen of all postpartum referrals in the province using the *BabyFirst* screening form. Families scoring “at risk” at this stage are given a more in-depth assessment (the Family Stress Checklist) and those scoring above the cut-off score become eligible for the home visiting program.

Three specific objectives of this report were:

1. To determine the utility of the *BabyFirst* screening form for identifying children at risk of maltreatment.
2. To evaluate the impact of the *BabyFirst* home visiting program on selected outcomes associated with child maltreatment.
3. To examine trends in injuries (particularly those associated with maltreatment) in the child population of Manitoba, before and after introduction of the *BabyFirst* program in 1999/2000.

Data Sources

The analyses for this report used anonymized administrative data contained in the Population Health Research Data Repository (Repository), housed at the Manitoba Centre for Health Policy (MCHP). Specific datasets used were hospital discharge abstracts, physician claims, population registry, Manitoba Immunization Monitoring System (MIMS), Vital Statistics, Social Assistance Management Information Network, and Child and Family Services Information System. For the purposes of this report, anonymized *BabyFirst* Screening data and BabyFirst home visiting program data were linked to Repository data.

Methods

Because child maltreatment cannot be measured directly, we have used as a proxy for maltreatment the rate of children in care. “Children in care” refers to children who have been removed from their families, due to concerns regarding care, and placed in the care of another adult(s). It is important to note that rates of children in care likely represent only a fraction of the actual cases of abuse and neglect. Other outcome measures that were analyzed included rates of children receiving services from Child and Family Services (CFS), deaths and hospitalizations for injuries related to maltreatment, continuity of care, and immunization rates.

The evaluation of the *BabyFirst* screening form (objective 1) involved: a) an analysis of the percent of births that were screened; b) an assessment of agreement between the *BabyFirst* items and measures in the Repository; c) calculation of the sensitivity and specificity of the screen; and, d) regression analyses of the items on the *BabyFirst* form to determine which items best predicted the outcomes of going into care or receiving services. The evaluation of the *BabyFirst* home visiting program (objective 2) involved regression analyses comparing outcomes for families in the program and a comparison group of families. Families were assigned to the Program or Comparison group on the basis of a cut-off score on an in-depth family functioning assessment. The analysis of outcomes was limited to children receiving services from CFS, and two outcomes associated with connections with community resources—continuity of care and immunization rates, due to small sample size. For the third objective, a population-based regression analysis of changes in injury rates over time was conducted. The model adjusted for age, gender and time. Rate differences before and after the introduction of *BabyFirst* were tested.

Key Findings

1. *BabyFirst* Screening

- Of all babies born in hospital in Manitoba in 2000 through 2002, 75.5% had BabyFirst screens associated with them. This means that screening information was missing for one-quarter of all births during this time period.

- Families not screened tended to be more vulnerable (e.g., young mothers, low-income (area residents) than families that did get screened, and infants who were not screened were at higher risk for maltreatment than the general population of infants.
- Agreement between the *BabyFirst* screen items and overlapping variables from the Repository was for the most part high, indicating accurate coding of items on the *BabyFirst* screening form.
- The sensitivity and specificity of the *BabyFirst* screen for identifying as “at risk” those children who ended up in care was moderate: 77% of those children who ended up in care scored “at risk” on the screen and 83% of the children who didn’t end up in care scored “not at risk.” For identifying those children who ended up receiving services, sensitivity was low (62%) and specificity was moderate (87%).
- Of the 23 items on the *BabyFirst* screening form, the strongest predictors of whether a child ended up in care were receipt of income assistance/having financial difficulties, having an existing file with local child protective services, low education status of mother, and social situation (e.g., one-parent family with no social support); children in families with these risk factors were 3 to 6 times more likely to be taken into care than families without these risks. Other significant predictors of going into care included complications of pregnancy caused by drug or alcohol use by mother, no prenatal care prior to the sixth month of pregnancy, parent’s own history of abuse, infant trauma or illness, prolonged maternal separation, lack of bonding between mother and infant, use of harsh disciplinary practices, a combination of low birthweight and short gestation, and lower 5-minute Apgar scores.
- The strongest predictors of receiving services from CFS were having a teen mother, receipt of income assistance/financial difficulties, being in a one-parent family with no social support, having an existing file with local protective services, maternal smoking during pregnancy, and low education status of mother; children in families with these risk factors were 1 1/2 to 20 times more likely to receive services from CFS than families without these risks. Other significant predictors of receiving services included depression in the mother or father, presence of an anxiety disorder in either parent, infant trauma or illness, no prenatal care before the sixth month of pregnancy, multiple births, pregnancy complications due to alcohol or drug use by the mother, schizophrenia or bipolar disorder in either parent, parents’ own history of child abuse or neglect, a combination of low birthweight and short gestation, and no prenatal class attendance.
- The predictive validity, and possibly the sensitivity and specificity, of the *BabyFirst* screen for identifying children at risk of going into care or receiving services from CFS could be increased by identifying as “at risk” children with the following: mothers who were teens when they had their first child; three or more older siblings; not breastfed at hospital discharge.

2. *BabyFirst* Home Visiting Program

- There were no deaths or hospitalizations for injuries related to maltreatment for children in either the Program or Comparison families during the study period, and too few children taken into care to allow a statistically sound comparison. For rare events such as these much larger sample sizes are needed to detect any differences in outcomes that may exist between the Program and Comparison groups.
- Families involved in the *BabyFirst* home visiting program were more likely to receive services from CFS than Comparison families, even when controlling for differences in risk factors between the two groups. Whether this was an indication that the program was working to connect vulnerable families to needed services or whether the higher rate of service receipt indicates that the program resulted in “over-identifying” families in need of services could not be assessed in this study.
- Despite finding no differences in immunization rates between the Program and Comparison families, and indeed no relationship between immunization rates and the cut-off score for the in-depth interview, both Program and Comparison families had relatively high immunization rates in comparison to the provincial average. It is encouraging to consider that perhaps the connection with the Public Health Nurses (through the first stage and second stage screening processes of the program) had an impact on this important preventative care measure.
- The analysis of continuity of care found no significant impact of the home visiting program, suggesting children in Program families were no more likely to see the same physician as opposed to numerous physicians for their care than children in Comparison families. Small sample size makes it difficult to determine whether this lack of effect was real.

3. Population-Based Analysis of Trends in Injury Rates

- Over the 20-year study period, 1984/85 - 2003/04 we observed a declining trend in hospitalization and death rates due to injury, assault and maltreatment among all Manitoba children.
- When children from birth to 18 years were studied together as a group, the implementation of the *BabyFirst* program in Manitoba in 1999 did not appear to have an impact on these population-based rates of child injury and maltreatment outcomes.
- When children three years of age and younger were studied, our findings suggest that the introduction of the *BabyFirst* program was associated with lower rates for maltreatment and assault in these children, independent of declining time trends.

Key Recommendations

- Continued efforts should be made to ensure that all births, particularly babies born to vulnerable families, are screened.
- Results of this report should be shared with stakeholders in First Nations health in Manitoba (e.g., Health Canada, Public Health Agency of Canada, and First Nations and Inuit Health Branch). Given the validity of the screen for identifying families at risk, First Nations communities may find it a useful tool for identifying challenged families and may request that more effort be made in ensuring families from First Nations communities are included in the screening process.
- The next revision of the screening tool should consider adding questions on the following: mother's age at first birth, number of siblings, and breastfeeding. Items that were not predictive of going into care or receipt of services could be considered for exclusion.
- An evaluation of the adequacy and funding levels of services provided by CFS should be considered, particularly given the fact that programs such as *BabyFirst*/Families First may be increasing the demand for these services.
- A qualitative analysis involving families whose children were taken into care (and/or received services) as well as their home visitors could provide important information about what participants felt was needed in order to prevent the placement as well as whether the placement was beneficial or harmful to family relationships. The interviews with families receiving services could include queries about which services families received (or might have received) that might have helped them prevent maltreatment.
- The evaluation sample size could be increased by including all families who receive the in-depth interview with the Family Stress Checklist (over 1,000 families), distinguishing between those families that qualify for and receive the home visiting program and those that do not.
- Some families eligible for home visiting do not receive it due to the limited number of home visitors in some areas of the province. This situation provides an opportunity to conduct randomized controlled trials on the impact of the *BabyFirst* home visiting program.
- Continued analysis of population-level trends in child maltreatment and assault rates in the post-*BabyFirst* period would provide confirmation as to whether these rates have truly declined and whether the association with the *BabyFirst* implementation period continues.

CHAPTER 1: INTRODUCTION

The maltreatment of children presents a significant threat to healthy child development. Victims of abuse and neglect in childhood frequently experience not only physical damage, but emotional damage that can last a lifetime. Maltreatment that occurs early in childhood may have the most devastating impact, given the rapid neurological and psychological growth that occurs in the first few years of life (Toth & Cicchetti, 2004). Early childhood maltreatment can have a negative impact on long-term physical and mental health, cognitive and social development (Cicchetti & Toth, 1995).

It is difficult to accurately estimate the extent of child maltreatment in Canada. The Canadian Incidence Study of Reported Child Abuse and Neglect 2003 reported a national incidence for substantiated child maltreatment of 2.2% (Trocmé et al., 2005). Canadian prevalence of children in care, which is used as a proxy for maltreatment, was about 0.8% in 2001, ranging up to 3.6% at regional levels (Federal/Provincial Working Group on Child and Family Services Information, 2005). The Manitoba prevalence of children in care was the highest among the provinces, at 1.8% (Federal/Provincial Working Group on Child and Family Services Information, 2005). Between 1998 and 2003, the incidence rate of substantiated child maltreatment increased 125% in Canada (Trocmé et al., 2005), and an 84% increase was observed in Ontario between 1993 and 1998 (Trocmé et al., 2003), but how much of these increases are due to changes in the actual rate of maltreatment or changes in awareness and reporting of maltreatment is unknown. It is generally accepted that the rates of substantiated child maltreatment and rates of children in care underestimate the true rates of child maltreatment in the population. Indeed, substantiated reports of child maltreatment and statistics on children in foster care probably represent only the “tip of the iceberg” of child abuse and neglect (Trocmé et al 1994). Data from the Ontario Health Survey, which used retrospective reports to quantify maltreatment, indicated that almost 16% of females and over 13% of males reported childhood histories of severe physical or sexual abuse (MacMillan et al., 1997), considerably higher estimates than those acquired through substantiated reports or statistics on children in care.

The literature identifies both risk and protective factors for child maltreatment. Many studies have identified social factors, particularly poverty, as risk factors for maltreatment, although some have suggested that parental psychiatric factors such as depression and substance abuse may be stronger predictors (Chaffin et al., 1996). The social and parental factors are not necessarily mutually exclusive, as certain social conditions may make parental psychiatric conditions more likely, and may interfere with parents’ abilities to be “emotionally sensitive and psychologically available to their offspring” (Belsky, 1993). Belsky (1993) stressed that it is probably the case that there is no single cause of child abuse and neglect and that the pathways to child maltreatment are multiple. These pathways in all likelihood involve individual, familial, community and societal factors.

Individual factors associated with child maltreatment include low birthweight and short gestation (Spencer et al., 2006), the presence of a developmental delay, learning disability and/or attention-deficit/hyperactivity disorder (Trocme et al., 2003), as well as ethnicity, with higher rates of substantiated maltreatment for children of Aboriginal heritage (Trocme et al., 2003). Beyond poverty, family factors associated with maltreatment include adolescent parenting (de Paul & Domenech, 2000; Ekeus, Christensson & Hjern, 2004; Lee & Goerge, 1999; Stier et al., 1993; Zuravin, 1988), lone-parent status (Trocme et al., 2003), lower levels of perceived social support (Crouch, Milner & Thomsen, 2001) larger number of children in the family (Chaffin et al., 1996; Zuravin, 1988) and living in rental accommodations (Trocme et al., 2003). Community characteristics associated with maltreatment include less extensive social networks (Garbarino & Sherman, 1980), higher levels of social disorganization and lower levels of social cohesion (Garbarino & Kostelny, 1992; Jack, 2004) and more social isolation (Whipple & Webster-Stratton, 1991). Societal factors associated with child maltreatment include not only economic circumstances, but also societal attitudes towards physical punishment and violence (Durrant, 2006). Corporal or physical punishment of children is still accepted and is lawful in Canada (Criminal Code of Canada, 1985). These laws have been challenged on the grounds that the distinction between abuse and punishment is not easily made and that child abuse often occurs during disciplinary action (Ateah & Durrant, 2005; Bernstein, 2005).

Outcomes for children who have suffered maltreatment tend to be poor across several domains. Maltreated children and youth are far more likely than their non-maltreated peers to experience difficulty in school (Velmann & Browne, 2001), develop substance abuse problems (Chaffin et al., 1996; Clark et al., 1997), and to be arrested (Widom & Maxfield, 1996). And children taken into care, often for reasons of maltreatment, have more emotional, developmental and acute and chronic health conditions than other children (Rosenfeld et al., 1997).

Given the devastating impact of maltreatment on children, it is important not only to provide the victims of child maltreatment with the programs and services they need to help them cope with the effects of abuse and neglect but it is also imperative to attempt to prevent child maltreatment from occurring in the first place. The necessity of prevention is underscored by the dearth of empirical evidence demonstrating the effectiveness of interventions for maltreated children (Pollack, 2004; Toth and Cicchetti, 2004). Numerous prevention programs have been developed, generally aimed at high-risk populations, in an attempt to reduce the incidence of abuse and neglect. One of the most widespread interventions is home visiting programs, which seek to reduce risk factors and promote protective factors associated with child maltreatment. Given that substantiated child maltreatment rates are highest during infancy (Trocme et al., 2003), most home visiting programs target this developmental period.

Several early life home visitation family support programs to prevent poor child outcomes have been implemented worldwide. These include the Hawaii Health Start Program in 1975 (El-Kamary et al., 2004), the Oregon Healthy Start Program in 1994 (McGuigan et al., 2003), the Early Start Program

in New Zealand in the mid-1990s (Fergusson et al., 2005; Vandeven & Newton, 2006) and the Scottish Starting Well Program in 2000 (Shute & Judge, 2005). Evaluations of these programs have shown moderate successes in changing parent risk behaviours and in lowering maternal depression or stress rates (Duggan, 1999; Shute & Judge, 2005).

While home visiting programs have been embraced as a means of reducing child maltreatment, evidence to support their effectiveness has been mixed. Some programs have reported long-term effects on child health care use for injury or maltreatment (Fergusson et al., 2005), while others have not (Duggan, 1999). The most rigorously evaluated home visiting programs suggest that regular home visits by trained nurses, that begin in the prenatal period and continue for the first two years of a child's life, can significantly reduce the incidence of child abuse and neglect in high-risk families (Eckenrode et al., 2000; Olds et al., 2002; Olds et al., 1997). The intensity of home visiting is also a factor, with a meta-analysis indicating greater effectiveness of home visiting when the number of visits was greater than 12 and the duration was longer than six months (MacLeod & Nelson, 2000).

Home visiting programs that involve paraprofessionals instead of nurses have resulted in far fewer benefits (Olds et al., 2002) and have had a negligible impact on reducing child maltreatment (Duggan et al., 1999; Duggan et al., 2004; Olds et al., 2002). However, Olds et al. (2002) reported that paraprofessional home visitors were successful in increasing the parents' ability to provide more sensitive and responsive care to their children, which in turn should promote secure attachment and healthy child development. They go on to suggest the possibility of developing effective paraprofessional models but also stress the need for "consistent evidence from well-conducted randomized trials to support paraprofessional home visiting with any program model" before claims can be made about the success of such programs (p. 495).

1.1 Manitoba's *BabyFirst* Program

In 1999 Healthy Child Manitoba (formerly Child and Youth Secretariat) introduced the *BabyFirst* home visiting program throughout the province. Since that time, the Healthy Child Manitoba Office has been funding and coordinating the province-wide *BabyFirst* program and its evaluation. *BabyFirst* (now known as Families First¹) is a targeted, multi-year home visiting program for families with newborns living under conditions of risk. An important program goal is the prevention of child maltreatment. Supervised by public health nurses, paraprofessional home visitors work with families to ensure physical health and safety, to support secure attachment and positive parent-child relationships, to promote healthy growth, development and learning, and to build community connections (Healthy Child Manitoba, 2002).

Families become eligible for the program through a two-stage screening process. In the first stage, public health nurses screen all postpartum referrals in Manitoba using the *BabyFirst* Screening form,

¹ Healthy Child Manitoba recently combined the *BabyFirst* and Early Start programs into one program known as Families First. Because the data analyzed in this report focus on births that occurred from 2000 through 2002, prior to the creation of the Families First program, we refer to the program throughout the report as *BabyFirst*.

a brief measure of biological, social, and demographic risk factors. In the second stage, families scoring above the *BabyFirst* Screen cut-off score are assessed for caregiving difficulties by public health nurses with a semi-structured interview called the Family Stress Checklist (FSC). Families scoring above the FSC cut-off score are eligible for the program and are offered *BabyFirst* home visiting. Those families that accepted the home visiting program and agreed to be evaluated became part of the provincial evaluation sample. Families that score below the FSC cut-off score are not eligible for the program and, in the provincial evaluation, comprised the comparison group. Participation in both the program and the evaluation is voluntary. *BabyFirst* and comparison families provide informed consent to participate in the evaluation, which includes baseline and annual measurement of child, parent, parent-child, family, and community determinants and outcomes.

Phase I of the provincial evaluation showed that after one year the program improved parental psychological well-being (including parental autonomy, environmental mastery, and self-acceptance), positive parenting, and family participation in community health and social services, after controlling for baseline child, parent, family, and community variables (Healthy Child Manitoba, 2006; Santos, 2005). A qualitative analysis of the *BabyFirst* program found that the development of a trusting relationship between the home visitor or the public health nurse and the family was important to both starting and staying with the program, and that the qualities necessary for building such relationships were evident in the nurses and home visitors who were included in the study (Heaman et al., 2006).

The goal of the current report was to take the next steps in the provincial evaluation of the *BabyFirst* Program. Three specific objectives were addressed:

1. To determine the utility of the *BabyFirst* screening form for identifying children at risk of maltreatment
2. To evaluate the impact of the *BabyFirst* home visiting program on selected outcomes associated with child maltreatment
3. To examine trends in injuries² (particularly those associated with maltreatment) in the child population of Manitoba, before and after introduction of the *BabyFirst* program in 1999-2000

A Working Group was established to review the project methods and design suggesting improvements where appropriate, to provide feedback on the analysis and interpretation of findings, to review and comment on drafts of the report, and to provide advice on recommendations arising from the report.

² Initially we intended to report on population trends in child maltreatment by examining rates of children in care; however, data on children in care prior to 1997 were incomplete, making analysis of trends over time impossible.

CHAPTER 2: GENERAL METHODS USED IN REPORT

The three objectives described at the end of Chapter 1 of this report involve three evaluations, each of which will be presented in a separate chapter. Each of these separate chapters will describe methods specific to that evaluation; general methods which apply to all three evaluations are described here.

2.1 Data Sources

The analyses for this report used administrative data contained in the Population Health Research Data Repository (Repository) which is housed at the Manitoba Centre for Health Policy (MCHP). The Repository is a comprehensive collection of databases that contains anonymized records of all Manitobans' contacts with physicians, hospitals, home care, personal care homes, and pharmaceutical prescriptions. The Repository also contains a population-based research Registry, which includes de-identified information on all Manitobans registered to receive health care, such as sex, region of residence and age, regardless of whether they access the health care system. Along with the health service databases, the Repository contains social service databases, including information about family receipt of income assistance, child protection and support services, and *BabyFirst* screening data. All records in the Repository are anonymous, as prior to data transfer to MCHP, Manitoba Health processes the records to encrypt all personal identifiers and remove all names and addresses.

Specific files used in this report were the hospital discharge abstracts, physician claims, registry data, Manitoba Immunization Monitoring System (MIMS), Vital Statistics, Social Assistance Management Information Network, Child and Family Services Information System, and *BabyFirst* Screening data. For the purposes of this report, anonymized data from the provincial evaluation sample from the *BabyFirst* home visiting program were linked to the Repository.

2.2 Outcome Measures

Child maltreatment includes both abuse and neglect. Child abuse is the physical or psychological mistreatment of a child by his or her parents, guardians, or other adults. Child neglect is the inaction of not doing what is necessary to ensure proper care of the child. Because there are no direct measures of child maltreatment available, studies of maltreatment generally use proxies for this measure, such as substantiated cases of child maltreatment. Several outcome measures associated with child maltreatment were examined in this report and each is defined below:

Children in Care

The rate of children in care was used in this report as a proxy for child maltreatment. Children in care are children who are removed from their families of origin and placed in the care of another

adult(s) due to concerns about the proper provision of care in the family of origin. Information on the number of children in care is taken from the Child and Family Services Information System (CFSIS) which was linked to Repository data to calculate rates of children in care.³ The recording of agency data into CFSIS was incomplete for non-Aboriginal agencies prior to 1997, and while it has improved in recent years, is still incomplete for Aboriginal agencies (about 37% of children in care are served by Aboriginal agencies (see Appendix 1, Table A1.1)). For this reason, data on children in care in this project will undercount those children who are served by Aboriginal agencies. These agencies primarily serve children living in the North. Most analyses are conducted for all of Manitoba and then for Winnipeg only to provide a comparison to a sub-population where missing data on children in care should not be an issue.

Children Receiving Protection or Support Services

CFSIS includes information on families receiving protective services, which are provided, without the removal of the child from the home, when a child is seen as in need of protection because his/her life, health or emotional well-being is endangered. CFSIS also includes information on families receiving support services, which are services that the family requests to aid in the resolution of family matters. While “protective” and “support” are distinct categories of services, in reality these distinctions are often blurred, and so for the purposes of this report, children living in families receiving either of these two categories of service are analyzed together, under the category “receiving services from Child and Family Services.”

Hospitalizations and Deaths for Injuries Related to Maltreatment

For our analysis of child maltreatment trends over time, we were unable to use the CFSIS data, as it was not complete throughout the time period of interest (see Appendix 1, Table A1.1). For this reason we focussed instead on hospitalized injuries and injury deaths for three categories of injury: all injuries, injuries due to assault or homicide, and injuries due to maltreatment. Specific codes for these injuries are reported in Chapter 5.

Continuity/Lack of Continuity of Care

Continuity of care, which is sometimes referred to as having a “medical home,” refers to the receipt of primary care from the same provider, as opposed to multiple providers. This allows a physician to know the history of the child and his/her family and allows the family to develop a level of comfort with the physician, and is thought to result in better care (Brousseau et al., 2004; Christakis et al., 1999; Christakis et al., 2001; Inkelas et al., 2004). Continuity of care in this report is not used as a measure of maltreatment, but as a positive outcome measure, as it fits with two of the goals of the *BabyFirst* home visiting program: that of facilitating families’ abilities to ensure physical health of their children and that of facilitating families’ connections with community resources. Continuity of care was assessed in the first year of life in the program evaluation based on the proportion of visits

³ Children appearing multiple times in the CFSIS dataset were counted only once in the current report.

made to the most frequent provider, using visits made to either general practitioners or generalist pediatricians. Lack of continuity of care is simply the inverse of continuity of care and was used for ease of modelling.

Age-Appropriate Immunization

Age-appropriate immunization rates were used as another positive outcome measure, as an indicator of families' abilities of ensuring the health of their child and of connecting with community resources. Immunization rates were assessed for the program evaluation based on the proportion of children who, by their first and second birthdays, had been fully immunized against diphtheria, pertussis, tetanus and polio, Haemophilus influenzae type b (Hib), and measles, mumps, and rubella. This information is obtained through the MIMS.

CHAPTER 3: EVALUATION OF THE *BABYFIRST* SCREENING FORM

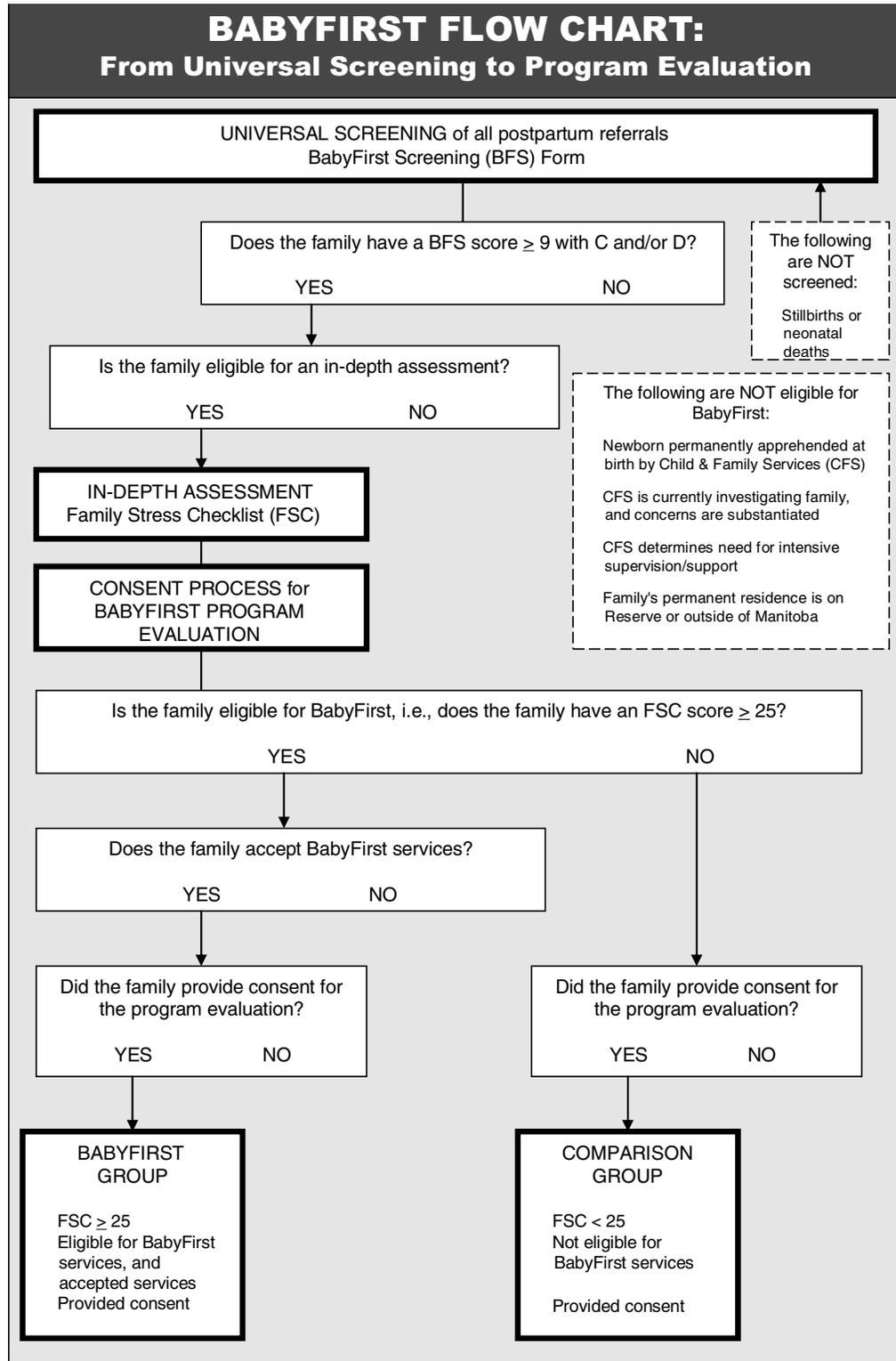
In order to develop effective prevention programs it is important to know who should receive these programs. The effective nurse visitation programs developed by Olds and colleagues (Eckenrode et al., 2000; Olds et al, 2002; Olds et al., 1997) selected new mothers on the basis of three high-risk characteristics: low income, unmarried and adolescent, with the first two characteristics considered to be the best predictors of child maltreatment (Olds, 2002). Screening tools have been developed in an attempt to incorporate other risk factors associated with maltreatment, but some have argued that the high false positive rates of such devices make their use questionable for identifying risk in the general population (MacMillan et al., 1993; MacMillan et al., 2000). While their use may be questionable in a primary care setting, these screening tools would be expected to reduce the rate of false positives compared to simply targeting prevention programs on the basis of whether a mother is unmarried, poor or an adolescent. Evidence for the validity of using screening tools to identify children at risk for maltreatment is largely lacking, however.

As indicated in Chapter 1, entry into the *BabyFirst* program requires a two-stage screening process. The first stage of this screening involves the screening of all postpartum referrals in the province using the *BabyFirst* Screening form⁴ (see Figure 3.1). A copy of the *BabyFirst* Screening form used during the period of this report can be found in Figure 3.2. Those families that achieved a score of 9 or greater on the screen and had a positive score in either of Sections C or D of the form (score of 1 or greater), were considered “at risk” and eligible for the second stage in-depth assessment. The goal of this chapter of the report was to examine the utility of the *BabyFirst* screening form for identifying children at risk of maltreatment. The evaluation of the *BabyFirst* screening form involved answering two main questions:

1. Is the screen being completed on all births in the province?
2. How good is the screen at predicting outcomes associated with child maltreatment?

⁴ The postpartum referral form notifies the public health nurse to contact the birth mother and initiate the screening process. For infants who are adopted or apprehended, a second screen may be completed for the same child based on the new parent or guardian, however only the screen with information from the birth mother is entered into the screening database.

Figure 3.1: *BabyFirst* Flow Chart: From Universal Screening to Program Evaluation



Source: Santos, 2005

The answer to the first question is discussed under the heading “Coverage” below. Following that discussion, the validity of the screen is discussed in an attempt to answer the second question.

3.1 Methods

Study population

The study population for the evaluation of the *BabyFirst* screening form was all births from January 1, 2000 to December 31, 2002 (N = 40,886). Outcomes for this population were followed from birth until March 31, 2004.

Analyses

The kappa statistic was used to assess agreement between overlapping items on the *BabyFirst* screening form and variables in the Repository. Because the information we were assessing between the two sources was categorical, we used weighted kappas. The predictive validity of the *BabyFirst* screening form was assessed by calculating sensitivity, specificity, and positive and negative predictive values, using two different outcomes: 1) children in care, and 2) children receiving protective and support services.

Stepwise logistic regression analyses, which involved forward and backward selection steps, were used to determine which items on the *BabyFirst* screening form were the best predictors of going into care or receiving protection and support services from Child and Family Services.⁵ Additional stepwise logistic regressions were used to explore whether birth-related variables from the Repository would increase the predictive validity of the *BabyFirst* screen.

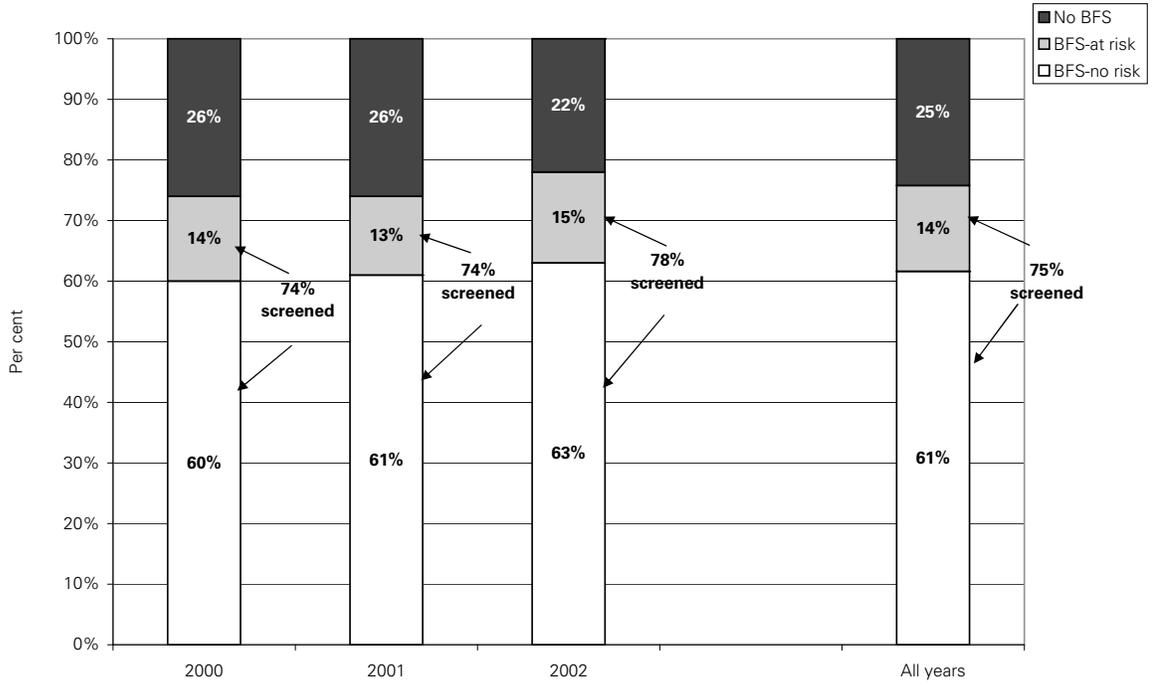
3.2 Results

Coverage: Who is Being Screened?

According to Figure 3.1, all postpartum referrals in the province of Manitoba should have a *BabyFirst* screen associated with them. Is this the case? By linking all births occurring in hospital between January 1, 2000 and December 31, 2002, with all *BabyFirst* screening forms, we were able to determine the percent of hospital births that received the screen. Of the 40,886 babies born in Manitoba in 2000-2002, 30,873 (75.5%) had *BabyFirst* screens associated with them. This means that screening information was missing for one quarter of all births during this time period. Figure 3.3 shows there was a slight increase in percent of infants screened in the most recent year of data. Figure 3.3 breaks down the infants screened into those that screened “at risk” (i.e., received a score of 9 or more and a positive score in sections C or D of the screening form) and those that did not screen at risk. About 14% of all infants born in the study period screened at risk; when we focus only on those infants who were screened (i.e., remove infants without a screen), close to 19% screened at risk during the study period.

⁵ A p-value of 0.05 was used for this selection process.

Figure 3.3: Percent of Manitoba Infants Given the *BabyFirst* Screen, by Year

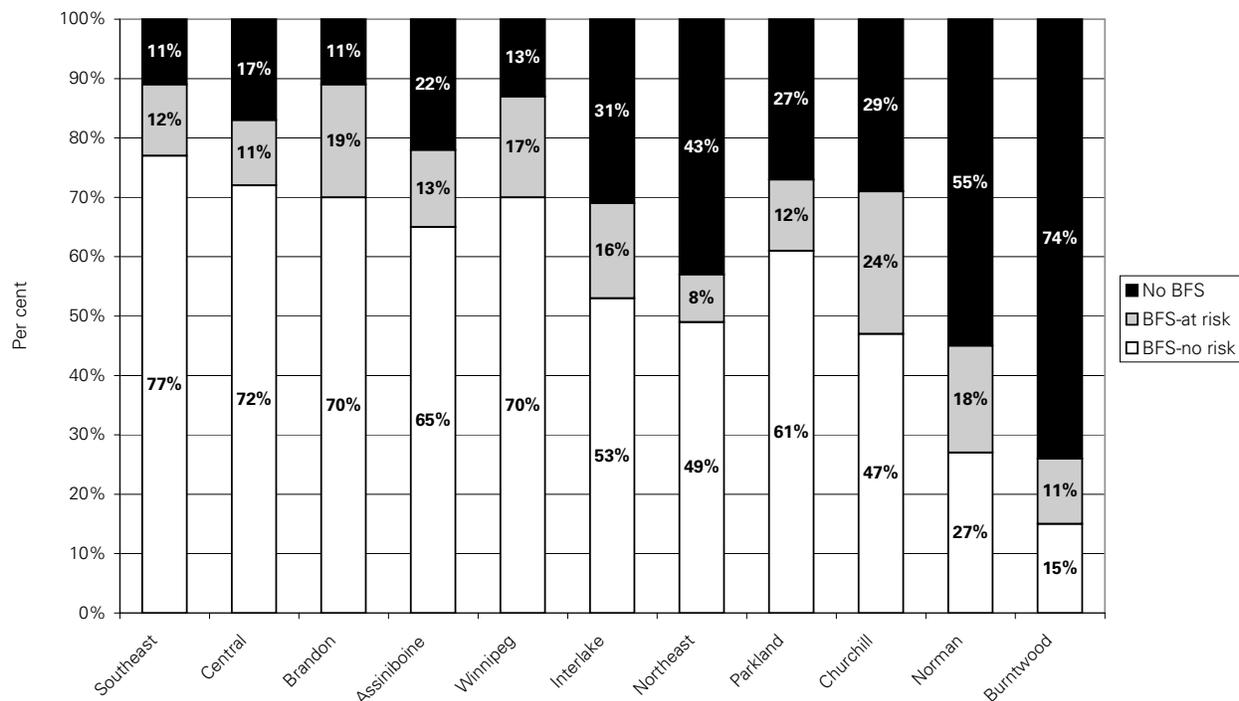


BFS=BabyFirst Screen, and indicates that there is a screening form associated with these infants

Source: Manitoba Centre for Health Policy, 2007

The percent of infants who were screened varied across regions. Figure 3.4 shows the percent of infants with a *BabyFirst* screen by Manitoba Regional Health Authorities (RHAs). The RHAs are ordered from highest to lowest socioeconomic status (Brownell et al., 2004), emphasizing the relationship between regional socioeconomic status and receipt of the screen. Because the initiation of a *BabyFirst* Screen is predicated on the receipt of a postpartum referral form, families whose residence was in a First Nations community may not have been screened; some postpartum referrals go directly to nursing stations in First Nations communities, rather than to public health nurses in the RHAs. Further, families in First Nations communities are not eligible for the *BabyFirst* home visiting program, and so screening these families may not be viewed as essential. Indeed, identifying First Nations communities using a combination of municipal codes and postal codes, we found that 89% of births occurring to women whose residence was in these communities did not receive a *BabyFirst* screen. This could partly explain lower screening rates in some of the RHAs, particularly those in the North. Births to women in First Nations communities accounted for 31% of all those not screened.

Figure 3.4: Percent of Manitoba Infants Given the *BabyFirst* Screen (BFS) by RHA, 2002



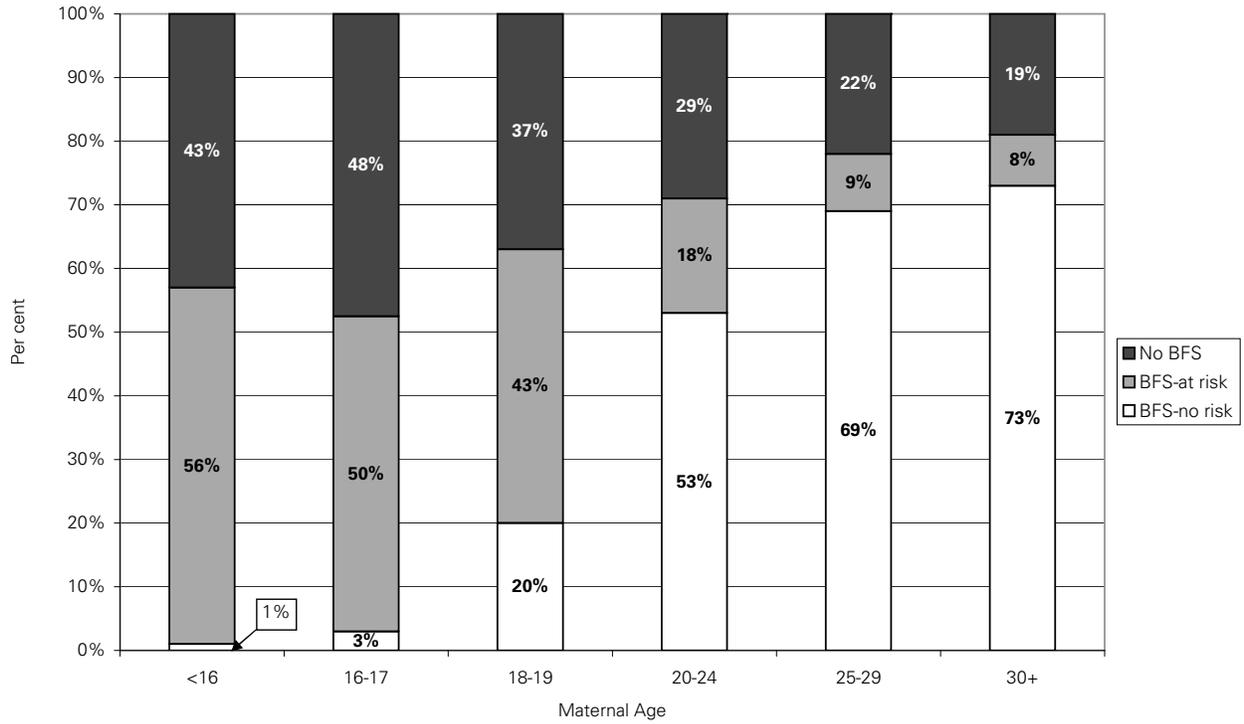
Newborns permanently apprehended at birth were also not eligible for the *BabyFirst* home visiting program (see Figure 3.1), so we looked at infants who were taken into care within 7 days of their birth to determine whether this group of infants might explain some of the missing screens. We found 195 of the 40,886 births (0.48%) were taken into care within the 7 days, and only 31% of these did not have a *BabyFirst* form associated with them. We also examined whether giving birth outside one's home region and mobility might be factors contributing to not being screened. We did find that those not screened were more likely to give birth outside their "home" region: 19% of those screened gave birth outside their home region compared to 34% of those not screened. Mobility did not seem to be associated with screening rates: 15% of those not screened had one or more moves compared to 16% of those who screened not at risk, whereas 30% of those who screened at risk had one or more moves.

Figures 3.5 through 3.9 show some of the other variables that are related to whether or not an infant was screened. The "a" version of each graph shows the results for all Manitoba births, whereas the "b" version of each graph provides the results for Winnipeg only, in order to examine the relationship between the variable and receipt of the screen without the concern about missing data associated with some of the non-Winnipeg RHAs. The graphs demonstrate that infants are less likely to have a *BabyFirst* screen associated with them if:

- Their mothers were teens when they were born
- Their mothers were teens at the birth of their first child
- Their residence was in a lower income area

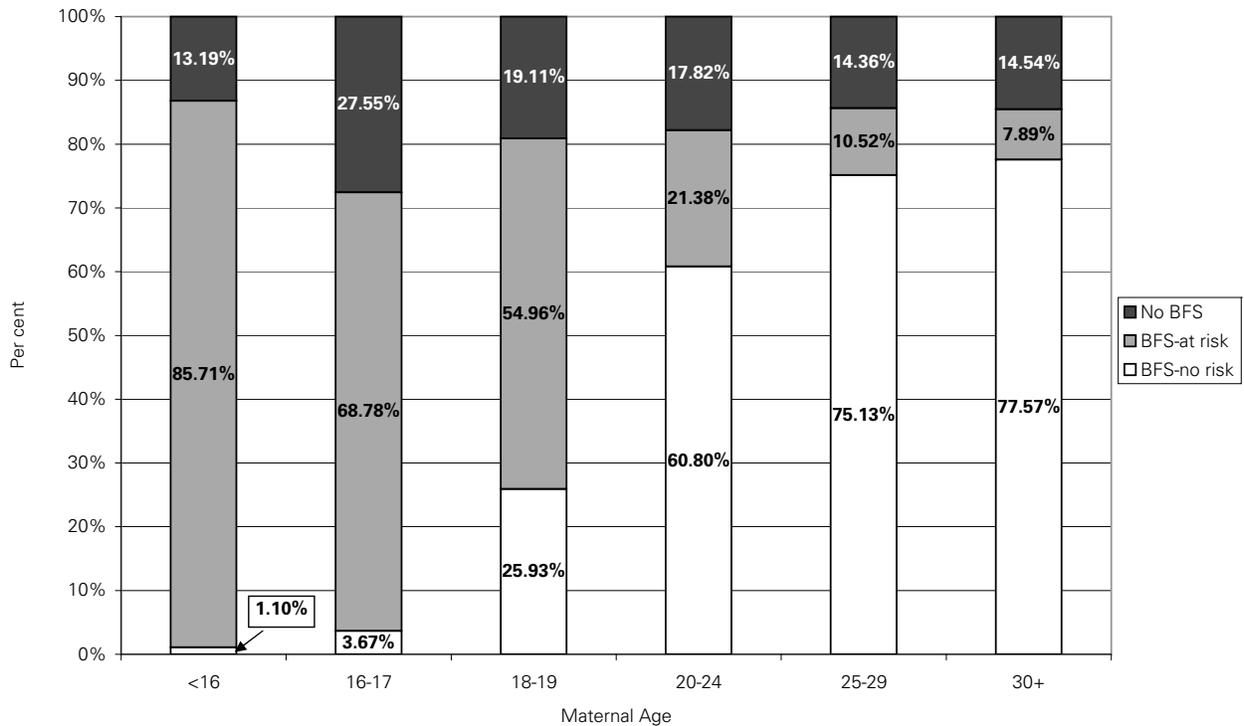
Infants whose mothers were receiving income assistance were slightly more likely to be screened if results from all Manitoba are examined, and slightly less likely to be screened if only Winnipeg residents are examined. Infants whose mothers had been diagnosed with depression and/or received an anti-depressant prescription were no more or less likely to receive the screen than other infants.

Figure 3.5a: Percent of Infants Given the *BabyFirst* Screen by Maternal Age at Current Birth, all Manitoba



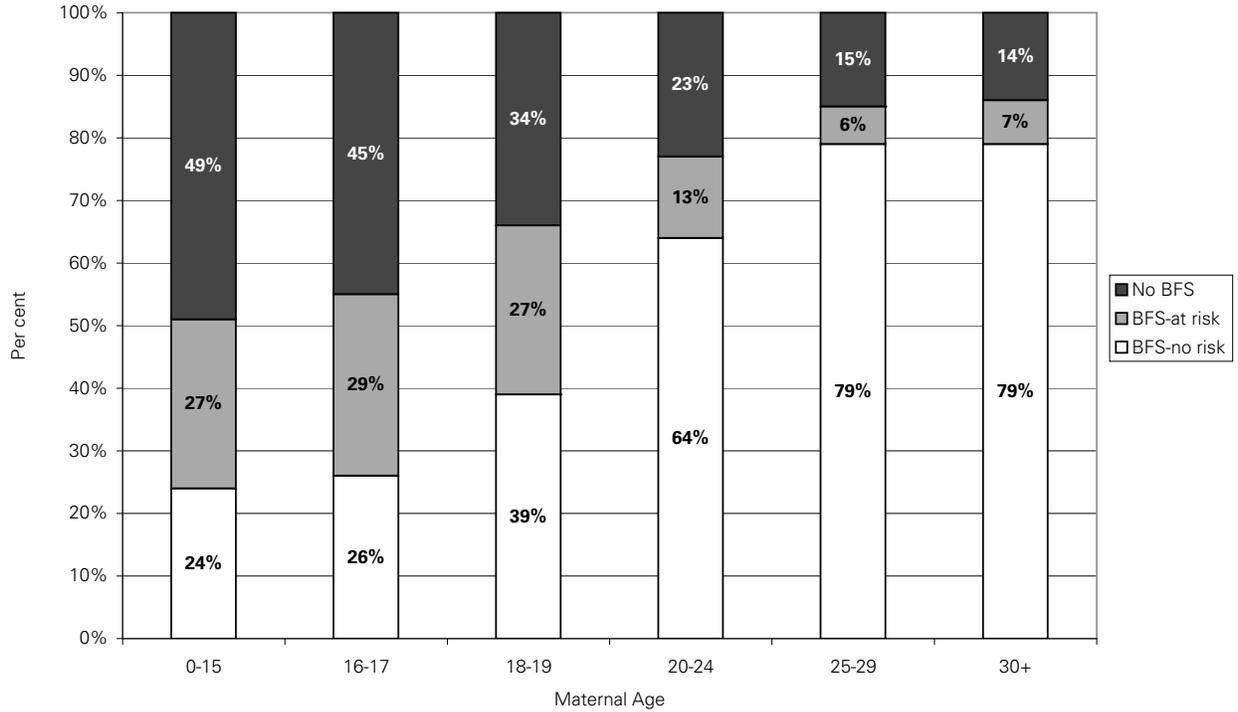
Source: Manitoba Centre for Health Policy, 2007

Figure 3.5b: Percent Infants Given the *BabyFirst* Screen by Maternal Age at Current Birth, Winnipeg Only



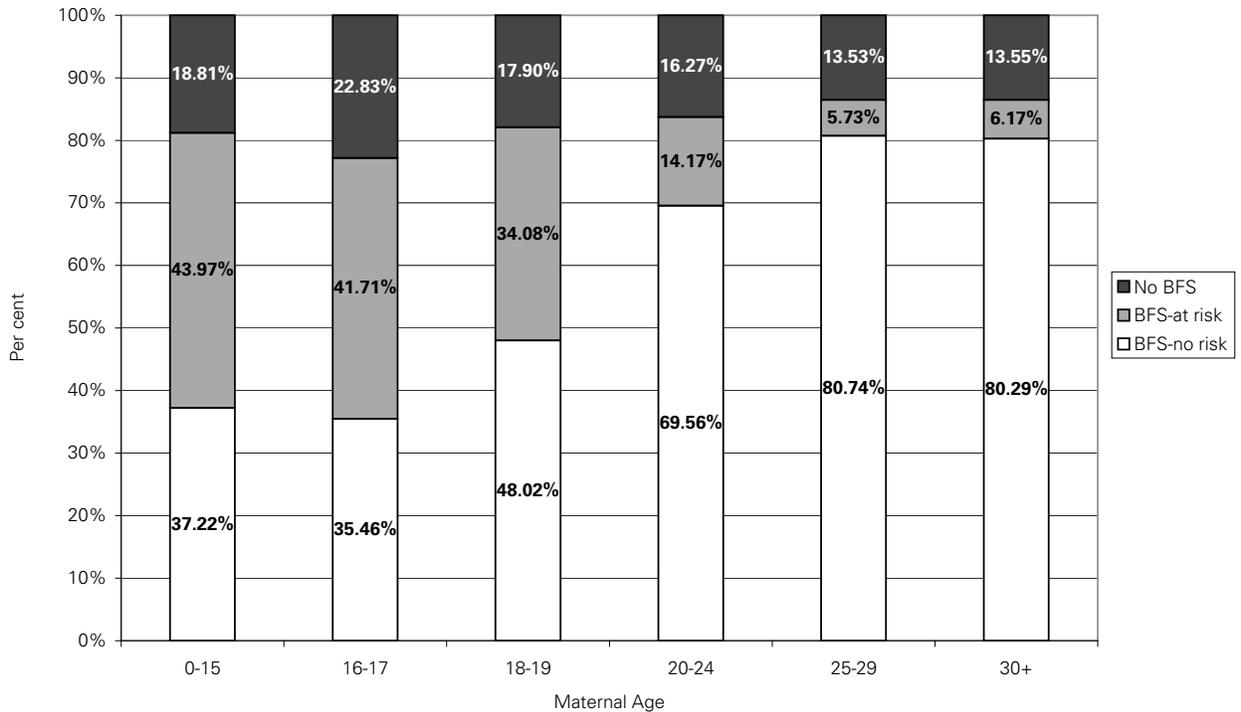
Source: Manitoba Centre for Health Policy, 2007

Figure 3.6a: Percent Infants Given *BabyFirst* Screen by Maternal Age at First Birth, All Manitoba



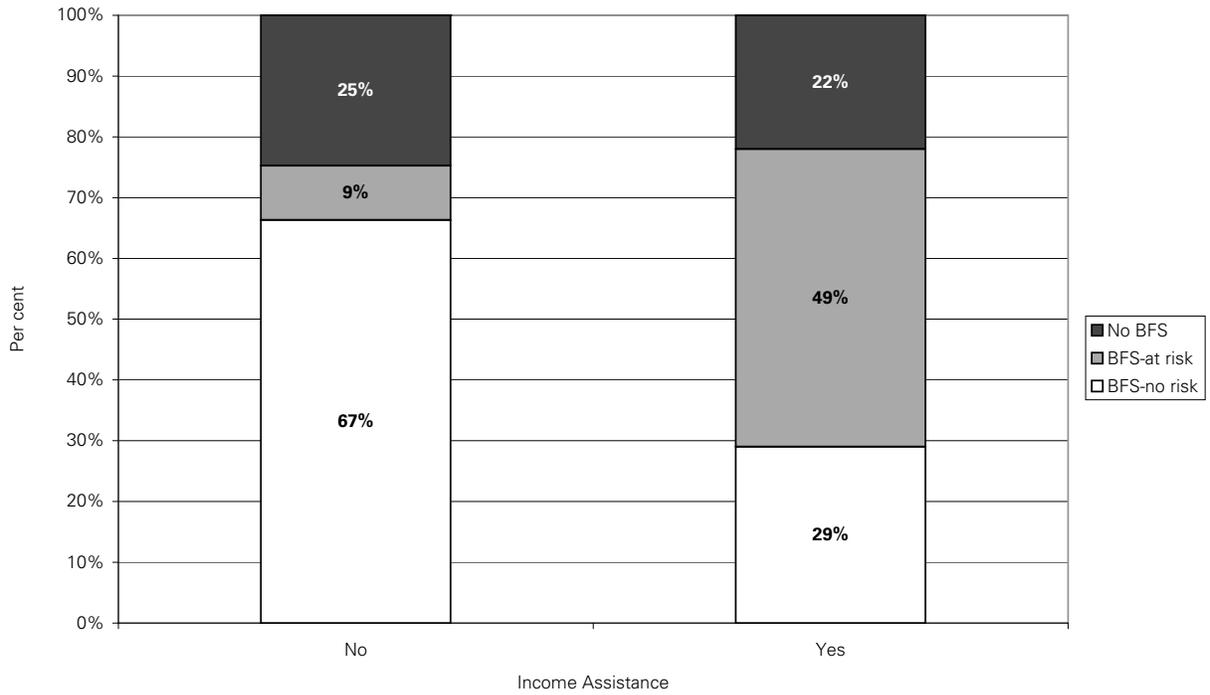
Source: Manitoba Centre for Health Policy,

Figure 3.6b: Percent Infants Given *BabyFirst* Screen by Maternal Age at First Birth, Winnipeg Only



Source: Manitoba Centre for Health Policy, 2007

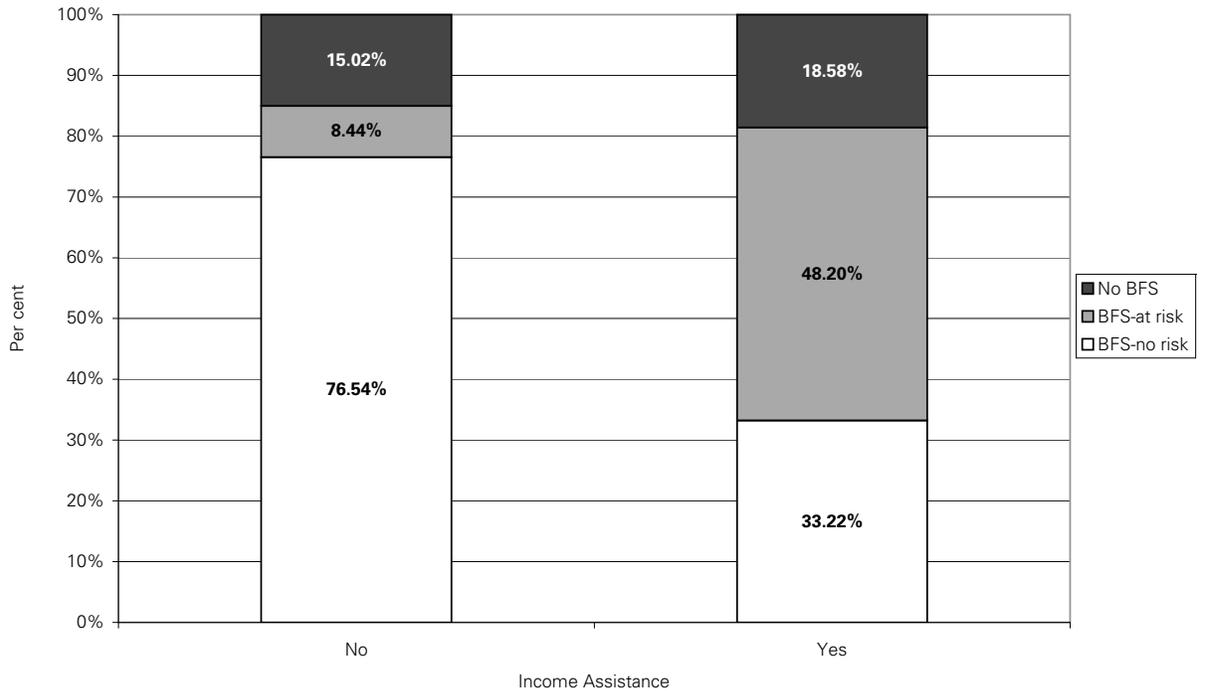
Figure 3.7a: Percent Infants Given *BabyFirst* Screen by Receipt of Income Assistance, Rural Areas*



*Includes all areas except Winnipeg and Brandon

Source: Manitoba Centre for Health Policy, 2007

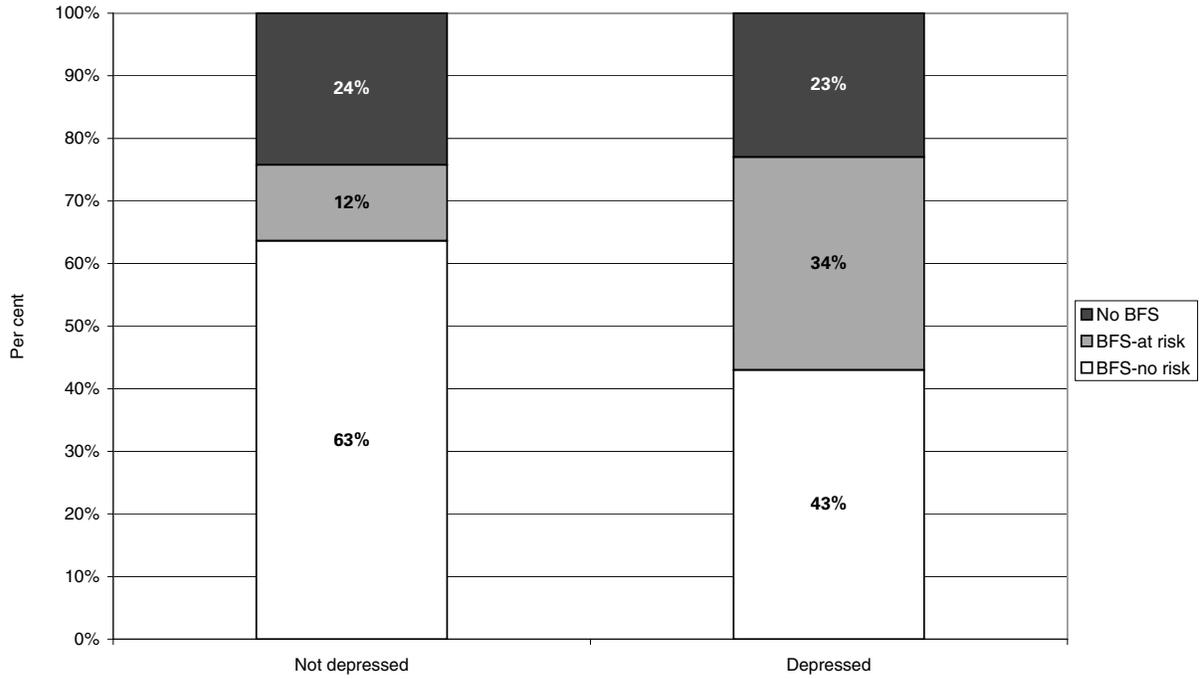
Figure 3.7b: Percent of Infants Given *BabyFirst* Screen by Receipt of Income Assistance, Urban Only*



*Includes Winnipeg and Brandon only

Source: Manitoba Centre for Health Policy, 2007

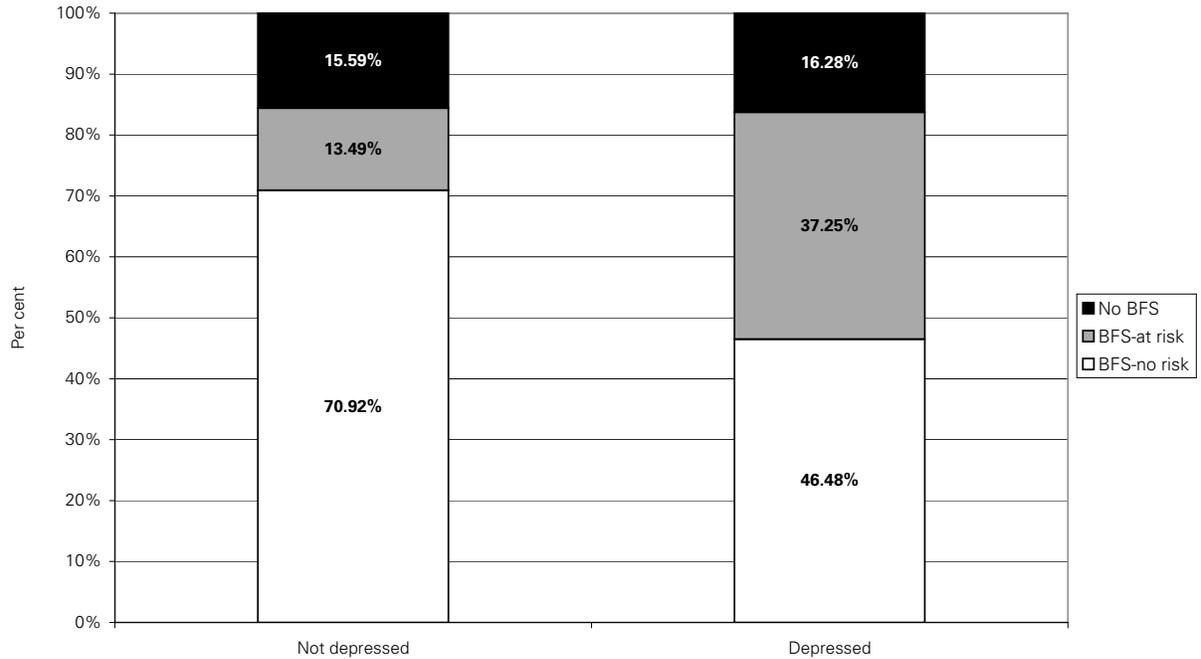
Figure 3.8a: Percent Infants Given *BabyFirst* Screen by Maternal Depression*, All Manitoba



* Maternal depression was measured using Repository data, which includes all mothers receiving a physician diagnosis for depression and/or a prescription for an anti-depressant

Source: Manitoba Centre for Health Policy, 2007

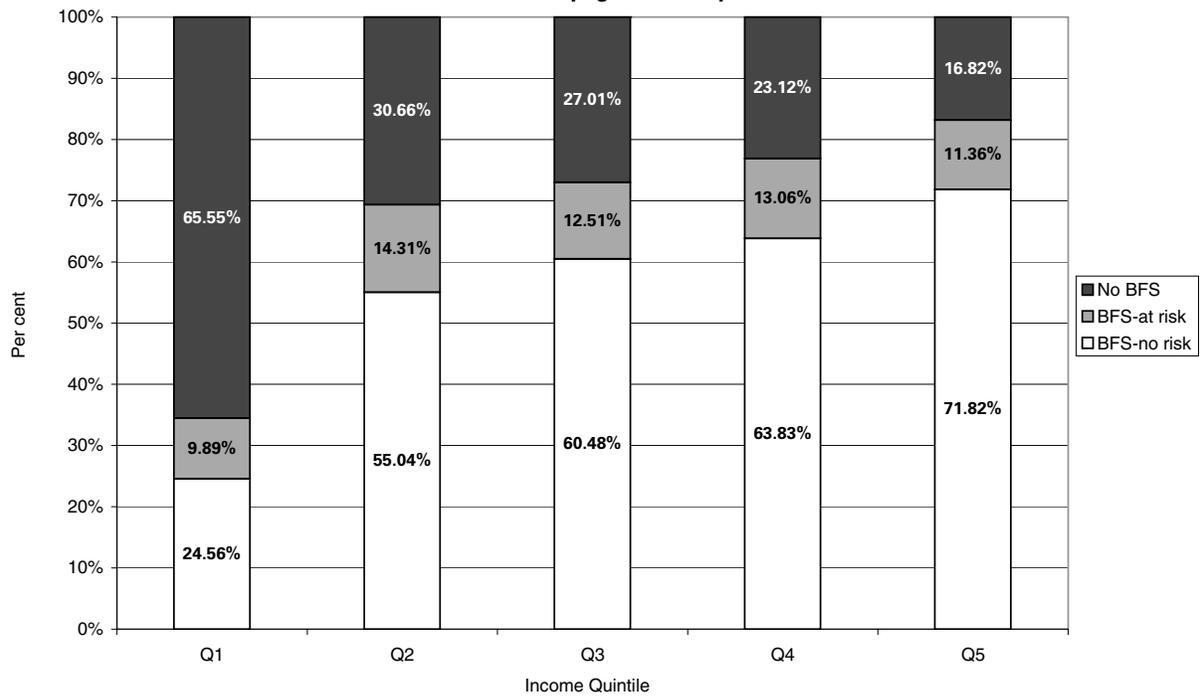
Figure 3.8b: Percent Infants Given *BabyFirst* Screen by Maternal Depression*, Winnipeg Only



* Maternal depression was measured using Repository data, which includes all mothers receiving a physician diagnosis for depression and/or a prescription for an anti-depressant

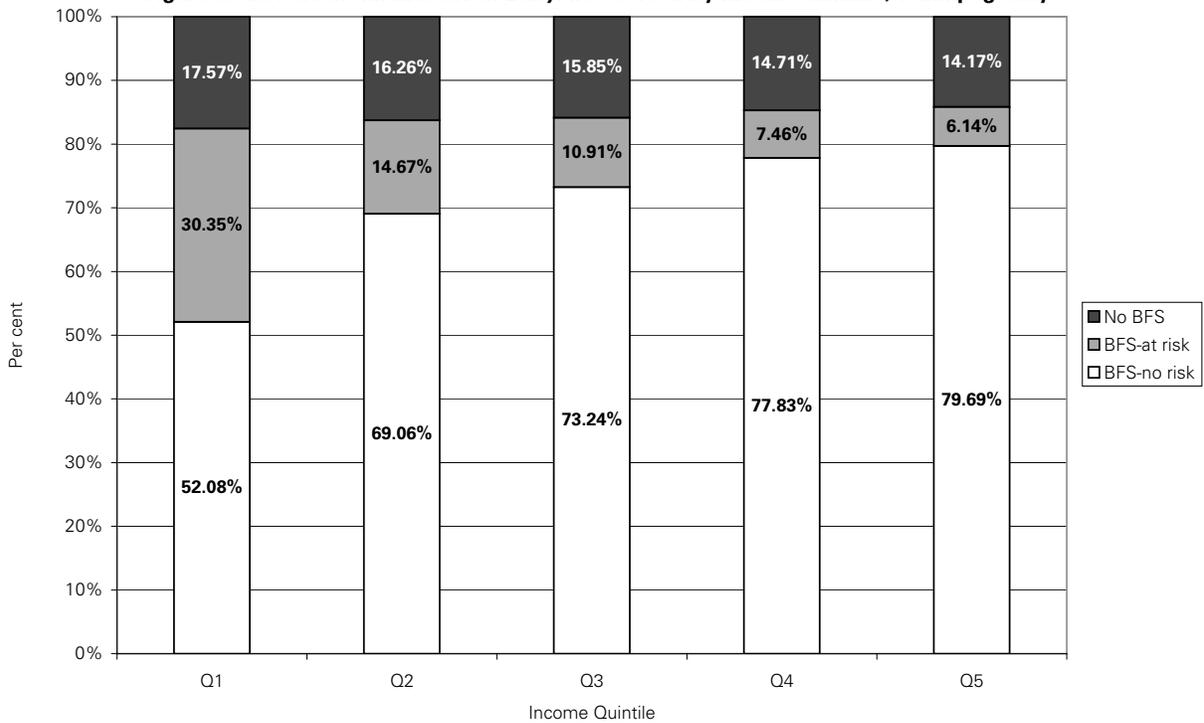
Source: Manitoba Centre for Health Policy, 2007

Figure 3.9a: Percent Infants Given *BabyFirst* Screen by Income Quintile, Non-Winnipeg Areas Only



Source: Manitoba Centre for Health Policy, 2007

Figure 3.9.b: Percent Infants Given *BabyFirst* Screen by Income Quintile, Winnipeg Only



Source: Manitoba Centre for Health Policy, 2007

Summary. The goal of a “universal” screen was clearly not being met in the study period, with almost one-quarter (24.5%) of Manitoba infants not having a *BabyFirst* form associated with them. Even focussing only on Winnipeg, where missing data from First Nations communities would not be an issue, a considerable proportion (16% over the study period) of births did not get screened, and it would appear that infants living in some of the more vulnerable families are less likely to get screened. As we demonstrate below, infants who are not screened tend to be at higher risk for outcomes associated with maltreatment than the general population of infants.

3.3 Validity of the *Babyfirst* Screen

Assessing agreement between BabyFirst screening items and variables in the Repository

There were four variables available on the *BabyFirst* screening form that overlapped with variables available from the Repository: mother’s age, birthweight and gestational age, 5-minute Apgar score, and no prenatal visits before 6 months. For those infants who received the screen (n=30,873) we assessed the extent of agreement between these two sources of information using the kappa statistic. According to Landis and Koch (1977), the interpretation of kappa values can be categorized as follows:

- < 0.00 - poor strength of agreement
- 0.00-0.20 - slight agreement
- 0.21-0.40 - fair agreement
- 0.41-0.60 - moderate agreement
- 0.61-0.80 - substantial agreement
- 0.81-1.0 - almost perfect agreement

As can be seen in Table 3.1, for two of the four items assessed (mother’s age and birthweight/gestation), there was “almost perfect” agreement, with kappa values over 0.80, indicating that these items are being accurately recorded on the *BabyFirst* screening form. There was only “moderate” agreement for the third variable, 5-minute Apgar scores. Given that the Apgar score that is filled out on the *BabyFirst* form is taken from the post-partum referral form, which is the same source of data for the Repository, it is surprising that the agreement is not higher. On the *BabyFirst* form, rather than filling in the actual Apgar score, nurses must subtract the actual score from 10 (e.g., a score of 6 must be filled in as 4), and this may have caused some confusion. Alternately, it is possible that in some cases values for 1-minute Apgar scores may have been entered on the form.

Table 3.1: Agreement between *BabyFirst* Screen items and corresponding variables in the Repository

Variable	Kappa
Mother's age	.9230
Birth weight + Gestation	.8512
5-minute Apgar score	.5213
No prenatal visit < 6 mo.	.0880

Source: Manitoba Centre for Health Policy, 2007

For the question on prenatal care on the *BabyFirst* screening form, only 2% of the mothers responded that they had no prenatal doctor visit prior to their sixth month of pregnancy, whereas the Repository data indicated that 16% of the mothers had not initiated prenatal care prior to their sixth month. Whether the discrepancy was due to difficulty in recalling when care was initiated (about a third of those who said in the *BabyFirst* form that they had initiated care prior to the sixth month, showed up in the physician visit data from the Repository as initiating care in their sixth month) or the desire to provide a socially acceptable response to the nurse filling out the *BabyFirst* form is not possible to determine. A discussion of the agreement between *BabyFirst* items and Repository variables where there was not complete overlap between the two data sources can be found in Appendix 1, Table 3.2.

Assessing Predictive Validity

The predictive validity of the *BabyFirst* screen refers to how well the scores on the screen predict outcomes associated with maltreatment. In this report we looked at how well the *BabyFirst* screen predicted: 1) children going into care, and 2) children receiving services from CFS. For each of these outcomes we assessed validity using descriptive measures and also using regression models.

1) Children in Care

Descriptive measures:

Out of all the 40,886 babies born in Manitoba from 2000 through 2002, 1,407, or 3.4%, ended up in care sometime between their birth and March 31, 2004. Of these 1,407, 585 (41.6%) did not have a *BabyFirst* Screening form associated with them. As we saw in Figure 3.4, there were some RHAs where a large proportion of births were not screened, including those RHAs with numerous First Nations communities. For this reason we also repeated all analyses on Winnipeg residents only, for whom missing data were less of an issue. Examining Winnipeg residents only, out of 21,667 births, 742, or 3.4%, ended up in care prior to March 31, 2004. Of these 742, 170 (22.9%) did not have a *BabyFirst* screening form associated with them. Characteristics of infants who ended up in care but did not have a screening form are given in Table 3.2; infants who ended up in care and were screened are shown for comparison.

Table 3.2: Characteristics of children in care who did not get the *BabyFirst* screen, and who did get screened, all Manitoba and Winnipeg

Variable	Not screened, in care		Screened, in care	
	All Manitoba, n (%)	Winnipeg only, n(%)	All Manitoba, n (%)	Winnipeg, n (%)
Infants in care	585	170	822	572
Mother a teen when this child was born	141 (24.1%)	49 (28.8%)	234 (28.5%)	171 (29%)
Mother a teen when first child born	462 (79.8%)	140 (82.3%)	639 (77.7%)	449 (78%)
Mother resident in FN community	249 (42.6%)	n/a	44 (5.6%)	n/a
Family receiving income assistance	191 (33%)	121 (71.2%)	617 (75%)	461 (80.1%)
Family living in lowest income area	375 (64.1%)	118 (69.4%)	520 (63.3%)	423 (79%)

Source: Manitoba Centre for Health Policy, 2007

Table 3.3: Number of children born in Manitoba in 2000, 2001 and 2002 screening at risk or not at risk* and going into care by March 31, 2004

	In Care	Not in Care
Screened "at risk"	631	5,109
Screened not "at risk"	191	24,942

* 10,013 children not receiving the screen are not included in this table

Source: Manitoba Centre for Health Policy, 2007

Table 3.3 shows a two-by-two table of risk category on the *BabyFirst* screen and whether a child ended up in care, for all infants who were screened. Using children in care as an indicator of child maltreatment in Manitoba, the predictive validity of the *BabyFirst* screen was measured in a number of ways:

- i) The **sensitivity** of the *BabyFirst* screen refers to the true positive rate, that is, the percent of children who end up in care who scored "at risk" on the screen. Sensitivity is calculated by taking the number of children in care who scored at risk (n=631) and dividing this by the total number of children who ended up in care (n=631+191). The sensitivity for the *BabyFirst* screen was therefore 76.8%. Thus over three-quarters of the children who ended up in care, scored "at risk" on the *BabyFirst* screen. On the other hand, almost one-quarter of those who ended up in care scored "not at risk" on the screen (false negatives).
- ii) The **specificity** of the *BabyFirst* screen refers to the true negative rate, that is, the percent of children who didn't end up in care who did not score "at risk". Specificity is calculated by taking the number of children not in care who scored not at risk (24,942) and dividing this

by the total number of children not in care (5,109+24,942). The specificity for the *BabyFirst* screen was therefore 83.0%. This also means that 17% of those not ending up in care screened “at risk”.

Besides sensitivity and specificity, predictive validity can also be measured by positive and negative predictive values:

- iii) The **positive predictive** value of the *BabyFirst* screen refers to the percent of children who scored “at risk” who did actually end up in care. The positive predictive value is calculated by taking the number of children scoring “at risk” who ended up in care (631) divided by the number who scored “at risk” (631+ 5,109). The positive predictive value for the *BabyFirst* screen was therefore 11.0%. It should be kept in mind that the positive predictive value is dependent on the prevalence of the outcome being tested; when screening the population for a low prevalence outcome, such as children in care, a high positive predictive value would not be expected.
- iv) The **negative predictive** value of the *BabyFirst* screen refers to the percent of children who scored no risk who didn’t end up in care. The negative predictive value is calculated by taking the number of child who didn’t score “at risk” and didn’t end up in care (24,942) and dividing this by the total number of children not “at risk” (191+24,942). The negative predictive value for the *BabyFirst* screen was therefore 99.2%.

Results for the above predictive validity measures were very similar when only Winnipeg residents were included in the analyses (see Appendix 1, Tables A1.3 and A1.4). A Policy Statement from the American Academy of Pediatrics categorized sensitivity and specificity levels for developmental screening tools as follows: 0-69 = low; 70-89 = moderate; 90+ = high (2006).⁶ This would indicate that the *BabyFirst* screening form has moderate sensitivity and specificity with respect to the outcome of children in care.

The descriptive measures of predictive validity described above indicate that as a first stage screen, the *BabyFirst* form is doing an adequate job at identifying children at risk of being taken into care. It is important to keep in mind that “children taken into care” probably represent only a fraction of children who are maltreated, and thus is not an ideal outcome for predicting child maltreatment. Additionally, having a fair number of “false positives” does not necessarily reflect poorly on the *BabyFirst* screen, given that parents are queried about a range of possible challenges, not only child maltreatment. This provides the public health nurse with an opportunity to check with the family about their strengths and challenges.

⁶ These values are lower than the values considered acceptable for medical screening tools in part due to the absence of demonstrably effective treatments (American Academy of Pediatrics, 2006).

Regression Models

The predictive validity of the *BabyFirst* screening tool was also measured using regression analysis that determined which variables were the most strongly associated with children who ended up in care. Analyses were run on three sets of potential predictors using: 1) all 23 items on the *BabyFirst* screening form,⁷ 2) eight variables available from the Repository that potentially could be asked during the screening, and 3) variables from 1) and 2) combined. The second set of predictors allowed us to run the regressions not only on all infants with a screen associated with them, but also on infants who were not screened. The third set of predictors were analyzed to see whether items not included on the *BabyFirst* screen which could potentially be added, would increase the predictive validity of the screen. Results for the regressions focusing on the *BabyFirst* screen form only are reported in detail here. Regression results for the second and third sets of predictors are summarized here and details can be found in Appendix 2.

Table 3.4: Number of children in regression samples

	Sample 1	Sample 2	Winnipeg only Sample
Total number of infants	15,281	15,281	17,960
Number (per cent) of children in care	346 (2.26)	341 (2.23)	461 (2.57)

Source: Manitoba Centre for Health Policy, 2007

Regression analyses on the *BabyFirst* items included only those infants that had a form associated with them who didn't go into care within 7 days of their birth (n=30,562). Infants who went into care within 7 days of their birth (n=135) were excluded; even though the majority (69%) of these infants did have a screen associated with them, the date of the screen usually followed the date of going into care, so it was unclear whether the social risk factors reflected the birth family or foster family. To ensure that the significant associations we identified in our regression models were not due to chance, we used a process of split-sample validation, where we randomly split the population of infants into two equal halves. The models were run on the first half (Sample 1) and then applied to the second half (Sample 2) to determine whether the same significant associations were identified with each half of the study population. Because so many more infants from northern RHAs did not have a screen associated with them, we also applied the Sample 1 regression models to Winnipeg residents only (Winnipeg Only Sample), to see if the same variables were associated with ending up in care when there were fewer infants with missing forms. The numbers of infants in each sample as well as the number and percent of children who ended up in care are given in Table 3.4.

⁷ Because some of the items on the *BabyFirst* screen were used to form two or three variables, the regressions actually included 27 variables rather than just 23. For example, item 3 "complications of pregnancy" was used to form two items: 3a) infections transmitted in utero and, 3b) pregnancy complications due to alcohol or drug use by mother.

Table 3.5 shows the items from the *BabyFirst* form that were significantly associated with a screened child going into care. The top four significant variables (i.e., had the highest Chi-square values) were the same variables in the models for each of the samples (Sample 1, Sample 2 and Winnipeg Only Sample), although the ordering of Chi-square values for the variables differed across the samples.⁸ Receiving income assistance or having financial difficulties (item 8), having an existing file with local child protective services (item 21), having a low education status (item 13), and the social situation item (e.g., one-parent family with no social support, item 7) were the strongest predictors of going into care.

Table 3.5: Variables from the *BabyFirst* form that were significantly related to child ending up in care*

Variable (item number of <i>BabyFirst</i> form)	DF	Sample 1 max_r-squared = 0.3239		Sample 2 max_r-squared = 0.3131		Winnipeg only max_r-squared = 0.3313	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models*							
Income assistance or financial difficulties (8)	1	130.68	<.0001	119.75	<.0001	150.36	<.0001
Low education status (13)	1	64.04	<.0001	26.15	<.0001	84.75	<.0001
Existing file with local child protective services (21)	4	59.09	<.0001	155.40	<.0001	130.79	<.0001
Social situation (7)	3	22.00	<.0001	27.39	<.0001	25.10	<.0001
Pregnancy complications due to alcohol or drug use in mother (3b)	1	13.30	0.0003	23.02	<.0001	16.12	<.0001
No prenatal care before 6th month of pregnancy (9)	1	10.60	0.0011	18.15	<.0001	15.26	<.0001
Variables significant in only two of the models							
Parents' own history of child abuse/neglect (22)	4	12.88	0.0119	13.98	0.0074	8.27	0.0823
Infant trauma or illness (4b)	1	7.73	0.0054	0.22	0.6363	5.20	0.0226
Prolonged postpartum maternal separation (11)	1	5.74	0.0165	0.46	0.4993	6.15	0.0131
Assessed lack of bonding (12)	1	4.45	0.035	1.48	0.2233	15.34	<.0001
Variables significant in only the Sample 1 model							
Harsh discipline practices (18)	4	13.79	0.008	2.64	0.6199	2.12	0.7131
Low birth weight/short gestation (2)	4	11.20	0.0245	4.04	0.4005	5.16	0.2715
Apgar less than 7 at 5 minutes (4c)	1	6.38	0.0115	0.29	0.5918	3.32	0.0683

*The variables from the *BabyFirst* screen were entered into regression models one at a time for Sample 1 and only significant variables were retained. The final regression model was then applied to Sample 2 and the Winnipeg only sample. We also ran separate models for Sample 2 and the Winnipeg only sample where variables were entered and retained independent of results from Sample 1 regressions. Those results can be found in Table A2.1 in Appendix 2.

Source: Manitoba Centre for Health Policy, 2007

⁸ Table 3.5 shows the results from regressions where variables found significant in Sample 1 were applied to Sample 2 and the Winnipeg only Sample. For results from regressions where Sample 2 and the Winnipeg only Sample were run independently of the results of the Sample 1 regressions, please see Table A2.1 in Appendix 2; results for these regressions were all very similar.

Table 3.6 shows the odds ratios for the various levels of these variables. For example, a child in a family that reported receiving income assistance or was experiencing financial difficulty had over six times the odds (or risk⁹) of ending up in care compared to a child whose family was not experiencing these financial difficulties. Children whose family had an existing file with local protection services and were rated at moderate risk on this item had over five times the odds of ending up in care as children whose families did not have an existing file with a protection agency. Children whose mother had low education status (less than high school) had almost three times the odds of ending up in care compared to children whose mothers had a higher education level. And children living in a one-parent family with no social support had 2.7 times the odds of ending up in care compared to children in two-parent families with social support. All odds ratios are adjusted for other significant predictors in the models.

Table 3.6: Odds Ratios for *BabyFirst* Screen Items that predicted child going into care, Sample 1¹

Variable	Odds Ratio (95% Confidence Interval)
Income assistance or financial difficulties (8)	6.11 (4.48, 8.34)
Existing file with local child protective services (21) - minimal	1.95 (1.09, 3.50)
Existing file with local child protective services (21) - low	3.47 (2.28, 5.27)
Existing file with local child protective services (21) - moderate	5.43 (2.72, 10.84)
Existing file with local child protective services (21) - high	3.40 (1.64, 7.07)
Low education status (13)	2.99 (2.28, 3.90)
Prolonged postpartum maternal separation (11)	2.01 (1.14, 3.56)
Social situation (7) - one parent family with social support	1.79 (1.35, 2.37)
Social situation (7) - one parent family without social support	2.69 (1.54, 4.69)
Social situation (7) - two parent family without social support	1.34 (0.76, 2.36)
No prenatal care before 6th month of pregnancy (9)	1.94 (1.30, 2.88)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.93 (1.35, 2.74)
Infant trauma or illness (4b)	2.70 (1.34, 5.45)
Harsh discipline practices (18) - minimal risk	2.32 (1.15, 4.66)
Harsh discipline practices (18) - low risk	0.00 (0.00, 0.00)
Harsh discipline practices (18) - moderate risk	0.00 (0.00, 0.00)
Harsh discipline practices (18) - high risk	0.00 (0.00, 0.00)
Parents' own history of child abuse/neglect (22) - minimal risk	0.48 (0.21, 1.07)
Parents' own history of child abuse/neglect (22) - low risk	1.15 (0.67, 1.97)
Parents' own history of child abuse/neglect (22) - moderate risk	1.68 (0.81, 3.51)
Parents' own history of child abuse/neglect (22) - high risk	2.74 (1.25, 6.03)
Apgar less than 7 at 5 minutes (4c)	2.57 (1.24, 5.36)
Low birth weight/short gestation (2) - 0-1499 gm	1.05 (0.37, 2.96)
Low birth weight/short gestation (2) - 1500-1999, <38 weeks	0.74 (0.27, 1.98)
Low birth weight/short gestation (2) - 2000-2500 gm, <38 weeks	2.65 (1.43, 4.90)
Low birth weight/short gestation (2) - 1500-2500, 38 weeks+	0.84 (0.19, 3.68)
Assessed lack of bonding (12)	3.24 (1.09, 9.68)

Note: *These estimates are based on the best fitting regression model for Sample 1 which predicted going into care. Variables from the *BabyFirst* form have the item number in parentheses.

Estimates for the models from Sample 2 and the Winnipeg only Sample can be found in Appendix 2, Tables A2.2 to A2.5.

Source: Manitoba Centre for Health Policy, 2007

⁹ When the incidence of the outcome of interest is low, as is the case with children ending up care in this study, then odds ratios provide a close approximation of risk ratios (Zhang & Yu, 1998).

Other significant predictors of care in all three models included: complications of pregnancy caused by drug or alcohol use by mother (item 3b) and no prenatal care prior to the sixth month of pregnancy (item 9). Variables which were significant predictors of care for two out of the three models included parent's own history of abuse (item 22), infant trauma or illness (item 4b), prolonged maternal separation (item 11), and lack of bonding between mother and infant (item 12). Variables significant only in the sample 1 model but not in the other two models included use of harsh disciplinary practices (item 18), a combination of low birthweight and short gestation (item 2) and lower 5-minute Apgar scores (item 4c). Regression models that retained all significant variables for each of the samples (rather than forcing the significant variables from Sample 1 on the other two samples) showed remarkably similar results (see Table A2.1, Appendix 2 as well as Tables A2.2 – A2.5 for the ORs for the other samples).

The eight variables analyzed in the regressions using only Repository variables were based on information available at birth: mother's age at first birth, marital status, area-level income, presence of older siblings, whether or not breastfeeding was initiated, receipt of income assistance, complications during delivery and geographic area. All were significant predictors of going into care for the infants who were screened, with the exception of complications during delivery. Results for those regressions can be found in Appendix 2, Tables A2.6 – A2.12.

One of the advantages of running the regression models on variables that came only from the Repository was that we could look at predictors of going into care for children who did not have a *BabyFirst* screen form associated with them. Of the eight Repository variables analyzed in these regressions all were significant predictors of going into care for the infants not screened, with the exception of geographic area and breastfeeding.¹⁰ Younger mother's age at birth of the first child, not being married, larger numbers of older siblings, receipt of income assistance, and complications during delivery all increased the odds of ending up in care¹¹ (see Tables A2.13 – A2.19 in Appendix 2).

One of the reasons we also ran regressions with *BabyFirst* items and Repository variables combined was to determine whether there were items that could potentially be added to the *BabyFirst* screen that might increase its predictive validity. Tables 3.5, A2.6, and A2.20 show the R-squared value for each of the models, in this case the max-rescaled R-squared. This value is an indication of the amount of variation in the outcome (in this case, children going into care) that is explained by the variables in the model. The closer this value is to 1.00, the better the variables in the model are at predicting going into care. When only *BabyFirst* items are used as predictors, the R-squared values are around 0.32 and when only Repository variables are used, the R-squared values are around 0.33.

¹⁰ Although breastfeeding was not a significant predictor of going into care in regressions based on Sample 1, when Sample 2 and the Winnipeg only Sample were run without restricting the variables to those significant in Sample 1, breastfeeding was significant in both (i.e., those infants whose mothers did not initiate breastfeeding were significantly more likely to go into care). See Table A.2.14 in Appendix 2

¹¹ It should be noted in these appendix tables that the models on the Winnipeg only Sample had much higher R-squared values indicating that the Repository variables entered into the model were better at explaining the outcome of going into care for children not screened for Winnipeg compared to the non-Winnipeg samples.

When both *BabyFirst* and Repository variables are included together, the R-squared values increase to about 0.40 (Tables A2.20 and A2.21 in Appendix 2).

When we ran these regressions combining *BabyFirst* and Repository variables we did find that while having an existing file open with child protection services and receipt of income assistance were still two of the top five predictors of going into care, three variables from the Repository were also amongst the five strongest predictors of going into care: younger mother's age at first birth, lower area level income group, and a larger number of older siblings (Table A2.20 in Appendix 2). Indeed, children whose mothers were less than 16 when they had their first child had over eight times the odds of ending up in care, and those whose mothers were 18-19 when they had their first child had almost four times the odds of ending up in care compared to children whose mothers were 25 years or older when they started having children (Table A.2.22, Appendix 2). The presence of six or more older siblings increased the odds of ending up in care to almost three times compared to children with no older siblings. Other strong predictors of care in all three models (Sample 1, Sample 2 and Winnipeg Only Sample) that came from the Repository included not being married and not breastfeeding on hospital discharge. Results for the regression models that included both *BabyFirst* items and Repository variables as predictors can be found in Tables A2.20 – A2.26 in Appendix 2.

Given that some of the Repository variables were strong predictors of going into care, we also looked at whether including these variables in the screen might have identified some of the 191 children who scored not at risk but ended up in care (see Table 3.3). Indeed, for these 191 children, almost 65% had positive scores in section C or D of the screening form but their total scores did not reach 9 (their mean score was 5.8), so they were not considered "at risk" on the screen. These 191 cases were examined in terms of five risk factors identified through the Repository: teen mother at first birth, living in the lowest income area, not married, receiving income assistance, and not breastfed at hospital discharge. Only 2% of the 191 children had none of these five risk factors, 8% had only one risk factor, 10% had two, 23% had three, 41% had four risk factors and 16% had all five risk factors.

In summary, the sensitivity and predictive validity of the *BabyFirst* form could be increased by including questions in the screen about risk factors such as mother's age at first birth, whether the baby was breastfed, and number of older siblings; however, this might also decrease the positive predictive value of the screen by increasing the number of false positives. It should also be kept in mind that the outcome variable of being taken into care is only a proxy for child maltreatment, and would probably only include a fraction of the actual child maltreatment cases.

Table 3.7: Number of children born in Manitoba in 2000, 2001 and 2002 screening at risk or not at risk* and receiving services by March 31, 2004

	Received Services	Did Not Receive Services
Screened "at risk"	2,076	3,664
Screened not "at risk"	1,253	23,880

* 10,013 children not receiving the screen are not included in this table

Source: Manitoba Centre for Health Policy, 2007

2) Children Receiving Services from Child and Family Services

Descriptives

Table 3.7 shows a two-by-two table of risk category on the *BabyFirst* screen and whether a child received services from CFS, for all infants who were screened. The same measures of validity described above were assessed:

- i) The sensitivity of the *BabyFirst* screen, that is the percent of children who receive services who scored "at risk" on the screen, was calculated by taking the number of children who received services who scored at risk ($n=2,076$) and dividing this by the total number of children who ended up receiving services ($n=2,076+1,253$). The sensitivity for the *BabyFirst* screen with respect to receiving services was therefore 62.4%, which would be considered low (American Academy of Pediatrics, 2006). Thus nearly two-thirds of the children who ended up receiving services, scored "at risk" on the *BabyFirst* screen. On the other hand, over one third of those who ended up receiving services scored "not at risk" on the screen (false negatives).
- ii) The specificity of the *BabyFirst* screen, that is, the percent of children who didn't receive services who did not score "at risk", was calculated by taking the number of children not receiving services who scored not at risk (23,880) and dividing this by the total number of children not receiving services ($3,664+23,880$). The specificity for the *BabyFirst* screen was therefore 86.7%, or moderate (American Academy of Pediatrics, 2006). This also means that 13.3% of those not receiving services screened "at risk."
- iii) The positive predictive value of the *BabyFirst* screen refers to the percent of children who scored "at risk" who did actually end up receiving services. The positive predictive value is calculated by taking the number of children scoring "at risk" who received services (2,076) divided by the number who scored "at risk" ($2,076+3,664$). The positive predictive value for the *BabyFirst* screen was therefore 36.2%.
- iv) The negative predictive value of the *BabyFirst* screen refers to the percent of children who scored no risk who didn't end up receiving services. The negative predictive value is calculated by taking the number of children who didn't score "at risk" and didn't receive services (23,880) and dividing this by the total number of children not "at risk" ($1,253+23,880$). The negative predictive value for the *BabyFirst* screen was therefore 95.0%.

Results for the above validity measures were very similar when only Winnipeg residents were included in the analyses (see Appendix 1, Tables A1.5 and A1.6).

The descriptive information on validity indicates the *BabyFirst* screening form is not as good at predicting children in families requiring services as it is at predicting children in care, with low sensitivity and moderate specificity. It is possible that the screen itself assists in the identification of families that require protective or support services and may be one component considered in the decision to recommend a family for services. The reader is reminded that receipt of services does not indicate maltreatment, and that receipt of services is not necessarily an ideal indicator of child maltreatment or risk for maltreatment.

Regression Analyses

As was done for predicting whether a child ended up in care, we also ran regression analyses to determine which variables were the most strongly associated with children who received services from CFS during the study period. As in the previous sections focussing on children in care as the outcome, here we focus our discussion on the results from the regressions which modelled the *BabyFirst* items which were the best predictors of receipt of services.

Once again, regression analyses included only those infants that had a form associated with them who didn't go into care within 7 days of their birth (n=30,562), and split-sample validation was used, where regressions were run on two halves of the Manitoba population as well as Winnipeg residents only. The numbers of infants in each sample as well as the number and percent of children who received services are given in Table 3.8.

Table 3.8: Number of children in samples for regressions of children receiving services from Child and Family Services

	Sample 1	Sample 2	Winnipeg only sample
Total number of infants	15,281	15,281	17,960
Number (%) of children receiving services	1,617 (10.6%)	1,589 (10.4%)	2,106 (11.7%)

Source: Manitoba Centre for Health Policy, 2007

Table 3.9 shows the items from the *BabyFirst* screen that were significantly associated with a screened child receiving services from CFS. The top six significant variables (i.e., had the highest Chi-square values) were the same variables in the models from each of the three samples, although the ordering of Chi-square values for the variables differed across the samples. The strongest

predictor of a child receiving services from CFS were having a teen mother (item 6),¹² receiving income assistance or experiencing financial difficulties (item 8), being in a one-parent family with no social support (item 7), having an existing file with local protective services (item 21), maternal smoking during pregnancy (item 17) and low education status of mother (item 13). Other variables that significantly predicted whether a child would require services from CFS in all three models included depression in the mother or father (item 10b), presence of an anxiety disorder (item 19), infant trauma or illness (item 4b) and no prenatal care before the sixth month of pregnancy (item 9). Variables significant in two of the three models included multiple births (item 15), pregnancy complications due to alcohol or drug use by the mother (item 3b), and schizophrenia or bipolar disorder in either parent (item 10a). Items significant only in the Sample 1 model included parents' own history of child abuse or neglect (item 22), a combination of low birthweight and short gestation (item 2), and no prenatal class attendance (item 16).

Table 3.9: Variables from the *BabyFirst* form that were significantly related to family receiving protection or support services*

Variable (item number on <i>BabyFirst</i> form)	DF	Sample 1 max_r-squared = 0.3239		Sample 2 max_r-squared = 0.3131		Winnipeg only max_r-squared = 0.3313	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models							
Mother's age at child's birth (6)	3	326.31	<.0001	295.90	<.0001	347.38	<.0001
Income assistance or financial difficulties (8)	1	294.70	<.0001	392.66	<.0001	435.15	<.0001
Social situation (7)	3	90.42	<.0001	32.69	<.0001	52.08	<.0001
Existing file with local child protective services (21)	4	69.03	<.0001	133.20	<.0001	121.38	<.0001
Maternal smoking during pregnancy (17)	4	62.21	<.0001	69.74	<.0001	93.62	<.0001
Low education status (13)	1	46.12	<.0001	31.81	<.0001	78.74	<.0001
Depression in mother or father (10b)	1	16.80	<.0001	18.65	<.0001	11.44	0.0007
Anxiety disorder (19)	4	12.36	0.0149	11.49	0.0215	13.04	0.0111
Infant trauma or illness (4b)	1	6.12	0.0133	8.07	0.0045	11.38	0.0007
No prenatal care before 6th month of pregnancy (9)	1	10.84	0.001	15.56	<.0001	17.65	<.0001
Variables significant in only two of the models							
Multiple births (15)	4	25.03	<.0001	8.91	0.0633	23.93	<.0001
Pregnancy complications due to alcohol or drug use in mother (3b)	1	12.50	0.0004	2.20	0.1383	11.27	0.0008
Schizophrenia or bipolar affective disorder (10a)	1	6.92	0.0085	10.95	0.0009	0.74	0.3885
Variables significant in only the sample 1 model							
Parents' own history of child Abuse/neglect (22)	4	13.48	0.0092	5.62	0.2294	8.42	0.0773
Low birth weight/short gestation (2)	4	12.08	0.0168	5.02	0.2854	3.19	0.526
No prenatal class attendance (16)	4	11.60	0.0206	3.59	0.4641	5.96	0.2024

*The variables from the *BabyFirst* screen were entered into the regression models one at a time for Sample 1 and only significant variables were retained. The final regression model was then applied to Sample 2 and the Winnipeg only Sample. We also ran separate models for Sample 2 and the Winnipeg only Sample where variables were entered and retained independent of results from Sample 1 regressions. These results can be found in Table A2.27.

Source: Manitoba Centre for Health Policy, 2007

¹² It is possible that being a teen mother was a strong predictor of receiving services because one of the services provided through CFS is "Expectant Parent Services", which is offered to all mothers under the age of 18 years. Additional analyses found that 994 out of 1,326 (75%) mothers under 18 years did receive services from CFS. However, only 41 of these teen mothers received only Expectant Parent Services (i.e., the remaining 953 received additional services, such as "Valid Protection Concerns") and of these 41, only 21 received the Expectant Parent Services for less than a year. Thus, although many teen mothers will start receiving services simply because they are teen parents, the large majority of these mothers will receive additional services beyond those mandated for teen parents.

Odds ratios indicated that children whose mothers were 15 years or younger had over 20 times the odds of receiving services (see Table 3.10); this is most likely related to a CFS mandate to provide services to all young teen mothers (see footnote 10). Regression models that retained all significant variables for each of the samples (rather than forcing the significant variables from Sample 1 on the other two samples) showed similar results (see Tables A2.27 – A2.31 in Appendix 2). Some additional variables were significant in both Sample 2 and the Winnipeg Only Sample that were not significant predictors in Sample 1, including: prolonged postpartum maternal separation (item 11), 5-minute Apgar score less than 7 (item 4c), relationship distress (item 14) and having a mentally disabled or challenged parent (10c).

Table 3.10: Odds Ratios for *BabyFirst* screen items that predicted child receiving services from Child and Family Services*

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance or experiencing financial difficulty (8)	3.86 (3.31, 4.50)
Mother's age at child's birth - 15 and under (6a)	20.29 (8.84, 46.56)
Mother's age at child's birth - 16 or 17 (6b)	15.91 (11.56, 21.90)
Mother's age at child's birth - 18 or 19 (6c)	1.47 (1.19, 1.82)
Social situation (7) - one parent family with social support	2.05 (1.74, 2.42)
Social situation (7) - one parent family without social support	2.86 (1.87, 4.39)
Social situation (7) - two parent family without social support	1.73 (1.30, 2.30)
Maternal smoking during pregnancy (17) - minimal risk	1.80 (1.49, 2.16)
Maternal smoking during pregnancy (17) - low risk	1.79 (1.46, 2.19)
Maternal smoking during pregnancy (17) - moderate risk	1.76 (0.94, 3.28)
Maternal smoking during pregnancy (17) - high risk	3.41 (1.24, 9.37)
Existing file with local child protective services (21) - minimal	2.89 (1.84, 4.56)
Existing file with local child protective services (21) - low	3.23 (2.14, 4.88)
Existing file with local child protective services (21) - moderate	3.57 (1.76, 7.25)
Existing file with local child protective services (21) - high	3.82 (1.84, 7.92)
Low education status (13)	1.66 (1.43, 1.92)
Multiple births (15) - minimal risk	0.87 (0.55, 1.37)
Multiple births (15) - low risk	1.62 (1.03, 2.54)
Multiple births (15) - moderate risk	5.43 (1.87, 15.78)
Multiple births (15) - high risk	15.64 (3.07, 79.76)
Depression in mother or father (10b)	1.63 (1.29, 2.05)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.65 (1.25, 2.19)
Parents' own history of child abuse/neglect (22) - minimal risk	0.59 (0.33, 1.05)
Parents' own history of child abuse/neglect (22) - low risk	1.30 (0.86, 1.97)
Parents' own history of child abuse/neglect (22) - moderate risk	1.77 (1.01, 3.08)
Parents' own history of child abuse/neglect (22) - high risk	2.07 (0.97, 4.43)
No prenatal care before 6th month of pregnancy (9)	1.60 (1.21, 2.11)
Infant trauma or illness (4b)	1.74 (1.12, 2.69)
Anxiety disorder (19) - minimal risk	0.43 (0.23, 0.83)
Anxiety disorder (19) - low risk	1.49 (0.86, 2.59)
Anxiety disorder (19) - moderate risk	0.67 (0.15, 2.95)
Anxiety disorder (19) - high risk	8.36 (0.84, 83.31)
Schizophrenia or bipolar affective disorder (10a)	3.04 (1.33, 6.94)
Low birth weight/short gestation (2) - 0-1499 gm	2.00 (1.12, 3.58)
Low birth weight/short gestation (2) - 1500-1999, <38 weeks	0.91 (0.50, 1.66)
Low birth weight/short gestation (2) - 2000-2500 gm, <38 weeks	1.54 (1.06, 2.24)
Low birth weight/short gestation (2) - 1500-2500, 38 weeks+	1.55 (0.84, 2.85)
No prenatal class attendance (16) - minimal risk	0.74 (0.58, 0.94)
No prenatal class attendance (16) - low risk	1.04 (0.77, 1.40)
No prenatal class attendance (16) - moderate risk	0.74 (0.34, 1.60)
No prenatal class attendance (16) - high risk	3.53 (1.09, 11.40)

Note: Variables from the *BabyFirst* form have the item number in parentheses.

*These estimates are based on the best fitting regression model for Sample 1 which predicted receipt of services. Estimates for the models from Sample 2 and the Winnipeg only Sample can be found in Appendix 2, Tables A2.28 to A2.31.

As was done with the children in care models, eight variables from the Repository data were analyzed to see which were the best predictors of receiving services: mother's age at first birth, marital status, area-level income, presence of older siblings, whether or not breastfeeding was initiated, receipt of income assistance, complications during delivery and geographic area. All were significant predictors of receiving services for those infants who were screened, with the exception of complications during delivery. Results for those regressions can be found in Appendix 2, Tables A2.32 – A2.38.

We were also able to run the regressions with the eight Repository variables on the children who did not receive the *BabyFirst* screen. Receipt of income assistance, mother's age at first birth, marital status, number of older siblings and area (Winnipeg or non-Winnipeg) were all significant predictors of a child receiving services from CFS (see Tables A2.39 – A2.45 in Appendix 2).

As was the case for the children in care models, when *BabyFirst* items and Repository variables were combined to look at predictors of receiving services, the R-squared values increased from about 0.32 with *BabyFirst* items alone to about 0.41 when Repository variables were added (see Table A2.46 – A2.53 in Appendix 2). Results from regressions combining the *BabyFirst* items and Repository variables to predict receipt of services can be found in Appendix 2, Tables A.2.52 – and A.2.53.

Summary:

The above sections demonstrate the validity of the *BabyFirst* screening tool for identifying children at risk for maltreatment. The tool had adequate sensitivity and specificity and also was able to predict reasonably well those children who ended up in care. The predictive validity of the screen could probably be improved by asking questions about the mother's age at first birth, number of older siblings and breastfeeding. While these additional items may increase the number of children who falsely screen at risk, it is important to keep in mind that this screen is only the first stage of a two-stage screening process for the *BabyFirst* program, and therefore it is acceptable to cast a wider net at that stage. Unfortunately there is relatively little information on the validity of the second stage screening tool, the Family Stress Checklist (FSC) (Korfmacher, 2000; Santos, 2005). It should also be kept in mind that the outcomes used in this analysis (children in care, children receiving services) will not capture all children who were maltreated. Items from the *BabyFirst* form that were not predictive of these outcomes may still provide important insight to public health nurses about family functioning.

CHAPTER 4: EVALUATION OF THE *BABYFIRST* HOME VISITING PROGRAM

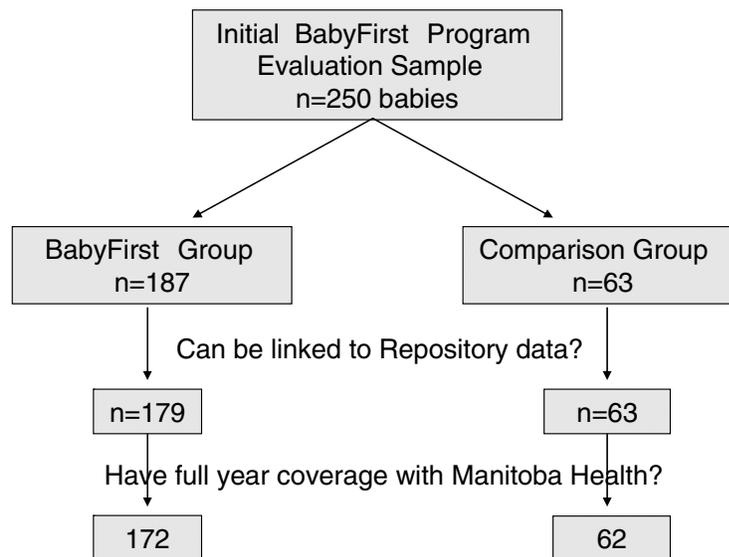
As reported in the first chapter of this report, the first phase of the provincial evaluation of the *BabyFirst* home visiting program showed that after one year the program improved parental psychological well-being, positive parenting, and family participation in community health and social services, after controlling for baseline child, parent, family, and community variables (Healthy Child Manitoba, 2006; Santos, 2005). The goal of this chapter of the *BabyFirst* evaluation was to evaluate the impact of the *BabyFirst* home visiting program on selected outcomes associated with child maltreatment.

4.1 Methods

Study population

The study population for the evaluation of the *BabyFirst* home visiting program was the 250 children in families that made up the provincial evaluation sample. These included infants born between January 1, 2000 and March 31, 2003. The selection process for the provincial evaluation sample, which was carried out in the first phase of the provincial evaluation of the *BabyFirst* program (Healthy Child Manitoba, 2006; Santos, 2005), is illustrated in Figure 3.1 (see Chapter 3). After screening of postpartum referrals with the *BabyFirst* screening form, families scoring at risk were given the FSC. Those families that scored 25 or higher on the FSC, and consented to participate in the *BabyFirst* home visiting program, and consented to program evaluation, became part of the *BabyFirst* Group in the evaluation. Those that scored below 25 on the FSC who consented to program evaluation became part of the Comparison Group in the evaluation. There were 247 families in the program evaluation sample, representing 250 children (three of the families had 2 children in the sample). Of the 250 children, 187 were part of the *BabyFirst* Group and the remaining 63 were in the Comparison Group. Of the 187 *BabyFirst* Group children, 8 could not be linked to the Repository data due to problems with their encrypted identifiers, so 242 remained for analyses (see Figure 4.1). Five of the *BabyFirst* Group children and 1 Comparison Group child did not have full first-year coverage with Manitoba Health and so were excluded from any analyses using health outcome data (see Figure 4.1). Analyses for the second year of immunizations excluded an additional 7 children without a second year of coverage. Outcomes analyzed were available up to March 31, 2004.

Figure 4.1: Flowchart of Sample for Analysis in *BabyFirst* Program Evaluation



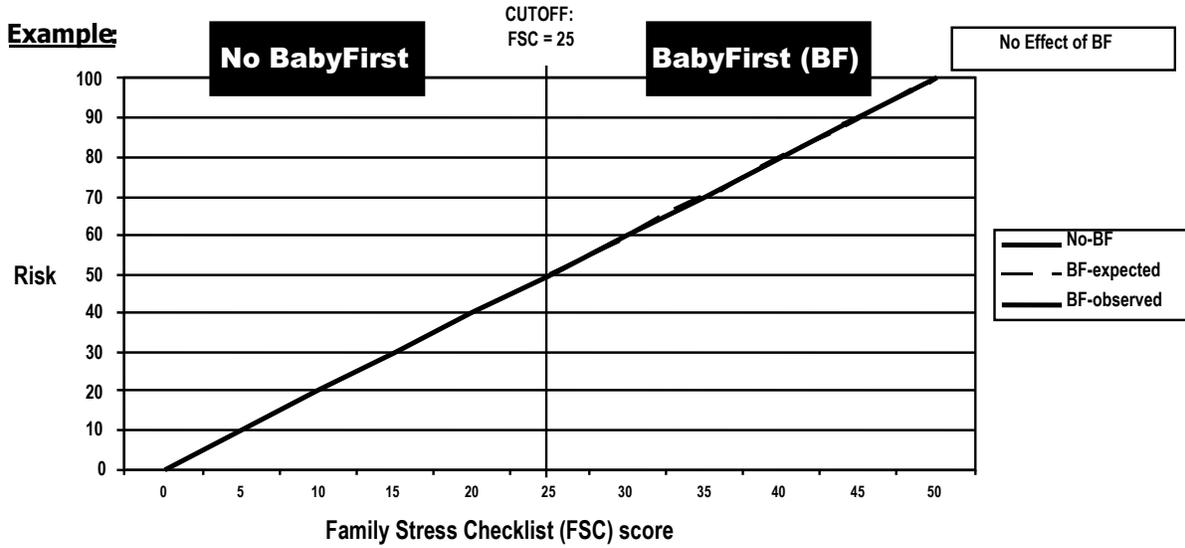
Source: Manitoba Centre for Health Policy, 2007

Analyses

The cut-off score-based approach to determining *BabyFirst* program eligibility (see Figure 3.1) permitted the use of a powerful, yet infrequently used, quasi-experimental design, the regression discontinuity design (RDD) (Campbell & Stanley, 1966, Cook & Campbell, 1979; Cook & Shadish, 1994; Marcantonio & Cook, 1994; Mohr, 1995; Trochim, 1984, 1990, 2000). The RDD is a pretest-posttest control group design that is characterized by its unique method of assignment to intervention: participants are assigned to either the intervention group or control group solely on the basis of a cut-off score on a pretest measure. The RDD is so named because a regression line is plotted to relate the assignment and outcome variables. If the treatment is effective, a discontinuity in the regression line should occur at the cut-off point (Cook & Shadish, 1994, p. 563). This discontinuity is an estimate of the effect of the treatment for individuals near the cut-off point (Reichardt & Bormann, 1994). By comparison, the absence of a discontinuity is interpreted as a null effect.

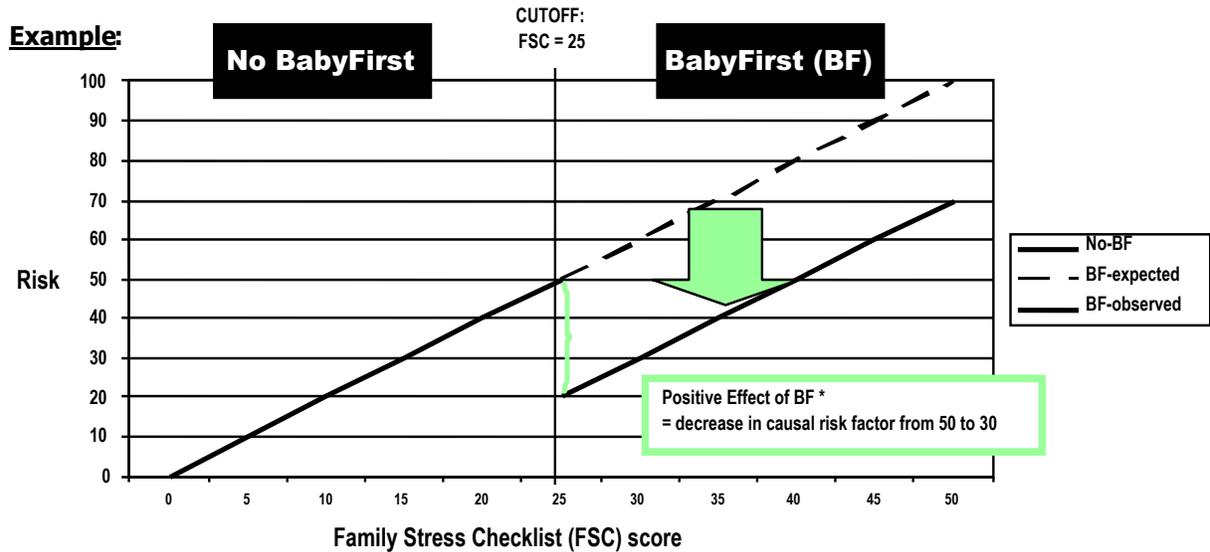
In this study, the RDD was employed to make comparisons on outcomes associated with maltreatment, between children in families receiving *BabyFirst* home visiting and children in comparison families. Using the FSC cut-off score of 25, the regression line was plotted in relation to comparison versus home visiting program, where discontinuity at the cut-off point was expected if the home visiting program was effective. Figure 4.2a illustrates the expected regression line if there was no treatment effect of the *BabyFirst* program, whereas Figure 4.2b illustrates the expected plot if the home visiting program was effective in reducing outcomes associated with maltreatment.

Figure 4.2a: Regression Discontinuity Design (RDD): Hypothetical Regression Line where no *BabyFirst* Effect Exists



Source: Santos, 2005

Figure 4.2b: Regression Discontinuity Design (RDD): Hypothetical Regression Line where Positive *BabyFirst* Effect Exists



* Negative program effects would be shown by an upward discontinuity in the regression line, i.e., an increase in the causal risk factor

Source: Santos, 2005

The outcomes associated with maltreatment that were examined in this chapter included deaths due to maltreatment or intentional injury, hospitalizations due to maltreatment or intentional injury, child being taken into care, and family receiving protective or support services from CFS. Because one of the goals of the *BabyFirst* home visiting program was to facilitate families' connections with community resources, including primary health care services, we also examined two measures of this connection: immunization rates and continuity of care.

The RDD analyses for children in care or receiving protective/support services included 242 children (179 *BabyFirst* Group and 63 Comparison Group); the RDD analyses for health outcomes included 236 children (174 *BabyFirst* Group and 62 Comparison Group); for analysis of first-year immunizations 156 *BabyFirst* Group children and 60 Comparison Group children were included; for analysis of second-year immunizations 133 *BabyFirst* Group children and 51 Comparison Group children were included.

4.2 Results

Approximately 75% of those scoring "at risk" on the first stage *BabyFirst* screen form also scored at risk on the FSC (Santos, 2005). Because the program operates on a voluntary basis, not all families offered home visiting services through the *BabyFirst* program accept them. Rates of decline of services range from 10% to 40% across RHAs (Families First Quarterly Activity Reports Jan–Dec 2005). As well, in some regions, there are more families requiring services than there are home visitors. Since December 2002, the *BabyFirst* program has had periods where home visitor caseloads were full and eligible families were referred to less optimal community supports (*BabyFirst* Status and Activity Report, March 31, 2003). In 2005, 127 or 9% of eligible families were denied access to Families First home visiting supports (Families First Quarterly Activity Report 2005). Available statistics indicate that at March 31, 2003, 1,100 families were participating in the *BabyFirst* home visiting program (*BabyFirst* Status and Activity Report April 2003).

Comparisons of baseline characteristics of Program and Comparison families are given in Tables 4.1 and 4.2. Not surprisingly, the Comparison and Program families differ on a number of characteristics. Program family parents tend to be younger and are much more likely to be teen parents than Comparison families and tend to have lower levels of education, and are less likely to have completed high school. Program families also have substantially lower incomes, fewer years in their current residences, are less likely to be married/common-law, and scored higher on a measure of depression compared to Comparison families. Program parents had higher hostile parenting scores and lower scores on social support, neighbourhood safety and parental well-being (total score and scores on positive relations, purpose in life and self-acceptance) compared to Comparison families. For other variables measured at the start of the *BabyFirst* home visiting program there were no differences between Program and Comparison families: child temperament scores, reading with child, child age, positive parenting score, and the autonomy, environmental and personal growth scores for parental well-being.

Table 4.1: Baseline characteristics for Program and Comparison families for ordinal variables

	Group	N	Mean	CI	Range	T value	Pr > t	Pr > F
FSC Score	Comparison	63	12.46	(10.77-14.15)	(0-20)	-22.33	<.0001	<.0001
	Program	179	43.72	(41.52-45.92)	(25-100)			
Parental age (years)	Comparison	63	27.00	(25.48-28.52)	(16-37)	2.87	0.0045	
	Program	176	24.47	(23.57-25.36)	(16-40)			
Child age (months)	Comparison	63	4.25	(3.83-4.68)	(2-9)	-1.17	0.2431	
	Program	171	4.53	(4.29-4.76)	(2-9)			
Parental education (years)	Comparison	63	11.32	(10.90-11.74)	(1-13)	2.5	0.0131	
	Program	172	10.59	(10.28-10.90)	(0-16)			
Years at current residence	Comparison	63	3.19	(2.29-4.09)	(0-18)	3.08	0.0023	
	Program	177	1.71	(1.24-2.18)	(0-19)			
Family income (\$10,000)	Comparison	54	4.83	(4.07-5.60)	(1-11)	5.88	<.0001	<.0001
	Program	157	2.46	(2.19-2.73)	(1-11)			
Child temperament score	Comparison	60	3.10	(2.86-3.34)	(1.5-5.8)	-1.02	0.31	
	Program	171	3.24	(3.10-3.38)	(1.1-5.6)			
Parental depression score	Comparison	59	1.52	(1.42-1.62)	(1-2.75)	-3.5	0.0006	0.0278
	Program	167	1.75	(1.67-1.83)	(1-3.42)			
Positive parenting score	Comparison	62	4.64	(4.54-4.74)	(3-5)	1.26	0.2099	0.0415
	Program	174	4.56	(4.49-4.63)	(1.8-5)			
Hostile parenting score	Comparison	61	1.40	(1.27-1.53)	(1-3)	-2.32	0.0216	0.0017
	Program	169	1.60	(1.49-1.72)	(1-4.5)			
Reading to child frequency	Comparison	57	6.09	(5.77-6.41)	(1-8)	(1-8)	-0.61	0.5419
	Program	159	6.20	(6.01-6.39)	(1-8)			
Social support score	Comparison	62	3.70	(3.60-3.80)	(2.5-4)	2.82	0.0053	
	Program	169	3.52	(3.46-3.59)	(2.17-4)			
Neighbourhood safety score	Comparison	62	3.33	(3.19-3.47)	(1-4)	3.28	0.0012	
	Program	177	3.06	(2.98-3.14)	(1.33-4)			
Parental well-being total score	Comparison	60	4.83	(4.69-4.97)	(3.5-5.83)	2.96	0.0034	
	Program	163	4.55	(4.45-4.65)	(3.06-5.94)			
Parental well-being autonomy score	Comparison	62	4.44	(4.26-4.63)	(3-6)	-0.29	0.7693	
	Program	170	4.48	(4.35-4.60)	(2-6)			
Parental well-being environmental	Comparison	62	4.79	(4.61-4.97)	(3.33-6)	1.25	0.2139	
	Program	174	4.64	(4.51-4.77)	(1.67-6)			
Parental well-being personal growth	Comparison	60	5.02	(4.84-5.20)	(3.67-6)	0.8	0.4233	
	Program	175	4.93	(4.80-5.05)	(2-6)			
Parental well-being positive relations	Comparison	62	4.93	(4.67-5.19)	(2-6)	3.74	0.0002	
	Program	173	4.35	(4.19-4.51)	(2-6)			
Parental well-being purpose in life score	Comparison	62	4.89	(4.68-5.10)	(2.33-6)	3.52	0.0005	
	Program	173	4.39	(4.24-4.54)	(1-6)			
Parental well-being self acceptance score	Comparison	62	4.96	(4.75-5.17)	(2.67-6)	2.9	0.0041	
	Program	174	4.55	(4.40-4.70)	(2-6)			
Transformed Pretest (precut)	Comparison	63	-12.54	(-14.23 + 10.85)	(-25 - -5)	-22.33	<.0001	<.0001
	Program	179	18.72	(16.52-20.92)	(0-75)			

Source: Manitoba Centre for Health Policy, 2007

Table 4.2: Baseline characteristics for Program and Comparison families for nominal variables

Variable	Group	Per cent	Chi Square	Prob
Teenage parent	Comparison	15.87	12.26	0.0155
	Program	28.41		
With Grade 12 or greater education	Comparison	73.02	20.44	0.0004
	Program	43.02		
Less than one year at current residence	Comparison	30.16	19.08	0.0008
	Program	53.67		
Married or common law	Comparison	74.60	31.73	<0.0001
	Program	51.40		
Child's sex male	Comparison	52.38	0.03	0.8653
	Program	51.14		
Yes read to child	Comparison	90.48	0.07	0.7871
	Program	89.27		

Source: Manitoba Centre for Health Policy, 2007

4.3 Regression Results

The RDD could not be used with three of the four outcome measures associated with maltreatment because the rates of the outcomes were too low. There were no deaths related to maltreatment or intentional injuries of target children during the study period in either Program or Comparison families. There were also only 25 hospitalizations of target children in the first year of life, and only four of these were due to injury, none intentional (all four injuries were due to falls).¹³ As well, there were only 16 of the target children taken into care. All 16 were Program children; with none of the Comparison children taken into care, no regression line could be fitted.¹⁴

There were 74 children in the evaluation sample whose families received protective or support services between the time of the target child's birth and the end of the study period (March 31, 2004), with children from both groups receiving these services, and so we were able to run an RDD with receipt of services as the outcome. Following Zuckerman et al. (2006), we tested the significance of the group variable (Program versus Comparison), adjusting for the cut-off score. In addition, we tested the possibility of the cut-off score effect being non-linear, and having an interactive effect with the group variable.

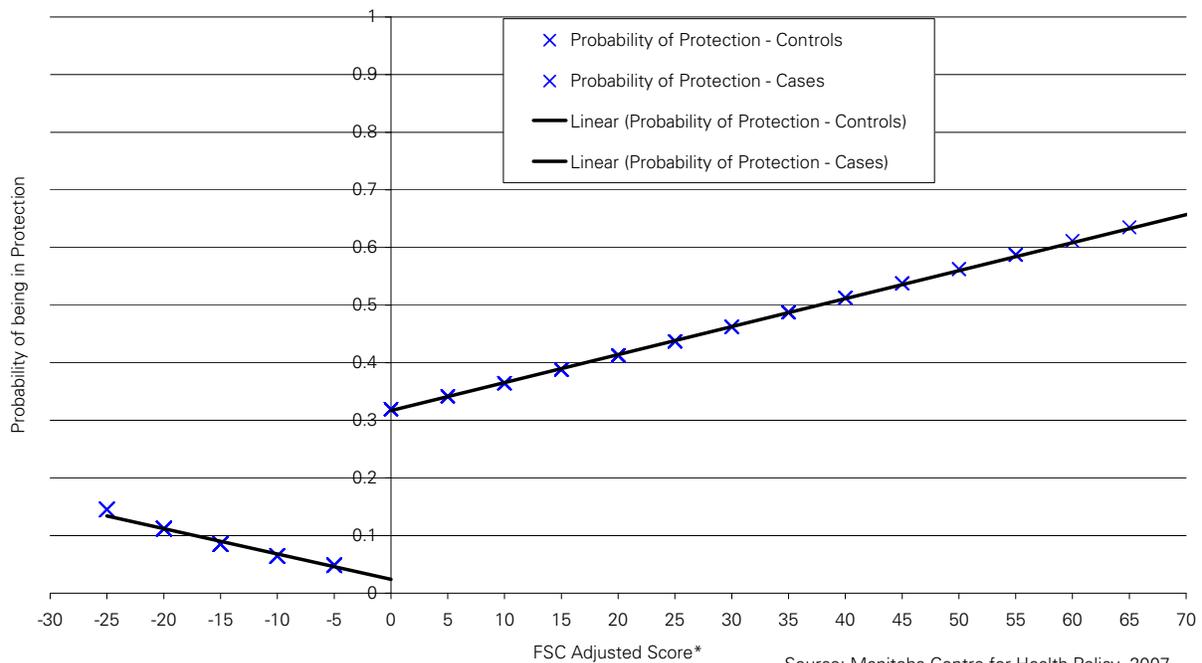
For the RDD comparing Program and Comparison families on receipt of services, the cut-off score effect was linear, with higher FSC scores related to a greater likelihood of receipt of services. Although there was no significant interaction effect, we kept the interaction in the model because it allowed for testing for differences of the slopes for the two groups. The group effect was significant ($p=0.0418$) suggesting a discontinuity between the Comparison and Program groups, with the likelihood of receiving services significantly higher than expected for the families in the *BabyFirst* program. Figure 4.3 illustrates this discontinuity. (Details from the RDD model can be found in Table A3.1 in Appendix 3.) This result is difficult to interpret. The higher receipt of services from CFS for Program families could indicate that the home visiting program was not effective at reducing negative outcomes for children in these families. The fact that receipt of services was actually greater than expected for the Program families suggests it was not simply a lack of effectiveness of the program that occurred. However, it could be that making regular home visits increased the likelihood of observing maladaptive behaviour towards the target child, thus increasing the likelihood of referral for services. Others have witnessed this possible surveillance bias when studying the impact of home visiting on the recurrence of child maltreatment (Chaffin & Bard, 2006; MacMillan et al., 2005). On the other hand, the increase in services could be seen as a positive outcome: the goal of protective and support services is to reduce the likelihood of maltreatment and the need to be taken into care and it is possible that the home visiting program was a means of connecting these high-risk

¹³ An analysis of these 25 hospitalizations indicated that there was no relationship between FSC score and hospitalization, and no difference between groups.

¹⁴ We did run a regression to determine whether there was a relationship between the FSC score and ending up in care and it was borderline significant ($p=0.0512$), meaning that the higher the risk score on the FSC, the greater the likelihood that the child would end up in care.

families to services that have the potential to reduce maltreatment. Of course, whether these services do provide advantages over the potential negative effects of being labelled could not be ascertained in this study. Finally, we know from Table 4.2 that there was a higher percentage of teen mothers in the Program compared to the Comparison Group. Teen mothers under 18 years of age are offered Expectant Parent Services during pregnancy, which can continue past the birth of the child, so the greater receipt of services for the Program Group may have been driven by the number of teen mothers in this group. In actuality, there were only 12 mothers who were less than 18 in the Program Group. An examination of the types of services received by these mothers revealed that the majority (57%) received services additional to the Expectant Parent Services. We removed the mothers less than 18 years who only received the Expectant Parent Services from our regression models, and this did not have an impact on the results.

Figure 4.3: Probability of Receiving Protective or Support Services from Child and Family Services, by Adjusted Family Stress Checklist (FSC) Cut-off Score, Comparison and *BabyFirst* Program Families, 2000-2004



* FSC score adjusted so the cut-off is at 0 rather than 25.

Source: Manitoba Centre for Health Policy, 2007

The first measure of families’ connections with community resources that we analyzed was childhood immunization rates, which were assessed for completeness at the end of both the first and second years of life for the target children. Children from both Comparison and Program families had relatively high percentages of full immunization at both the end of the first and second years (see Table 4.3). Fully 95.2% of the comparison group and 89.1% of the program children had complete immunization rates at the end of their first years; this compares favourably to the Manitoba mean

of 82% in 2001/02 (Brownell et al., 2004). Likewise, 80.7% of the comparison children and 79.6% of the program children had full immunizations at the end of their second year, compared to a Manitoba average of 69% in 2001/02. The RDD analyses for both first and second years failed to find a significant group or cut-off score effect, suggesting that there was no relationship between the FSC score and immunization rates, making it difficult to determine whether the *BabyFirst* program had an impact on immunization rates. (Regression results can be found in Tables A3.2.a and A3.2.b.)

Table 4.3: Percent children with complete immunization schedules at one and two years after birth, for Comparison and *BabyFirst* Program children

Group	Per cent Complete at End of:	
	First Year	Second Year
Comparison	95.16	80.65
<i>BabyFirst</i> Program	89.08	79.64

Source: Manitoba Centre for Health Policy, 2007

The second measure of families' connections with community resources that we examined was continuity of care, that is, whether the target child tended to receive most of his/her care from the same or different physicians. The RDD analysis for continuity of care included only those children who had complete coverage with Manitoba Health for the first year of life (n=236). For these 236 children, 14.4% of the Program children and 21% of the Comparison children had 100% of their visits to the same provider.¹⁵ When continuity of care was modelled, although there was a significant effect of the FSC cut-off, there was no group effect, suggesting the *BabyFirst* home visiting program did not have an impact on continuity of care for target children, or if there was an effect it was not detected in this analysis (see discussion below). (Regression results can be found in Table A3.3 in Appendix 3.)

The lack of significant results for analyses assessing the impact of the *BabyFirst* home visiting program could be an indication that the program is not having the expected effects on families involved with the program. It is also possible that the indicators used to measure child maltreatment may not be the right indicators to measure program effectiveness. However, caution should be exercised prior to forming any conclusions about the impact of the program, based on the size of the evaluation sample. Because the main outcome—a child going into care—is rare, a much larger evaluation sample than was available in the current analysis is necessary to detect significant program effects.¹⁶ For example, if the true program effect was small—for instance reducing the likelihood of going into care from 12% to 10%, then the comparison group would have to be over 2,500 and the program group would have to be close to 8,000 in order to detect this effect 80% of the time. Even if the true effect was large—for example reducing the likelihood of going into care from 20% to 10%, the comparison group would have to be around 150 and the program group would have to be over 450 in order to detect a significant effect of the program 80% of the time. These numbers are over two times higher than the number of families available in the current analysis.

¹⁵ It is possible that in non-Winnipeg areas, the use of nurse practitioners and lack of shadow billing by salaried physicians could have been a source of bias in this analysis.

¹⁶ To state that there is no program effect would be running the risk of committing a Type II error—that is, the error of failing to observe a program effect when, in truth, there was one. The probability of making a Type II error can be decreased by increasing sample size.

CHAPTER 5: POPULATION-BASED EVALUATION OF THE *BABYFIRST* PROGRAM

There are many challenges to evaluating early life family support programs aimed at preventing child abuse, including biased reporting of outcomes, insufficient sample size to detect uncommon events such as child maltreatment, and inability to assess all participants due to high drop out rates (Duggan, 2006; McGuigan, 2003). Further, it is conceivable that these programs have far reaching effects on the general population of children, and/or that the community context will influence program effectiveness (McGuigan, 2003). To date, all of the evaluations (including the evaluation discussed in Chapter 4 of this report) have been of children and families enrolled in a program in comparison to a control group (those not enrolled). None have assessed program effectiveness in the general population.

Population-based evaluations require the pre- and post-study design, with baseline time periods of sufficient duration to control for community trends, such as recent declines in childhood hospitalization rates for injury (Durbin, 2000; Donner, 2004). The goal of this chapter of the report was to evaluate the impact of the *BabyFirst* program on the whole population of Manitoba children, with a 15-year baseline period for comparison. Our hypothesis was that the *BabyFirst* program would reduce child maltreatment rates.

5.1 Methods

This was a population-based evaluation of the *BabyFirst* program in Manitoba, which accessed data from health care databases housed at MCHP to compare indicators of child maltreatment in a 15-year time period before *BabyFirst* implementation and during the five years which followed.

Three measures of child abuse were implemented in children aged 18 years and younger: 1) hospitalization for or death due to injury [800-899.99, all E-codes except medical and surgical misadventure (E870-E879 and E930-E949)], 2) hospitalization for or death due to assault [E960-E969], and 3) hospitalization for or death due to maltreatment [E904, E967, E968.4]. For children most likely affected by the program, at ages three years and younger, the following two measures of child abuse were reported: 1) hospitalization for or death due to injury [800-899.99, all E-codes except medical and surgical misadventure (E870-E879 and E930-E949)], and 2) hospitalization for or death due to assault or maltreatment [E904, E960-E969, E988]. If a death occurred within 7 days of a hospitalization episode, it was counted as the same episode.

The analyses were both descriptive and hypothesis-testing in nature. Descriptive analyses reported crude rates of child maltreatment per 1,000 before and after *BabyFirst* implementation. The time period before *BabyFirst* was divided into three time intervals: 1984/85-1988/89, 1989/90-1993/94 and 1994/95-1998/99. The *BabyFirst* “in effect” period was the five-year time period from 1999/2000 to 2003/04, and included the first year of *BabyFirst* implementation.

To test for the effectiveness of the *BabyFirst* program, a generalized linear model (GLM) was used to test for differences in rate estimates of the child maltreatment outcomes before and after program introduction, adjusted for age and sex. A negative binomial distribution was assumed for each of the outcomes. Goodness of model fit was assessed with the deviance score. Rate differences between time periods before and after the introduction of *BabyFirst* were tested with focussed contrasts. An intervention variable was included in all models which included the child maltreatment measures expressed as yearly rates, to test for the independent effects of the *BabyFirst* program. Variables were retained in models at the 95% level of confidence ($p < 0.05$).

5.2 Results

During the 20-year study period, 1984/85 to 2003/04, between 1.5 and 1.6 million children were included in our analyses in each of the five-year evaluation periods; this included between 290,000 and 335,000 children aged three years and younger. Among all children, the overall hospitalization and death rates for injury were 9.9 per 1,000 children; for assault the rates were 0.47 per 1,000 and for maltreatment the rates were 0.09 per 1,000 (Table 5.1). Among children aged three years or younger, the overall hospitalization rates for injury were 8.4 per 1,000 children, and for assault and maltreatment the rates were 0.42 per 1,000.

Table 5.1: Crude hospitalization rates per 1,000 for outcomes associated with maltreatment before and after the *BabyFirst* Program

	Age 18 years and younger	Age 3 years and younger
Any Injury	9.93	8.42
1984/85–1988/89	12.06	10.68
1989/90–1993/94	10.46	9.29
1994/95–1998/99	9.05	7.30
1999/2000–2003/04	8.04 (33% decline)	6.02 (44% decline)
Assault	0.47	
1984/85–1988/89	0.50	
1989/90–1993/94	0.49	
1994/95–1998/99	0.47	
1999/2000–2003/04	0.42 (16% decline)	
Maltreatment*	0.09	0.42
1984/85–1988/89	0.11	0.48
1989/90–1993/94	0.10	0.50
1994/95–1998/99	0.09	0.40
1999/2000–2003/04	0.07 (36% decline)	0.27 (44% decline)

* Includes assault for children 3 years and younger

Source: Manitoba Centre for Health Policy, 2007

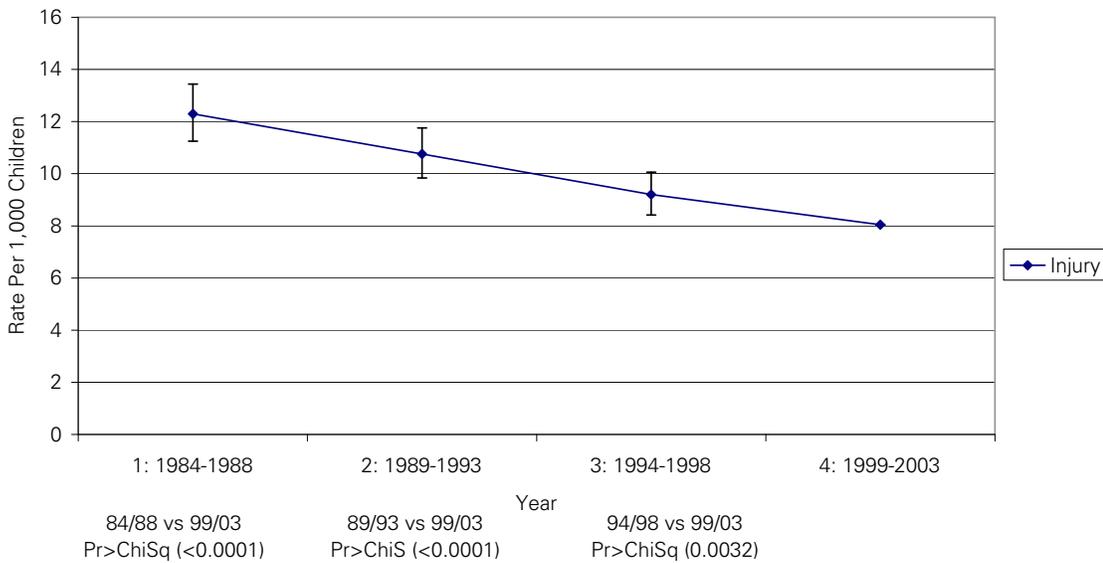
Crude rates for the child injury outcomes in each five-year time period before and after the *BabyFirst* program are reported in Table 5.1, separately for all children and for children aged three years and younger. Generally, the rates for child injury, assault and maltreatment decreased successively from 1984/85 to 2003/04. The percent declines in these rates ranged from 16% for assault to

36% for maltreatment. The rates of decline were higher for children three years and younger, as much as 44% for hospitalization or death due to assault and maltreatment.

All Children

Figures 5.1-5.3 report the period rates for the child injury outcomes, adjusted for age and gender. Reported in the horizontal axis are the results of the contrast statements (statistical significance determined at $p < 0.05$), comparing the hospitalization and death rates following the introduction of the *BabyFirst* program to each of the five-year time periods prior to its implementation. Post *BabyFirst*, the adjusted rate of hospitalization or death due to injury was significantly lower than in each of the time periods before *BabyFirst* implementation (Figure 5.1). For example, the injury rate for 1999/2000-2003/04 was 8.0 per 1,000 children, which was significantly lower than 9.2 events per 1000 in 1994/95-1998/99 or 12.3 events per 1,000 in 1984/85-1988/89.

Figure 5.1: Injury Rates in Manitoba Children Before (1984-1998) and After (1999-2003) Introduction of *BabyFirst* Program, Ages ≤ 18



Source: Manitoba Centre for Health Policy, 2007

Hospitalization or death due to assault was significantly lower after *BabyFirst* (0.42 per 1,000) than in the time periods between 1984/85-1993/94 (for example, 0.66 per 1,000 for 1984/85-1988/89, Figure 5.2). This rate was not significantly lower than the rate during the five-year time period (1994/95-1998/99) immediately before the implementation of *BabyFirst* (0.57 per 1,000). Hospitalization or death due to maltreatment (0.07 per 1,000) following the *BabyFirst* program did not differ from any of the maltreatment rates in the 15-year time period prior to *BabyFirst* (Figure 5.3).

Figure 5.2: Assault Rates in Manitoba Children Before (1984-1998) and After (1999-2003) Introduction of *BabyFirst* Program, Ages <= 18

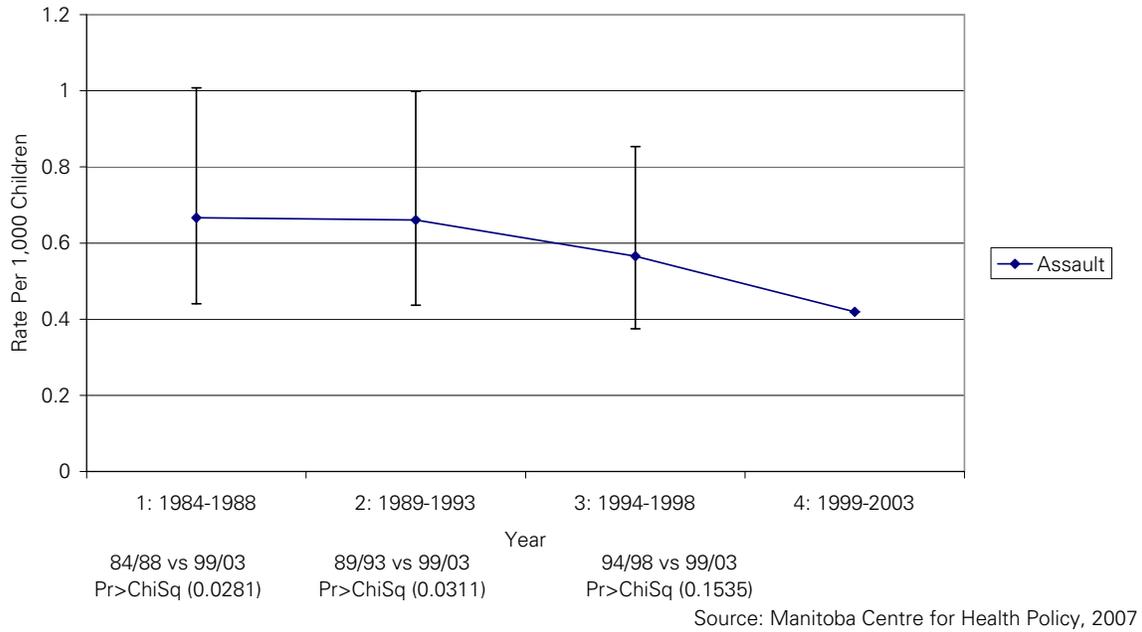
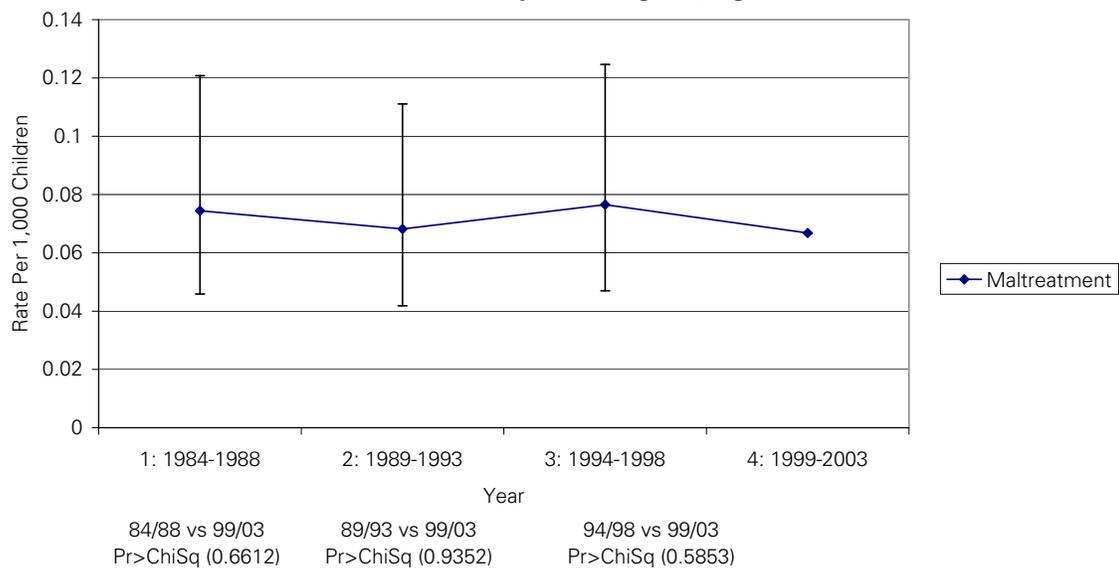


Figure 5.3: Maltreatment Rates in Manitoba Children Before (1984-1998) and After (1999-2003) Introduction of *BabyFirst* Program, Ages <= 18



The addition of an intervention variable to models with child injury and maltreatment outcomes reported as yearly rates (in lieu of categorical time period rates), did not change statistical significance for the rates of injury in all children (Table 5.2). A steady decline in injury rates was observed over time from 1994/95 to 2003/04. No constant time trend was observed for assault or maltreatment. Relevant to the question of interest, the intervention variable itself was not significantly associated with any of the outcomes.

Table 5.2: Change in child outcome (relative risk, 95% CI) after *BabyFirst* (ABF)

Outcome	Estimate*	p value	Relative Risk,* 95% CI
Age 18 years and younger			
Injury rate change ABF	0.01	0.90	1.01 (0.90–1.13)
Injury rate over time	-0.03	<0.0001	0.97 (0.96–0.98)
Assault rate ABF	-0.24	0.37	0.78 (0.46–1.34)
Assault rate over time	-0.02	0.44	0.98 (0.94–1.03)
Maltreatment rate ABF	-0.11	0.72	0.89 (0.48–1.65)
Maltreatment rate over time	0.00	0.92	1.00 (0.96–1.05)
Age 3 years and younger			
Injury rate ABF	-0.02	0.86	0.98 (0.79–1.22)
Injury rate over time	-0.04	<0.0001	0.96 (0.95–0.98)
Maltreatment rate ABF	-0.35	0.06	0.71 (0.49–1.01)
Maltreatment rate over time	-0.02	0.13	0.98 (0.96–1.01)

* Adjusted for age and sex

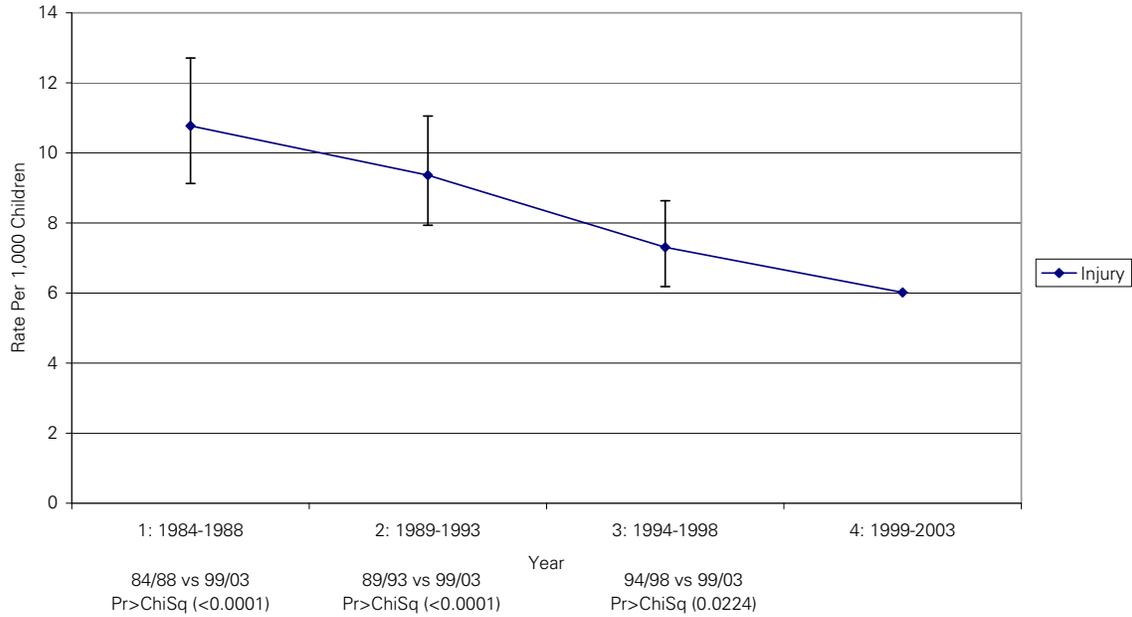
Source: Manitoba Centre for Health Policy, 2007

Children 3 Years and Younger

The aforementioned findings for injury events were similar for children aged three years and younger. In comparison to each of the time periods beforehand, the rate of hospitalization or death due to injury was significantly lower following the *BabyFirst* program (Figure 5.4). For example, the rate for 1999/2000–2003/04 was 6.02 per 1,000 children, which was significantly lower than 7.30 per 1,000 in 1994/95–1998/99. In contrast to the trends in all children, maltreatment/assault rates for this younger age group showed a steady decline from 1984/85 to 2003/04 (Figure 5.5). The combined maltreatment and assault rate post *BabyFirst* (0.27 per 1,000) was significantly lower than each of these rates.

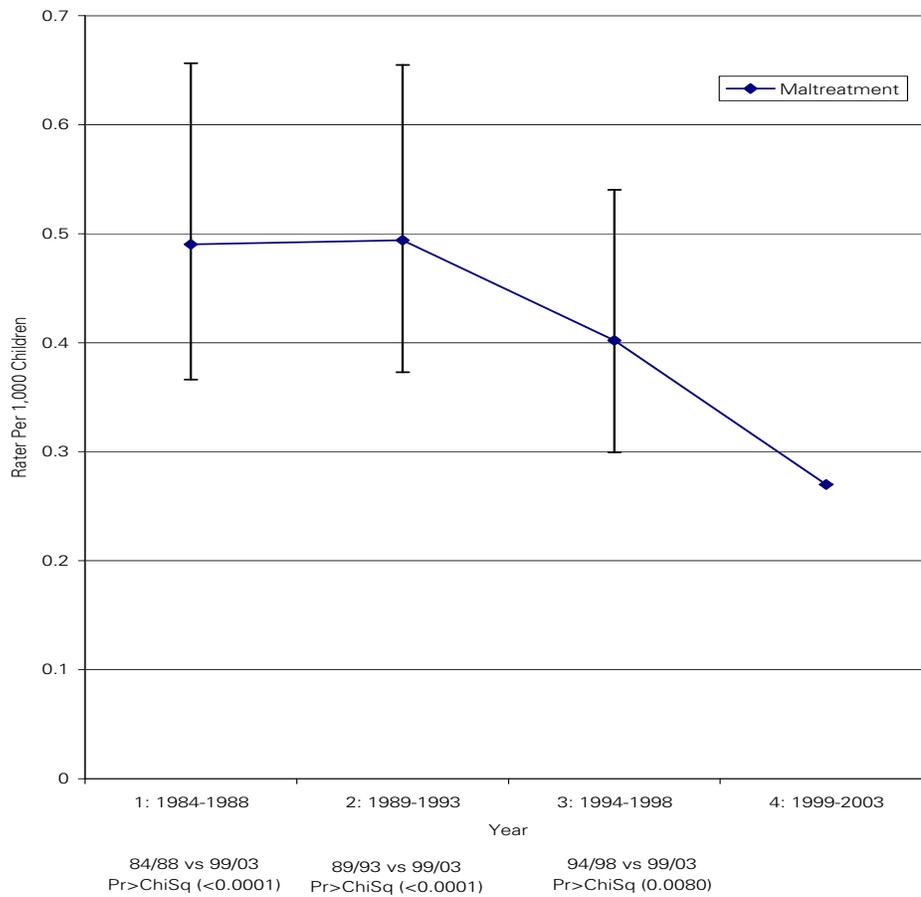
A steady decline in injury rates over the time period from 1984/85 to 2003/04 was observed among children 3 years and younger (Table 5.2). As in all children, the intervention variable itself was not significantly associated with the injury outcomes. However, the rates for maltreatment and assault yielded different results in children 3 years and younger. There appeared to be a trend for a steady decline in these rates, although the result was not statistically significant ($p < 0.13$). Of note, the intervention variable was almost statistically significant ($p < 0.06$), suggesting that rates for

Figure 5.4: Injury Rates in Manitoba Children Before (1984-1998) and After (1999-2003) Introduction of *BabyFirst* Program , Ages <= 3



Source: Manitoba Centre for Health Policy, 2007

Figure 5.5: Maltreatment Rates in Manitoba Children Before (1984-1998) and After (1999-2003) Introduction of *BabyFirst* Program, Ages <= 3



Source: Manitoba Centre for Health Policy, 2007

maltreatment and assault decreased following *BabyFirst*, independently of the downward decline in rates over the 15-year period. The relative risk for the intervention variable indicated that the likelihood of maltreatment/assault in children 3 years and younger after *BabyFirst* came into effect was 0.71. In other words, the likelihood of a maltreatment/assault episode was reduced by almost 30% during the intervention period.¹⁷

5.3 Summary

Over the 20-year study period, 1984/85 – 2003/04 we observed a declining trend in hospitalization and death rates due to injury, assault and maltreatment among all Manitoba children. When children from birth to 18 years were studied together as a group, the implementation of the *BabyFirst* program in Manitoba in 1999 did not appear to have an impact on these population-based rates of child maltreatment outcomes. This conclusion is based on the following:

- 1) The hospitalization and death rates for injury and assault (adjusted for age and sex) began to decrease in the 15-year time period before *BabyFirst*, indicating an overall population trend of declining rates.
- 2) The hospitalization and death rates due to assault or maltreatment (adjusted for age and sex) between the five-year time periods immediately before and after *BabyFirst* implementation were not statistically different from each other.
- 3) The lack of statistical significance of a “before and after intervention” variable in models which included yearly rates for the child injury outcomes indicated no additional effect of *BabyFirst* beyond general population trends.

However, our findings do suggest that the introduction of the *BabyFirst* program was associated with lower rates for maltreatment and assault in children 3 years and younger, independent of declining time trends. This conclusion is based on:

- 4) The “before and after intervention” variable in models, which included yearly rates for assault and maltreatment, was marginally statistically significant, indicating an additional effect of *BabyFirst* beyond general population trends.

These findings in the younger age group are more pertinent to the expected short-term effects of the *BabyFirst* program than the analyses of all ages of children. Further years of data for child maltreatment and assault in the post *BabyFirst* period are required to confirm whether rates have truly declined and to determine whether this “*BabyFirst* effect” will continue. Of course it must be acknowledged that a number of other initiatives focussed on improving early childhood development were implemented in this *BabyFirst* time period, and any one of these or the combination of these programs and policies could have contributed to the decreases we observed in assault and maltreatment of very young children.

¹⁷ We ran additional models to determine whether this reduction was experienced equally by males and females; however, due to the small number of assault/maltreatment events an adequate model fit could not be achieved for both sexes, and hence, no comparisons could be made.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

This report evaluated the *BabyFirst* Screening and Home Visiting programs for babies born in 2000 through 2002, the initial years of the program. In addition, an evaluation of trends in injury rates (with particular focus on injuries associated with maltreatment) before and after implementation of the *BabyFirst* program was conducted. Given that the Screening and Home Visiting programs were not static but have evolved and changed since their inception, the conclusions and recommendations discussed below should be considered in light of any changes that have been made to the program. Appendix 4 provides a discussion of changes to the program that have occurred since 2003.

1. The *BabyFirst* screening program reached slightly over 75% of the births in the study years. This means that almost a quarter of the infants born in Manitoba during the study period were not screened. While a portion of the missing screens can be attributed to the very low screening rate of families in First Nations communities, over two-thirds of those families not screened were not living in First Nations communities. Families not screened tended to be more vulnerable (e.g., young mothers, low-income area residents) than families that did get screened, and infants who were not screened were at higher risk for maltreatment than the general population of infants. According to the Healthy Child Manitoba Office the screening rate has improved and comprised 90% of births in 2003; we did not have 2003 data to review for this report.

Recommendation: Continued efforts should be made to ensure that all births, particularly babies born to vulnerable families, are given the Families First¹⁸ screen. Sharing of information between RHAs may help public health nurses follow-up and screen those births that occur outside a woman's home region. Other possible mechanisms for ensuring all postpartum referrals are sent to the public health nurse for follow-up should be explored.

Recommendation: The percent of hospital births receiving a Families First screen should continue to be monitored to determine the coverage of the screen.

Recommendation: Results of this report should be shared with stakeholders in First Nations health in Manitoba (e.g., Health Canada, Public Health Agency of Canada, First Nations and Inuit Health Branch), with the aim of intergovernmental coordination of services to families living in First Nations communities. Given the validity of the screen for identifying families at risk, First Nations communities may find it a useful tool for identifying challenged families and may request that more effort be made in ensuring families from First Nations communities are included in the screening process. It may first be necessary to determine whether the screening tool is equally valid in First Nations communities.

¹⁸ In this chapter, when discussing recommendations, the current name of the *BabyFirst* program "Families First" is used.

2. The *BabyFirst* screening tool demonstrated a moderate level of sensitivity and specificity, as well as predictive validity for identifying children at risk for maltreatment. The predictive validity of the screen, and potentially the sensitivity, could be improved by asking questions about the mother's age at first birth, number of older siblings and breastfeeding. While these additional items may increase the number of children who falsely screen at risk, this is not necessarily a negative result, as it would potentially create more opportunities to connect families with appropriate services. It is important to note that the outcome variables of being taken into care and receiving services are only proxies for child maltreatment, and likely only include a fraction of the actual child maltreatment cases. Indeed, the Child and Family Services dataset does not consistently differentiate between those families whose children are receiving protective services for valid protection concerns and those families who have voluntarily requested support services.

Recommendation: The next revision of the Families First screening tool should consider adding questions on the following: mother's age at first birth,¹⁹ number of siblings, and breastfeeding. Items that were not predictive of going into care or receipt of services could be considered for exclusion.

Recommendation: In order to be more useful for research purposes, the recording of type of services received (voluntary or protective) in the CFSIS should be clearly differentiated.

Recommendation: Because the *BabyFirst* screening tool was a reasonable predictor of children at risk, it may provide useful information for others interested in improving outcomes for children at risk. For example it may be useful in the adoption of the "differential response" model proposed by the Department of Family Services and Housing to provide supports for families under stress (Department of Family Services and Housing, 2006).

3. Families involved in the *BabyFirst* home visiting program were more likely to receive services from CFS than Comparison families, even when controlling for differences in risk factors between the two groups. It is difficult to determine from the data available for this study whether this is a positive or negative outcome. On the positive side, it could be an indication that the program was working to connect vulnerable families to needed services; whether these services were adequate for reducing the risk of maltreatment could not be assessed here.²⁰ On the negative side, the higher rate of service receipt could indicate that the program resulted in "over identifying" families in need of protection or children in need of care, with potentially negative consequences for the child, particularly if the services provided by Child and Family Services were not adequate to overcome the potentially disruptive implications of being labeled as a "family at risk."

¹⁹The Healthy Child Manitoba Office has reported that in response to preliminary results from this report, the question on mother's age on the screening form has been revised to query mother's age at first birth.

²⁰The Healthy Child Manitoba Office reported that in some cases CFS permits families to continue to care for their children if they are receiving the Families First home visiting program.

Recommendation: Close connections between Families First home visitors/public health nurses and CFS workers should be established and maintained to ensure children receive the services they require.

Recommendation: An evaluation of the adequacy and funding levels of services provided by CFS should be considered, given the fact that programs such as Families First may be increasing the demand for these services, particularly for children aged 0 to 3 years.

4. Many of the outcome measures associated with maltreatment (e.g., going into care, hospitalization for injury) could not be assessed properly in this study due to insufficient sample size. Although the provincial evaluation sample was large enough to assess outcomes that could be measured for all families, such as parental psychological well-being (Santos, 2005), for rare events such as going into care, the size of the groups was not large enough to detect differences between groups, even if the true effect size was relatively large. Additionally, important information on the total number of visits received and duration of the home visiting program (see MacLeod & Nelson, 2000) was not available to this evaluation.

Recommendation: A qualitative analysis involving families whose children were taken into care (and/or received services) as well as their home visitors could provide important information about what participants felt was needed in order to prevent the placement as well as whether the placement was beneficial or harmful to family relationships. The interviews with families receiving services could include queries about which services families received (or might have received) that helped prevent maltreatment.

Recommendation: The evaluation sample size could be increased by including all families who receive the in-depth interview with the Family Stress Checklist (over 1000 families), distinguishing between those families that qualify for and receive the home visiting program and those that do not. The use of de-identified health and social services data should preclude the need to obtain informed consent from all families who receive this in-depth assessment (Tu et al., 2004).

Recommendation: Because some of the families eligible for home visiting must be placed on a wait list to receive it, due to the limited number of home visitors in some areas of the province, a randomized controlled trial should be conducted on the impact of the Families First home visiting program, with those on wait lists serving as controls.

Recommendation: Information on the duration of the home visiting program (including start and drop-out dates) and the number of visits should be collected to provide a more complete understanding of the impact of the home visiting.²¹

²¹ This information is recorded by the public health nurses however it is not currently submitted to Healthy Child Manitoba; plans are in place to ensure this information is included in the data collection procedure.

- Analyses showed no impact of the *BabyFirst* home visiting program on increasing continuity of physician care. While this finding could be due to small sample size, or not capturing visits to nurse practitioners or salaried physicians in remote rural areas, it could also indicate that the program objective of increasing contact between at-risk families and primary health care providers was not being met.

Recommendation: The Families First program should encourage stronger connections between families in the program and primary health care providers.

- Despite finding no differences in immunization rates between the Program and Comparison families, and indeed no relationship between immunization rates and the FSC score, both Program and Comparison families had relatively high immunization rates in comparison to the provincial average. It is encouraging to consider that perhaps the connection with the public health nurses (through the first and second stage screening processes) had an impact on this important preventative care measure.
- Our analysis of the trends in injury rates over time suggests that the introduction of the *BabyFirst* program was associated with lower rates of maltreatment and assault injuries in children 3 years and younger, independent of declining time trends. It should be kept in mind that other early childhood development-focused programs and policies implemented during this same time period may have contributed to the decreases in maltreatment and assault injuries that we observed.

Recommendation: Continued analysis of population-level trends in child maltreatment and assault in the post *BabyFirst* period would provide confirmation as to whether rates have truly declined and whether the association with the *BabyFirst* implementation period continues.

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GLOSSARY

Acronyms used in this report:

BFS form—*BabyFirst* Screening Form
CFSIS—Child and Family Services Information System
CIC—Child in Care
FSC—Family Stress Checklist
HCM—Healthy Child Manitoba
MIMS—Manitoba Immunization Monitoring System

NPV—Negative Predictive Value
PPV—Positive Predictive Value
RHAs—Regional Health Authorities
RDD—Regression Discontinuity Design
SAMIN—Social Assistance Management Information Network
VFS—Voluntary Family Services

Apgar Scores

Apgar scores measure the physiological well-being of newborn babies, and are recorded for virtually all births in hospital. A score of zero, one, or two is given for each of five vital signs that are assessed at one and five minutes after birth. These five scores are added up to give a total score between 0 and 10. The five vital signs are: appearance, pulse, reflex, muscle tone, and breathing pattern.

***BabyFirst* (now known as Families First)**

A targeted, multiyear home visiting program for families with newborns living under conditions of risk. An important program goal is the prevention of outcomes associated with child maltreatment. Supervised by public health nurses, para-professional home visitors promote child health and safety, facilitate parental problem-solving, positive parent-child interaction, and community referrals.

***BabyFirst* Screening (BFS) Form**

A brief measure of biological, social, and demographic risk factors. This is used by public health nurses to screen all postpartum referrals in Manitoba. The BFS is the first of two screening stages for Manitoba's *BabyFirst* program.

Birth Complications (See Complications of Labour and Delivery)

Birth weight

The weight of a newborn as recorded at birth, usually measured in grams. Low birth weight is generally considered less than 2500 grams whereas high birth weight is generally considered greater than 4000 grams.

Child and Family Services Information System (CFSIS)

A data management system that supports case tracking and reporting of services provided to children and families as they pass through the Child and Family Services system. CFSIS is not designed as a case management tool for service providers but does provide some minimal case management capabilities.

Child in Care (CIC)

Children in care are children who are removed from their families of origin and placed in the care of another adult(s) due to concerns about the proper provision of care in the family of origin.

Children are placed in foster care through voluntary placement,²³ voluntary surrender of guardianship,²⁴ apprehension,²⁵ or order of guardianship.²⁶ CIC does not include children who remain with or are returned to a parent or guardian under an order of supervision.

Child Maltreatment

Child maltreatment includes both child abuse and child neglect. Child abuse is the physical or psychological mistreatment of a child by his or her parents (including adoptive parents), guardians, or other adults. Child neglect is the inaction of not doing what is necessary to ensure proper care of the child.

²³ 14(1) An agency may enter into an agreement with a parent, guardian or other person who has actual care and control of a child, for the placing of the child without transfer of guardianship in any place which provides child care where that person is unable to make adequate provision for the care of that child

(a) because of illness, misfortune, or other circumstances likely to be of a temporary duration; or
(b) because the child

(i) is a child with a mental disability as defined in The Vulnerable Persons Living with a Mental Disability Act, or

(ii) is suffering from a chronic medical disability requiring treatment which cannot be provided if the child remains at home, or

(iii) is 14 years of age or older and beyond the control of the person entering into the agreement.

Source: <http://web2.gov.mb.ca/laws/statutes/ccsm/14>

²⁴ 16(1) The following persons may, by agreement on a prescribed form, surrender guardianship of the child to an agency:

(a) the parents of the child;

(b) if a parent is deceased, the surviving parent; or

(c) if both parents are deceased, the individual who is the child's guardian appointed by court order.

Source: <http://web2.gov.mb.ca/laws/statutes/ccsm/16>

²⁵ 21(1) The director, a representative of an agency or a peace officer who on reasonable and probable grounds believes that a child is in need of protection, may apprehend the child without a warrant and take the child to a place of safety where the child may be detained for examination and temporary care and be dealt with in accordance with the provisions of this Part.

Source: <http://web2.gov.mb.ca/laws/statutes/ccsm/c080e.php#21>

²⁶ 38(1) Upon the completion of a hearing under this Part, a judge who finds that a child is in need of protection shall order

(a) that the child be returned to the parents or guardian under the supervision of an agency and subject to the conditions and for the period the judge considers necessary; or

(b) that the child be placed with such other person the judge considers best able to care for the child with or without transfer of guardianship and subject to the conditions and for the period the judge considers necessary; or

(c) that the agency be appointed the temporary guardian of a child under 5 years of age at the date of apprehension for a period not exceeding 6 months; or

(d) that the agency be appointed the temporary guardian of a child 5 years of age or older and under 12 years of age at the date of apprehension for a period not exceeding 12 months; or

(e) that the agency be appointed the temporary guardian of a child of 12 years of age or older at the date of apprehension for a period not exceeding 24 months; or

(f) that the agency be appointed the permanent guardian of the child.

Source: <http://web2.gov.mb.ca/laws/statutes/ccsm/c080e.php#38>

Complications of Labour and Delivery

Unsuspected conditions that arise during the labour or delivery process. Complications were considered if the delivery was by C-Section or any of the following occurred (see Table G.1 for descriptions): ICD-9-CM=72.5, 660.4, 641.2, 663, 665.1, 760-779. This definition also includes Birth Complications: ICD-9-CM 72, 73.3, 763.2, 652.2, and 669.6.

Table G.1: Complications of Labour and Delivery

Complications of Labour and Delivery	ICD-9-CM Code	ICD Description
Birth Complications	72	Forceps, vacuum, breech procedure
	73.3	Failed forceps procedure
	763.2	Forceps delivery
	652.2	Breech presentation without mention of version
	669.6	Breech extraction without mention of indication
Other Complications	72.5	Breech extraction procedure
	660.4	Shoulder dystocia
	641.2	Placental abruption
	663	Cord prolapse
	665.1	Uterine rupture
	760-779	Certain conditions originating in the perinatal period

Source: Manitoba Centre for Health Policy, 2007

Congenital Anomaly

An abnormality of structure, function or body metabolism that is present at birth (even if not diagnosed until later in life) and results in physical or mental disability, or is fatal.²⁷

Congenital anomalies are identified using the following ICD-9-CM codes 277 and 740 to 759 (see Table G.2 for descriptions). In this study, congenital anomalies were identified using Repository data up to 90 days after the birth of the child.

²⁷ Source: March of Dimes Resource Center. Birth Defects. 1998. (Available www.modimes.org).

Table G.2: Congenital Anomalies

ICD-9-CM Code	ICD Description
277	Other and unspecified disorders of metabolism
740	Anencephalus and similar anomalies
741	Spina bifida
742	Other congenital anomalies of nervous system
743	Congenital anomalies of eye
744	Congenital anomalies of ear, face, and neck
745	Bulbus cordis anomalies and anomalies of cardiac septal closure
746	Other congenital anomalies of heart
277	Other and unspecified disorders of metabolism
747	Other congenital anomalies of circulatory system
748	Congenital anomalies of respiratory system
749	Cleft palate and cleft lip
750	Other congenital anomalies of upper alimentary tract
751	Other congenital anomalies of digestive system
752	Congenital anomalies of genital organs
753	Congenital anomalies of urinary system
754	Certain congenital musculoskeletal deformities
755	Other congenital anomalies of limbs
756	Other congenital musculoskeletal anomalies
757	Congenital anomalies of the integument
758	Chromosomal anomalies
759	Other and unspecified congenital anomalies

Source: Manitoba Centre for Health Policy, 2007

Continuity of Care (Ambulatory)

The extent to which individuals see a given health care provider (versus one or more other providers) over a specified period of time. Continuity of care can be calculated in several different ways. In this report, a provider was defined either as a general practitioner or generalist pediatrician, and continuity of care was calculated as the proportion of visits made to the most frequent provider.

Discharge Abstracts (See Hospital Discharge Abstracts)**Families First**

Healthy Child Manitoba recently combined the *BabyFirst* and Early Start programs into one program known as Families First. See entries for *BabyFirst*.

Family Stress Checklist (FSC)

In the second stage of the *BabyFirst* screening process, families scoring “at-risk” on the *BabyFirst* Screen are assessed for caregiving difficulties by public health nurses with a semi-structured interview known as the Family Stress Checklist. Families scoring above the FSC cut-off score are eligible for the program and are offered *BabyFirst* home visiting.

First Nations Community

Specifically, Indian and Northern Affairs Canada's (INAC's) legal list of First Nations communities includes the following Census Sub Division (CSD) types: Indian Government Districts (IGD), Reserves (R), Indian Settlements (S-E), Terre Reservées (TR), Nisga'a Lands (NL), Nisga'a Villages (NVL) and Teslin Lands (TL).

By definition, INAC's complete list of First Nations communities includes:

- Land reserved under the Indian Act
- Land set aside for the use and benefit of Indian people
- Areas where activities on the land are paid or administered by INAC or
- Areas listed in the Indian Lands Registry System held by Lands and Trust Services at INAC²⁸

This broader definition of a First Nation community includes a selection of the following CSD types: Chartered Community (CC), Hamlet (HAM), Northern Hamlet (NH), Northern Village (NV), Settlement (SET), Town (T), and Village (VL).

Gestational Age

The duration of the pregnancy, counted from the date of the last normal menstrual period until the birth of the child.

Healthy Child Manitoba (HCM)

The Government of Manitoba's long-term, cross-departmental prevention strategy for putting children and families first. Led by the Healthy Child Committee of Cabinet, Healthy Child Manitoba bridges departments and governments and, together with the community, works to improve the well-being of Manitoba's children and youth. HCM focuses on child-centred public policy through the integration of financial and community-based family supports. HCM researches best practices and models and adapts these to Manitoba's unique situation. It strengthens provincial policies and programs for healthy child and adolescent development, from the prenatal period to adulthood. HCM then evaluates programs and services to find the most effective ways to achieve the best possible outcomes for Manitoba children, families, and communities.

²⁸ CSD codes and names of First Nations Communities in Manitoba:

4619082 Chemawawin 3

4617092 Division No. 17, Unorganized

4618091 Division No. 18, Unorganized, East Part

4620066 Division No. 20, Unorganized, South Part

4619058 Fisher River 44A

4616025 Gambler 63

4621034 Opaskwayak Cree Nation 21B

4621035 Opaskwayak Cree Nation 21C

Source: *First Nations Community Well-Being in Canada: The Community Well-Being Index (CWB), 2001*

http://www.ainc-inac.gc.ca/pr/ra/cwb/cwb_e.pdf

Home Visiting Programs

Programs developed to assist with functioning for challenged families. Home visitors are trained in areas such as child development, family functioning, and parenting skills and make regular visits to families in order to reduce risk and increase protective factors associated with child maltreatment.

Hospital Discharge Abstracts (Discharge Abstracts)

Information compiled by hospitals on each patient's stay, such as codes for the most responsible diagnosis and secondary diagnoses, and for any procedures performed on the patient, and the admission and discharge dates of the patient's episode of care.

Income Assistance

A provincial program of last resort for people who need help to meet basic personal and family needs. Wherever possible, the program is aimed at helping people find a job or get back to work. Eligibility for income assistance is determined by a test of need. The total financial resources of the household are compared to the total cost of basic necessities as defined in the Employment and Income Assistance Act and Regulation. Applicants must be in financial need for the monthly cost of: basic needs such as food, clothing, personal needs and household supplies; some medical costs; and housing (rent) and utilities; and some special costs if you are an adult with a disability.

Infant Illness/Trauma

If the ICD-9-CM code in any one of the 16 diagnostic codes was one of 760-779 (see Table G.3 for descriptions), the record was identified as an infant illness/trauma originating in the perinatal period.

Table G3: Infant Illness/Trauma

ICD-9-CM Code	ICD Description
760	Fetus or newborn affected by maternal conditions which may be unrelated to present pregnancy
761	Fetus or newborn affected by maternal complications of pregnancy
762	Fetus or newborn affected by complications of placenta, cord, and membranes
763	Fetus or newborn affected by other complications of labour and delivery
764	Slow fetal growth and fetal malnutrition
765	Disorders relating to short gestation and low birthweight
766	Disorders relating to long gestation and high birthweight
767	Birth trauma
768	Intrauterine hypoxia and birth asphyxia
769	Respiratory distress syndrome
770	Other respiratory conditions of fetus and newborn
771	Infections specific to the perinatal period
772	Fetal and neonatal hemorrhage
773	Hemolytic disease of fetus or newborn, due to isoimmunization
774	Other perinatal jaundice
775	Endocrine and metabolic disturbances specific to the fetus and newborn
776	Hematological disorders of fetus and newborn
777	Perinatal disorders of digestive system
778	Conditions involving the integument and temperature regulation of fetus and newborn
779	Other and ill-defined conditions originating in the perinatal period

Injury Hospitalizations

Hospitalizations lasting one day or longer that resulted from an injury as indicated by the presence of one of the ICD-9-CM E-Codes listed on the hospital separation record. In this report, E-Codes from E800 - E999 were included with the exception of E870 – E879 (surgical misadventures) and E930 – E949 (adverse drug effects).

Kappa Statistic (κ)

A measure of agreement between two sources, each of which is measured on a binary scale (i.e., disease present/absent).

Manitoba Immunization Monitoring System (MIMS)

MIMS is a population-based monitoring system that provides monitoring and reminders to help achieve high levels of immunization. Immunization status is monitored by comparing the system record and the recommended schedule (see Table G.4 for the Manitoba Childhood Immunization Schedule).

Table G.4: Manitoba Childhood Immunization Schedule

Age	DaPTP given as "one needle"	HIB	MMR	HBV	Td
2 mo.	X	X			
4 mo.	X	X			
6 mo.	X	X			
12 mo.			X 1		
18 mo.	X	X			
4-6 years	X		X		
Grade 4				XXX	
14-16 yrs.					X
Every 10 yrs thereafter					X

Source: Manitoba Centre for Health Policy, 2007

1. Must be on or after 1st birthday

HBV = hepatitis B vaccine

D or d = diphtheria

aP = acellular pertussis (whooping cough)

T = tetanus

Hib = haemophilus influenzae b

M = measles (red measles)

M = mumps

R = rubella (german measles)

P = inactivated polio

Source: Manitoba Health, Public Health Branch, Communicable Disease Control Unit.

Marital Status

Marital status was determined using Repository data from the population registry. The Manitoba Health registry includes the following categories for adult registrants: married, single, and widowed.

Maternal Depression

Depression was defined as the presence of any hospital or physician claims coding depression between 8 months before the birth and 4 months after birth. Included were ICD-9-CM codes from the hospital files or physician claims file for affective psychoses, neurotic depression, adjustment reaction, or depressive disorder, or neurotic disorders plus a prescription for an antidepressant or mood stabilizer (excluding the anti-anxiety drugs paroxetine, citalopram and venflaxamine). The *BabyFirst* screening form also included a question on maternal depression which was assessed by the public health nurse.

Mother's Age at First Birth

Mother's age at first birth refers to the age of the mother when she gave birth to her first child.

Negative Predictive Value (NPV)

The negative predictive value of a test is the probability that the subject will not have the condition when restricted to all subjects who test negative. You can compute the negative predictive value as $NPV = TN / (TN + FN)$ where TN and FN are the number of true negative and false negative results, respectively. Notice that the denominator for negative predictive value is the number of subjects who test negative.

Paraprofessional Home Visitors

Paraprofessional home visitors are home visitors that do not necessarily have formal training (such as public health nursing) but who undergo training in areas such as child development, family functioning and parenting skills.

Physician Claims

Claims that are submitted to the provincial government by individual physicians for services they provide. Fee-for-service physicians receive payment based on these claims, while those submitted by physicians on alternate payment plans (APP) are for administrative purposes only. The physician claims data file is part of the Manitoba Population Health Research Data Repository.

Population Health Research Data Repository (Repository)

A comprehensive collection of administrative, registry, survey and other databases primarily comprising residents of Manitoba housed at the Manitoba Centre for Health Policy (MCHP). It was developed to describe and explain patterns of health care and profiles of health and illness, facilitating inter-sectoral research in areas such as health care, education, and social services. The administrative health database, for example, holds records for virtually all contacts with the provincial health care system, the Manitoba Health Services Insurance Plan (including physicians, hospitals, personal care homes, home care, and pharmaceutical prescriptions) of all registered individuals. MCHP acts as a steward of the information in the Repository for agencies such as Manitoba Health.

Population Registry

Refers to the Research Registry, which contains data on the insured population organized by family registration numbers. The research registry contains information on dates of coverage, age, sex, and place of residence (by postal code and municipal code only; no addresses are contained in the file). Annual snapshots of these data have been received since 1970. Information on marital status has been constructed from the family registration information. A massive programming effort maintained over many years has joined these snapshot files together such that individual histories can be constructed over the entire period of the data base. This results in the creation of the longitudinal population registry; many checks have been done on this registry. Software has been developed to facilitate longitudinal follow-up or mobility, migration, and mortality.

Positive Predictive Value (PPV)

The positive predictive value of a test is the probability that the subject has the condition when restricted to those subjects who test positive. This term is sometimes abbreviated as PPV. You can compute the positive predictive value as $PPV = TP / (TP + FP)$ where TP and FP are the number of true positive and false positive results, respectively. Notice that the denominator for positive predictive value is the number of subjects who test positive.

Predictive Validity

The extent to which a measure can accurately predict that something will occur in the future.

Prenatal Care (Prenatal Doctor Visits)

A series of regular contacts between a health care provider, typically a physician, and a pregnant woman that take place at scheduled intervals between the confirmation of pregnancy and the initiation of labour. The primary function of this care is to monitor the progress of pregnancy to identify complications, to provide information to the women on beneficial practices, and to co-ordinate the involvement of other providers in the mother's labour and the delivery of the newborn.

Protection

This category applies to child protection investigations and interventions under Part III of The Child and Family Services Act.²⁹

Protective Services

Families where children are in need of protection (see above definition) are provided with protective services from Child and Family Services, which are services provided when a child's life, health or emotional well-being are seen as endangered. These services are provided without the removal of the child from the home. Services include counselling, guidance, support, education and emergency shelter services to aid the resolution of family matters.

Receipt of Protective or Support Services

Any child or family receiving protective (see Protective Services) or support services (see Support Services) from Child and Family Services. Although support services are supposed to be voluntary, and protective services mandatory, this distinction is often blurred in the Child and Family Services Information System, so these two types of services were combined for analyses in this report.

Regional Health Authorities (RHAs)

Regional governance structure set up by the province to be responsible for the delivery and administration of health services in specified areas. In Manitoba, as of July 1, 2002, there are 11 RHAs: Winnipeg, Brandon, South Eastman, Assiniboine, Central, Parkland, North Eastman, Interlake, Burntwood, Norman and Churchill.

Regression Discontinuity Design (RDD)

Quasi-experimental, pretest-posttest control group design that is characterized by its unique method of assignment to intervention: participants are assigned to either the intervention group or control group solely on the basis of a cut-off score on a pretest measure.

²⁹ Child in need of protection

17(1) For purposes of this Act, a child is in need of protection where the life, health or emotional well-being of the child is endangered by the act or omission of a person.

Illustrations of child in need

17(2) Without restricting the generality of subsection (1), a child is in need of protection where the child

- (a) is without adequate care, supervision or control;
- (b) is in the care, custody, control or charge of a person
 - (i) who is unable or unwilling to provide adequate care, supervision or control of the child, or
 - (ii) whose conduct endangers or might endanger the life, health or emotional well-being of the child, or
 - (iii) who neglects or refuses to provide or obtain proper medical or other remedial care or treatment necessary for the health or well-being of the child or who refuses to permit such care or treatment to be provided to the child when the care or treatment is recommended by a duly qualified medical practitioner;
- (c) is abused or is in danger of being abused;
- (d) is beyond the control of a person who has the care, custody, control or charge of the child;
- (e) is likely to suffer harm or injury due to the behaviour, condition, domestic environment or associations of the child or of a person having care, custody, control or charge of the child;
- (f) is subjected to aggression or sexual harassment that endangers the life, health or emotional well-being of the child;
- (g) being under the age of 12 years, is left unattended and without reasonable provision being made for the supervision and safety of the child; or
- (h) is the subject, or is about to become the subject, of an unlawful adoption under The Adoption Act or of a sale under section 84.

Source: <http://web2.gov.mb.ca/laws/statutes/ccsm/c080e.php#18.4>

The RDD is so named because a regression line is plotted to relate the assignment and outcome variables. If the treatment is effective, a discontinuity in the regression line should occur at the cut-off point. By comparison, the absence of a discontinuity is interpreted as a null effect.

Sensitivity

The ability of a test to identify correctly those who have the condition; the proportion of those who test positive among those who truly (according to the gold standard) have the condition.

Social Assistance Management Information Network (SAMIN)

The SAMIN Research Data set combines variables from the various tables in the SAMIN database into a single SAS data set.³⁰ The data set contains one record per person (client) for each month that they are present in the SAMIN database by fiscal year. Some variables are recorded on a person basis (client) and others on a family basis (case).

Socioeconomic Status

Characteristics of economic, social and physical environments in which individuals live and work, as well as demographic characteristics. Measures of SES in this report included area-level income which is measured using average household income information from the Canada Census. Areas were grouped into quintiles ranked from 1 (poor) to 5 (wealthy), with each quintile comprising 20% of the population.

Specificity

The ability of a test to identify correctly those who do not have the condition; the proportion of those who do not test positive among those who truly (according to the gold standard) do not have the condition.

Substantiated Child Maltreatment

A case is considered substantiated if the balance of evidence indicates that abuse or neglect has occurred. Alternatively, a case is suspected if there is not enough evidence to substantiate maltreatment, but maltreatment cannot be ruled out. Lastly, a case is unsubstantiated if the balance of evidence indicates that abuse or neglect has not occurred.

Support Services

Support services are services provided by Child and Family Services to challenged families in need of support. The services can include counselling, guidance, support, education and emergency shelter services to aid the resolution of family matters. In contrast to Protective Services, Support Services are voluntary and are generally applied for by the family in need. (See also Voluntary Family Services)

³⁰ Key variables used in analyses are:

Personal Identifiers: Case number, role number (member within a family), client number, Manitoba Health identifier, and date.

Demographics: Gender and birth date of client.

Case Characteristics: Monthly case status, monthly case category (benefit category such as disabled, aged, single parent, etc.)

Also updated on a monthly basis: Marital status, education level, income, and geographic identifiers (e.g., postal code of case).

Vital Statistics

A Manitoba government department responsible for keeping records and registries of all births, deaths, marriages and stillbirths that take place in Manitoba.

Voluntary Family Services (VFS)

This category applies to services provided under Part II of The Child and Family Services Act with the exception of the placement of a homemaker to care for a child in the absence of a parent.³¹ (See also support services)

Weighted Kappas

Kappa statistic (see Kappa) that is weighted to account for ordered categorical data.

³¹ Services to families

9(1) A member of a family may apply to an agency for and may receive from the agency counselling, guidance, supportive, educational and emergency shelter services in order to aid in the resolution of family matters which if unresolved may create an environment not suitable for normal child development or in which a child may be at risk of abuse.

Source: <http://web2.gov.mb.ca/laws/statutes/ccsm/c080e.php#9>

APPENDIX 1: TABLES

Table A1.1: Counts of children in care by type of agency and data source

Year	Non-Aboriginal Agencies			Aboriginal Agencies		
	CFSIS Extract	FSH Annual Reports CFSIS-Based	FSH Annual Reports Total	CFSIS Extract	FSH Annual Reports CFSIS-Based	FSH Annual Reports Total
1995	1,564	0 (0%)	3,658	427	0 (0%)	1,668
1996	2,510	2,827 (79%)	3,595	529	0 "	1,575
1997	3,078	3,523 (99%)	3,548	614	0 "	1,655
1998	3,375	3,396 (99%)	3,406	714	0 "	1,821
1999	3,601	3,419 (99%)	3,428	909	0 "	1,930
2000	3,724	3,475 (100%)	3,475	1,236	0 "	2,093
2001	3,639	3,343 "	3,343	1,395	260 (12%)	2,097
2002	3,606	3,351 "	3,351	1,430	948 (44%)	2,144
2003	3,060	3,499 "	3,499	1,137	977 (48%)	2,034

Note: The Child and Family Services Information System (CFSIS) extract counts are for March of each year while the Family Services and Housing (FSH) counts are for March 31st of each year.

This table shows that although CFSIS extract counts were capturing close to 100% of the counts reported in the FSH Annual Reports by 1997 for Non-Aboriginal Agencies, CFSIS captured only a fraction of the cases reported in the FSH Annual Reports for Aboriginal Agencies (e.g., 1236/2093=59% in 2000). Data on children in care reported in this project will therefore under-represent actual numbers for children in care who are served by Aboriginal Agencies. These agencies primarily serve children living in the North. Analyses in this report are conducted for all Manitoba children and for Winnipeg children only, the latter group not being affected by the missing data from Aboriginal Agencies.

Because CFSIS capture of children in care was poor for all children prior to 1996, analyses of time trends for children in care are not possible using these data.

This table was produced by Harvey Stevens, Department of Family Services and Housing, as part of work done for the Department in analyzing the impact of income assistance rates on the likelihood of children entering the child welfare system.

Source: Manitoba Centre for Health Policy, 2007

Table A1.2: Agreement between *BabyFirst* screen items and similar variables in the Repository

Variable	Kappa
Income assistance	.6434
Birth complications	.4671
Marital status	.2408
Maternal depression	.2395
Congenital anomaly	.1624
Infant trauma/illness	.0615

Note: For the six variables listed in Table A1.2, there was some, but not complete, overlap of information between the *BabyFirst* screening form and the Repository. The income assistance item on the *BabyFirst* form included not only individuals receiving income assistance, but also individuals who were experiencing financial difficulties, whereas the Repository included information only on those individuals receiving income assistance. As well, individuals living in First Nations communities receiving income support might be included in the *BabyFirst* information, but would not be included in Repository information. Despite these differences, agreement between the two data sources was “substantial” at over 0.61.

There was “moderate” agreement between the *BabyFirst* form and Repository data for birth complications, which included use of forceps, breech delivery and emergency Caesarean section. Using Repository data, 6,639 infants met the definition of birth complication (see Glossary) whereas only 2,825 infants were identified as having birth complications with the *BabyFirst* screening form. As there was no way of determining whether birth complications were mild, moderate or major using Repository data, it is not surprising that many more infants were identified using this data source. Of the 2,825 infants identified with birth complications using the screen, 90% of them were captured with the Repository data, suggesting the field is very reliable.

The agreement on marital status was “fair” which was not surprising, given that the Repository data often misclassifies married individuals as “not married”; when the Repository identifies someone as “married”, there is far greater accuracy (Brownell et al., 2007). Over 99% of the mothers classified as married using Repository information were also classified as married on the *BabyFirst* form, indicating an extremely reliable item.

There are also reasons why the maternal depression variable only achieved “fair” agreement between the two data sources. Depression as defined in the Repository includes only “treated” depression, that is, only those mothers who have seen a physician and received a diagnosis of depression and/or were prescribed an anti-depressant medication between the period 8 months before the birth and 4 months after would be captured here. For some of these mothers, if the treatment was effective, the nurse completing the *BabyFirst* form may not have detected any symptoms of depression. As well, there were probably many mothers experiencing symptoms of depression who did not seek or receive treatment for their depression.

The final two variables on Table A1.2 (congenital anomalies and infant trauma or illness) had kappa values that indicated only “slight” agreement between the two data sources. For both of these variables there were substantially more cases identified using Repository data compared to *BabyFirst* form data (see Glossary for definitions using Repository data). As was the case for birth complications, using Repository data we were unable to distinguish between severe and less severe anomalies and illnesses, and this may have contributed to the discrepancies. As well, the anomalies could be identified up to 90 days of life using the Repository data, whereas the information on the *BabyFirst* form would depend on when the form was filled out. Of the infants who were identified with congenital anomalies using the *BabyFirst* form, 77% of these were also identified using the Repository data; of the infants identified with infant trauma or illness using the *BabyFirst* form, 88% were identified with the Repository data.

Table A1.3: Number of children born in 2000, 2001 and 2002 screening at risk or not at risk* and going into care by March 31, 2004, Winnipeg only

	In Care	Not in Care
Screened "at risk"	428	2,900
Screened not "at risk"	144	14,749

*3,446 children not receiving the screen are not included in this table

Source: Manitoba Centre for Health Policy, 2007

Table A1.4: Validity of the *BabyFirst* screen for predicting child in care, Winnipeg*

Population studied	Sensitivity (%)	Specificity (%)	Positive Predictive Value (%)	Negative Predictive Value (%)
All Manitoba	76.8	83.0	11.0	99.2
Winnipeg only	74.8	83.6	12.9	99.0

*10,013 children not receiving the screen (3,446 from Winnipeg) are not included in this table.

Source: Manitoba Centre for Health Policy, 2007

Table A1.5: Number of children born in 2000, 2001, and 2002 screening at risk or not at risk* and receiving services by March 31, 2004, Winnipeg only

	Received Services	Did Not Receive Services
Screened "at risk"	1,344	1,984
Screened not "at risk"	863	14,030

*3,446 children not receiving the screen are not included in this table

Source: Manitoba Centre for Health Policy, 2007

Table A1.6: Validity of the *BabyFirst* screen for predicting receipt of services, Winnipeg*

Population Studied	Sensitivity (%)	Specificity (%)	Positive Predictive Value (%)	Negative Predictive Value (%)
All Manitoba	62.4	86.7	36.2	95.0
Winnipeg only	60.9	87.6	40.4	94.2

*10,013 children not receiving the screen (3,446 from Winnipeg) are not included in this table.

Source: Manitoba Centre for Health Policy, 2007

APPENDIX 2: REGRESSION MODELS FOR *BABYFIRST* SCREENING EVALUATION

Table A2.1: Variables from the *BabyFirst* form that were significantly related to child ending up in care*

Variable (item on <i>BabyFirst</i> form)	DF	Sample 1 max_r-squared = 0.3239		Sample 2 max_r-squared = 0.3084		Winnipeg only max_r-squared = 0.3228	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models*							
Income assistance or financial difficulties (8)	1	130.68	<.0001	122.61	<.0001	155.30	<.0001
Low education status (13)	1	64.04	<.0001	25.97	<.0001	83.40	<.0001
Existing file with local child protective services (21)	4	59.09	<.0001	154.56	<.0001	133.56	<.0001
Social situation (7)	3	22.00	<.0001	27.55	<.0001	26.80	<.0001
Pregnancy complications due to alcohol or drug use in mother (3b)	1	13.30	0.0003	21.85	<.0001	15.84	<.0001
No prenatal care before 6th month of pregnancy (9)	1	10.60	0.0011	19.00	<.0001	14.95	0.0001
Variables significant in only two of the models							
Parents' own history of child abuse/neglect (22)	4	12.88	0.0119	13.38	0.0096	ns	ns
Infant trauma or illness (4b)	1	7.73	0.0054	ns	ns	7.59	0.0059
Prolonged postpartum maternal separation (11)	1	5.74	0.0165	ns	ns	11.74	0.0006
Assessed lack of bonding (12)	1	4.45	0.035	ns	ns	14.41	0.0001
Variables significant in only the Sample 1 model							
Harsh discipline practices (18)	4	13.79	0.008	ns	ns	ns	ns
Low birth weight/short gestation (2)	4	11.20	0.0245	ns	ns	ns	ns
Apgar less than 7 at 5 minutes (4c)	1	6.38	0.0115	ns	ns	ns	ns

*The values for the Wald Chi-Square and probabilities for Samples 2 and the Winnipeg only Sample differ in this table from those in Table 5. This table reports the results of regression models run separately for each of Sample 1, Sample 2 and the Winnipeg only Sample.

Source: Manitoba Centre for Health Policy, 2007

Table A2.2: Odds ratios for *BabyFirst* screen items that predicted child going into care, Sample 2*

Variable	Odds Ratio (95% Confidence Interval)
Income assistance or financial difficulties (8)	5.68 (4.16, 7.75)
Existing file with local child protective services (21) - minimal	3.54 (2.03, 6.20)
Existing file with local child protective services (21) – low	9.80 (6.41, 15.00)
Existing file with local child protective services (21) - moderate	5.97 (3.12, 11.43)
Existing file with local child protective services (21) – high	6.12 (3.26, 11.50)
Low education status (13)	2.01 (1.54, 2.63)
Prolonged postpartum maternal separation (11)	1.26 (0.64, 2.49)
Social situation (7) - one parent family with social support	1.78 (1.34, 2.36)
Social situation (7) - one parent family without social support	3.41 (1.90, 6.12)
Social situation (7) - two parent family without social support	0.99 (0.53, 1.82)
No prenatal care before 6th month of pregnancy (9)	2.32 (1.58, 3.42)
Pregnancy complications due to alcohol or drug use in mother (3b)	2.30 (1.64, 3.24)
Infant trauma or illness (4b)	1.24 (0.50, 3.06)
Harsh discipline practices (18) - minimal risk	0.73 (0.32, 1.68)
Harsh discipline practices (18) - low risk	0.45 (0.13, 1.59)
Harsh discipline practices (18) - moderate risk	0.00 (0.00, 0.00)
Harsh discipline practices (18) - high risk	0.31 (0.03, 3.80)
Parents' own history of child abuse/neglect (22) - minimal risk	0.41 (0.15, 1.10)
Parents' own history of child abuse/neglect (22) - low risk	1.90 (1.12, 3.21)
Parents' own history of child abuse/neglect (22) - moderate risk	2.17 (1.01, 4.64)
Parents' own history of child abuse/neglect (22) - high risk	1.28 (0.45, 3.65)
Apgar less than 7 at 5 minutes (4c)	0.66 (0.15, 2.97)
Low birth weight/short gestation (2) - 0-1499 gm	1.86 (0.53, 6.48)
Low birth weight/short gestation (2) - 1500-1999, <38 weeks	1.19 (0.41, 3.42)
Low birth weight/short gestation (2) - 2000-2500 gm, <38 weeks	1.61 (0.80, 3.26)
Low birth weight/short gestation (2) - 1500-2500, 38 weeks+	0.25 (0.03, 2.12)
Assessed lack of bonding (12)	1.85 (0.69, 5.00)

Note: Variables from the *BabyFirst* form have the item number in parentheses.

*The variables for this model were derived from the best fitting model for Sample 1 and applied to Sample 2.

Source: Manitoba Centre for Health Policy, 2007

Table A2.3: Odds ratios for *BabyFirst* screen items that predicted child going into care, Winnipeg only Sample*

Variable	Odds Ratio (95% Confidence Interval)
Income assistance or financial difficulties (8)	5.69 (4.31, 7.52)
Existing file with local child protective services (21) - minimal	2.83 (1.76, 4.54)
Existing file with local child protective services (21) - low	5.46 (3.83, 7.77)
Existing file with local child protective services (21) - moderate	5.59 (3.20, 9.79)
Existing file with local child protective services (21) - high	3.96 (2.22, 7.07)
Low education status (13)	3.08 (2.42, 3.91)
Prolonged postpartum maternal separation (11)	1.92 (1.15, 3.22)
Social situation (7) - one parent family with social support	1.63 (1.28, 2.07)
Social situation (7) - one parent family without social support	2.84 (1.70, 4.76)
Social situation (7) - two parent family without social support	1.14 (0.67, 1.95)
No prenatal care before 6th month of pregnancy (9)	1.95 (1.40, 2.73)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.88 (1.38, 2.56)
Infant trauma or illness (4b)	2.22 (1.12, 4.41)
Harsh discipline practices (18) - minimal risk	1.69 (0.83, 3.42)
Harsh discipline practices (18) - low risk	0.00 (0.00, 0.00)
Harsh discipline practices (18) - moderate risk	0.00 (0.00, 0.00)
Harsh discipline practices (18) - high risk	0.00 (0.00, 0.00)
Parents' own history of child abuse/neglect (22) - minimal risk	0.33 (0.14, 0.79)
Parents' own history of child abuse/neglect (22) - low risk	1.02 (0.58, 1.82)
Parents' own history of child abuse/neglect (22) - moderate risk	1.26 (0.58, 2.74)
Parents' own history of child abuse/neglect (22) - high risk	1.72 (0.71, 4.18)
Apgar less than 7 at 5 minutes (4c)	1.94 (0.95, 3.94)
Low birth weight/short gestation (2) - 0-1499 gm	1.59 (0.68, 3.71)
Low birth weight/short gestation (2) - 1500-1999, <38 weeks	0.54 (0.20, 1.45)
Low birth weight/short gestation (2) - 2000-2500 gm, <38 weeks	1.17 (0.60, 2.28)
Low birth weight/short gestation (2) - 1500-2500, 38 weeks+	0.36 (0.08, 1.62)
Assessed lack of bonding (12)	7.89 (2.81, 22.18)

Note: Variables from the *BabyFirst* form have the item number in parentheses.

*Variables for this model were derived from the best fitting model for Sample 1 and applied to the Winnipeg only Sample.

Source: Manitoba Centre for Health Policy, 2007

Table A2.4: Odds ratios for *BabyFirst* screen items that predicted child going into care, Sample 2, ideal variables*

Variable	Odds Ratio (95% Confidence Interval)
Existing file with local child protective services (21) - minimal	3.24 (1.90, 5.54)
Existing file with local child protective services (21) - low	9.39 (6.17, 14.29)
Existing file with local child protective services (21) - moderate	5.93 (3.14, 11.20)
Existing file with local child protective services (21) - high	5.94 (3.18, 11.08)
Income assistance or financial difficulties (8)	5.77 (4.23, 7.88)
Pregnancy complications due to alcohol or drug use in mother (3b)	2.24 (1.60, 3.14)
Low education status (13)	2.00 (1.53, 2.61)
Social situation (7) - one parent family with social support	1.78 (1.34, 2.35)
Social situation (7) - one parent family without social support	3.45 (1.93, 6.19)
Social situation (7) - two parent family without social support	1.00 (0.55, 1.83)
No prenatal care before 6th month of pregnancy (9)	2.35 (1.60, 3.45)
Parents' own history of child abuse/neglect (22) - minimal risk	0.34 (0.15, 0.80)
Parents' own history of child abuse/neglect (22) - low risk	1.65 (0.99, 2.77)
Parents' own history of child abuse/neglect (22) - moderate risk	1.92 (0.91, 4.04)
Parents' own history of child abuse/neglect (22) - high risk	1.22 (0.45, 3.27)

*Variables for this model were derived from the best fitting model for Sample 2, independent of Sample 1 regression results.

Source: Manitoba Centre for Health Policy, 2007

Table A2.5: Odds ratios for *BabyFirst* screen items that predicted child going into care, Winnipeg only Sample, ideal variables¹

Variable	Odds Ratio (95% Confidence Interval)
Existing file with local child protective services (21) - minimal	2.31 (1.55, 3.46)
Existing file with local child protective services (21) - low	5.42 (3.82, 7.69)
Existing file with local child protective services (21) - moderate	5.25 (3.04, 9.08)
Existing file with local child protective services (21) - high	4.41 (2.51, 7.74)
Income assistance or financial difficulties (8)	5.80 (4.40, 7.65)
Low education status (13)	3.02 (2.38, 3.83)
Social situation (7) - one parent family with social support	1.60 (1.26, 2.02)
Social situation (7) - one parent family without social support	3.09 (1.86, 5.12)
Social situation (7) - two parent family without social support	1.21 (0.71, 2.05)
Prolonged postpartum maternal separation (11)	2.09 (1.37, 3.18)
No prenatal care before 6th month of pregnancy (9)	1.92 (1.38, 2.67)
Assessed lack of bonding (12)	7.17 (2.59, 19.81)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.86 (1.37, 2.52)
Infant trauma or illness (4b)	2.54 (1.31, 4.93)

¹Variables for this model were derived from the best fitting model for the Winnipeg only Sample, independent of Sample 1 results.

Source: Manitoba Centre for Health Policy, 2007

Table A2.6: Variables from the Repository that were significantly related to child going into care for those children with a *BabyFirst* form^{*}

Variable	DF	Sample 1 max_r-squared = 0.3263		Sample 2 max_r-squared = 0.3442		Winnipeg only max_r-squared = 0.3498	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models*							
Receipt of income assistance	1	109.62	<.0001	115.32	<.0001	114.44	<.0001
Mother's age at first birth	5	88.32	<.0001	55.88	<.0001	88.03	<.0001
Presence of older siblings	4	31.16	<.0001	54.70	<.0001	39.00	<.0001
Area-level income quintile	4	29.54	<.0001	47.18	<.0001	64.00	<.0001
Marital status	1	20.23	<.0001	35.19	<.0001	21.85	<.0001
Newborn feeding (breast) at hospital discharge	1	15.06	0.0001	11.50	0.69	24.79	<.0001
Variables significant in only the Sample 1 model							
Area (Winnipeg or non-Winnipeg)	1	4.31	0.0379	0.69	0.4059	n/a	n/a

*The variables from the Repository were entered one at a time for Sample 1 and only significant variables were retained. The final regression model was then applied to Sample 2 and the Winnipeg only Sample. We also ran separate models for Sample 2 and the Winnipeg only Sample where the same variables were entered and retained independent of results from Sample 1 regressions. Those results can be found in Table A2.7.

Source: Manitoba Centre for Health Policy, 2007

Table A2.7: Variables from the Repository that were significantly related to child going into care for those children with a *BabyFirst* form*

Variable	DF	Sample 1 max_r-squared = 0.3263		Sample 2 max_r-squared = 0.3440		Winnipeg only max_r-squared = 0.3498	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models*							
Receipt of income assistance	1	109.62	<.0001	115.23	<.0001	114.44	<.0001
Mother's age at first birth	5	88.32	<.0001	56.50	<.0001	88.03	<.0001
Presence of older siblings	4	31.16	<.0001	55.14	<.0001	39.00	<.0001
Area-level income quintile	4	29.54	<.0001	46.65	<.0001	64.00	<.0001
Marital status	1	20.23	<.0001	35.02	<.0001	21.85	<.0001
Newborn feeding (breast) at hospital discharge	1	15.06	0.0001	11.88	0.0006	24.79	<.0001
Variables significant in only the Sample 1 model							
Area	1	4.31	0.0379	ns	ns	n/a	n/a

*These regression models were run separately for each sample. These results represent the best fitting models for each of the samples.

Source: Manitoba Centre for Health Policy, 2007

Table A2.8: Odds ratios for Repository variables that predicted child going into care, for children with a *BabyFirst* screen form for Sample 1

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance	5.00 (3.70, 6.76)
Mother's age at first birth, 0-15 yrs	11.61 (5.68, 23.73)
Mother's age at first birth, 16-17 yrs	8.04 (4.02, 16.07)
Mother's age at first birth, 18-19 yrs	5.60 (2.82, 11.12)
Mother's age at first birth, 20-24 yrs	2.73 (1.37, 5.44)
Mother's age at first birth, 30+ yrs	1.60 (0.66, 3.88)
Area-level income, Q1	2.00 (1.18, 3.40)
Area-level income, Q2	1.37 (0.79, 2.38)
Area-level income, Q3	1.03 (0.57, 1.86)
Area-level income, Q4	0.54 (0.26, 1.12)
Presence of older siblings (1)	0.82 (0.60, 1.12)
Presence of older siblings (2)	0.93 (0.65, 1.33)
Presence of older siblings (3-5)	1.89 (1.36, 2.61)
Presence of older siblings (6+)	2.51 (1.18, 5.36)
Marital status	2.45 (1.66, 3.62)
Newborn feeding (breast) at hospital discharge (no)	1.62 (1.27, 2.07)
Winnipeg or non-Winnipeg area (Wpg)	0.76 (0.59, 0.98)

Source: Manitoba Centre for Health Policy, 2007

Table A2.9: Odds ratios for Repository variables that predicted going into care for children with a *BabyFirst* screen form for Sample 2

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance	5.37 (3.95, 7.30)
Mother's age at first birth, 0-15 yrs	3.80 (2.08, 6.95)
Mother's age at first birth, 16-17 yrs	3.69 (2.10, 6.47)
Mother's age at first birth, 18-19 yrs	2.22 (1.27, 3.90)
Mother's age at first birth, 20-24 yrs	1.24 (0.70, 2.20)
Mother's age at first birth, 30+ yrs	0.85 (0.36, 1.99)
Area-level income, Q1	5.27 (2.40, 11.58)
Area-level income, Q2	2.35 (1.04, 5.32)
Area-level income, Q3	3.24 (1.42, 7.38)
Area-level income, Q4	1.68 (0.69, 4.10)
Presence of older siblings (1)	1.20 (0.87, 1.66)
Presence of older siblings (2)	1.58 (1.10, 2.26)
Presence of older siblings (3)	2.91 (2.06, 4.10)
Presence of older siblings (6+)	5.44 (2.70, 10.98)
Marital status	3.59 (2.35, 5.48)
Newborn feeding (breast) at hospital discharge	1.53 (1.20, 1.96)
Winnipeg or non-Winnipeg area (Wpg)	0.90 (0.69, 1.16)

*The variables for this model were derived from the best fitting model for Sample 1 and applied to Sample 2.

Source: Manitoba Centre for Health Policy, 2007

Table A2.10: Odds ratios for Repository variables that predicted child going into care, for children with a *BabyFirst* screen form for the Winnipeg only Sample*

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance	4.79 (3.59, 6.38)
Mother's age at first birth, 0-15 yrs	5.29 (3.09, 9.07)
Mother's age at first birth, 16-17 yrs	4.29 (2.56, 7.18)
Mother's age at first birth, 18-19 yrs	2.65 (1.58, 4.43)
Mother's age at first birth, 20-24 yrs	1.55 (0.93, 2.61)
Mother's age at first birth, 30+ yrs	0.68 (0.31, 1.50)
Area-level income, Q1	9.65 (3.03, 30.79)
Area-level income, Q2	4.80 (1.49, 15.53)
Area-level income, Q3	3.55 (1.06, 11.83)
Area-level income, Q4	2.28 (0.63, 8.23)
Presence of older siblings (1)	0.86 (0.66, 1.14)
Presence of older siblings (2)	1.18 (0.87, 1.60)
Presence of older siblings (3-5)	1.79 (1.33, 2.40)
Presence of older siblings (6+)	3.70 (2.01, 6.78)
Marital status	2.34 (1.64, 3.35)
Newborn feeding (breast) at hospital discharge (no)	1.71 (1.39, 2.11)

*Variables for this model were derived from the best fitting model for Sample 1 and applied to the Winnipeg only Sample.

Source: Manitoba Centre for Health Policy, 2007

Table A2.11: Odds ratios for Repository variables that predicted child going into care, for children with a *BabyFirst* screen form for Sample 2 ideal*

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance	5.26 (3.88, 7.12)
Mother's age at first birth, 0-15 yrs	3.84 (2.10, 7.02)
Mother's age at first birth, 16-17 yrs	3.73 (2.13, 6.56)
Mother's age at first birth, 18-19 yrs	2.25 (1.28, 3.95)
Mother's age at first birth, 20-24 yrs	1.26 (0.71, 2.22)
Mother's age at first birth, 30+ yrs	0.84 (0.36, 1.96)
Area-level income, Q1	5.09 (2.33, 11.12)
Area-level income, Q2	2.30 (1.02, 5.19)
Area-level income, Q3	3.20 (1.41, 7.28)
Area-level income, Q4	1.68 (0.69, 4.09)
Presence of older siblings (1)	1.20 (0.87, 1.66)
Presence of older siblings (2)	1.58 (1.10, 2.26)
Presence of older siblings (3-5)	2.92 (2.07, 4.12)
Presence of older siblings (6+)	5.49 (2.72, 11.08)
Marital status	3.58 (2.34, 5.45)
Newborn feeding (breast) at hospital discharge	1.54 (1.21, 1.97)

*Variables for this model were derived from the best fitting model for Sample 2, independent of Sample 1 regression results.

Source: Manitoba Centre for Health Policy, 2007

Table A2.12: Odds ratios for Repository variables that predicted child going into care, for children with a *BabyFirst* screen form for the Winnipeg only Sample ideal*

Variable	Odds Ratio (95% Confidence Interval)
Mother's age at first birth (0-15 yrs)	5.29 (3.09, 9.07)
Mother's age at first birth, 16-17 yrs)	4.29 (2.56, 7.18)
Mother's age at first birth, 18-19 yrs)	2.65 (1.58, 4.43)
Mother's age at first birth, 20-24 yrs)	1.55 (0.93, 2.61)
Mother's age at first birth, 30+ yrs)	0.68 (0.31, 1.50)
Marital status	2.34 (1.64, 3.35)
Receipt of income assistance	4.79 (3.59, 6.38)
Area-level income (Q1)	9.65 (3.03, 30.79)
Area-level income (Q2)	4.80 (1.49, 15.53)
Area-level income (Q3)	3.55 (1.06, 11.83)
Area-level income (Q4)	2.28 (0.63, 8.23)
Newborn feeding (breast) at hospital discharge	1.71 (1.39, 2.11)
Presence of older siblings (1)	0.86 (0.66, 1.14)
Presence of older siblings (2)	1.18 (0.87, 1.60)
Presence of older siblings (3-5)	1.79 (1.33, 2.40)
Presence of older siblings (6+)	3.70 (2.01, 6.78)

*Variables for this model were derived from the best fitting model for the Winnipeg only sample, independent of Sample 1 results.

Source: Manitoba Centre for Health Policy, 2007

Table A2.13: Variables from the Repository that were significantly related to child ending up in care for those children without a *BabyFirst* form*

Variable	DF	Sample 1 max_r-squared = 0.1868		Sample 2 max_r-squared = 0.1615		Winnipeg only max_r-squared = 0.3275	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models*							
Receipt of income assistance	1	58.91	<.0001	36.59	<.0001	27.12	<.0001
Mother's age at first birth	5	33.30	<.0001	43.53	<.0001	47.11	<.0001
Complications at birth	1	7.94	0.0048	4.56	0.0327	5.85	0.0156
Variables significant in only two of the models							
Presence of older siblings	4	34.60	<.0001	42.09	<.0001	6.01	0.1981
Marital status	1	32.99	<.0001	27.80	<.0001	2.59	0.1074
Area-level income quintile	4	13.42	0.0094	6.73	0.1507	18.72	0.0009
Variables significant in only the Sample 1 model							
None							

*The variables from the Repository were entered one at a time for Sample 1 and only significant variables were retained. The final regression model was then applied to Sample 2 and the Winnipeg only Sample. We also ran separate models for Sample 2 and the Winnipeg only Sample where variables were entered and retained independently of results from Sample 1 regressions. The results from those models can be found in Table A2.14.

Source: Manitoba Centre for Health Policy, 2007

Table A2.14: Variables from the Repository that were significantly related to child ending up in care for those children without a *BabyFirst* form*

Variable	DF	Sample 1 max_r-squared = 0.1868		Sample 2 max_r-squared = 0.1616		Winnipeg only max_r-squared = 0.3242	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models*							
Receipt of income assistance	1	58.91	<.0001	38.31	<.0001	30.75	<.0001
Mother's age at first birth	5	33.30	<.0001	47.88	<.0001	52.61	<.0001
Complications at birth	1	7.94	0.0048	5.00	0.0254	5.73	0.0167
Variables significant in only two of the models							
Presence of older siblings	4	34.60	<.0001	41.08	<.0001	ns	ns
Marital status	1	32.99	<.0001	27.24	<.0001	ns	ns
Area-level income quintile	4	13.42	0.0094	ns	ns	19.30	0.0007
Breastfeeding not initiated at hospital discharge	1	ns	ns	6.28	0.0122	3.98	0.0461
Variables significant in only the Sample 1 model							
None							

*Regression models were run separately for each sample. These results represent the best fitting models for each of the samples.

Source: Manitoba Centre for Health Policy, 2007

Table A2.15: Odds ratios for Repository variables that predicted child going into care, for children with no *BabyFirst* screen form, Sample 1

Variable	Odds Ratio (95% Confidence Interval)
Mother's age at first birth (0-15 yrs)	4.71 (2.04, 10.86)
Mother's age at first birth (16-17 yrs)	4.12 (1.84, 9.22)
Mother's age at first birth (18-19 yrs)	3.63 (1.62, 8.16)
Mother's age at first birth (20-24 yrs)	2.00 (0.88, 4.55)
Mother's age at first birth (30+ yrs)	0.22 (0.03, 1.77)
Marital status	3.70 (2.37, 5.79)
Receipt of income assistance	3.08 (2.31, 4.11)
Area-level income (Q1)	1.27 (0.64, 2.52)
Area-level income (Q2)	0.96 (0.46, 1.98)
Area-level income (Q3)	0.70 (0.32, 1.55)
Area-level income (Q4)	0.55 (0.23, 1.30)
Complications at birth	1.46 (1.12, 1.89)
Presence of older siblings (1)	1.26 (0.87, 1.83)
Presence of older siblings (2)	1.07 (0.70, 1.62)
Presence of older siblings (3-5)	2.45 (1.71, 3.51)
Presence of older siblings (6+)	2.81 (1.46, 5.38)

Source: Manitoba Centre for Health Policy, 2007

Table A2.16: Odds ratios for Repository variables that predicted child going into care, for children with no *BabyFirst* screen form, Sample 2*

Variable	Odds Ratio (95% Confidence Interval)
Mother's age at first birth (0-15 yrs)	5.86(2.58, 13.29)
Mother's age at first birth (16-17 yrs)	4.07 (1.81, 9.12)
Mother's age at first birth (18-19 yrs)	2.79 (1.24, 6.30)
Mother's age at first birth (20-24 yrs)	1.98 (0.87, 4.51)
Mother's age at first birth (30+ yrs)	0.70 (0.18, 2.75)
Marital status	3.04 (2.01, 4.60)
Receipt of income assistance	2.55 (1.88, 3.46)
Area-level income (Q1)	1.84 (0.83, 4.09)
Area-level income (Q2)	1.64 (0.71, 3.78)
Area-level income (Q3)	1.27 (0.53, 3.04)
Area-level income (Q4)	1.14 (0.46, 2.85)
Complications at birth	1.33 (1.02, 1.74)
Presence of older siblings (1)	1.15 (0.77, 1.70)
Presence of older siblings (2)	1.40 (0.92, 2.14)
Presence of older siblings (3-5)	2.91 (2.03, 4.17)
Presence of older siblings (6+)	2.07 (1.00, 4.29)

*Variables for this model were derived from best fitting model for Sample 1 and applied to Sample 2

Source: Manitoba Centre for Health Policy, 2007

Table A2.17: Odds ratios for Repository variables that predicted child going into care, for children with no *BabyFirst* screen form, Winnipeg only Sample*

Variable	Odds Ratio (95% Confidence Interval)
Mother's age at first birth (0-15 yrs)	41.35 (5.29, 323.44)
Mother's age at first birth (16-17 yrs)	43.40 (5.80, 324.85)
Mother's age at first birth (18-19 yrs)	29.62 (3.95, 222.36)
Mother's age at first birth (20-24 yrs)	8.47 (1.10, 65.17)
Mother's age at first birth (30+)	2.57 (0.23, 28.54)
Marital status	1.61 (0.90, 2.89)
Receipt of income assistance	3.12 (2.03, 4.79)
Area-level income (Q1)	3.78 (0.88, 16.32)
Area-level income (Q2)	2.10 (0.47, 9.38)
Area-level income (Q3)	1.01 (0.20, 5.10)
Area-level income (Q4)	1.37 (0.26, 7.08)
Complications at birth	1.60 (1.09, 2.33)
Presence of older siblings (1)	1.08 (0.66, 1.76)
Presence of older siblings (2)	0.87 (0.50, 1.54)
Presence of older siblings (3-5)	1.64 (0.95, 2.81)
Presence of older siblings (6+)	0.38 (0.05, 3.15)

*Variables for this model were derived from best fitting model for Sample 1 and applied to the Winnipeg only Sample.

Source: Manitoba Centre for Health Policy, 2007

Table A2.18: Odds ratios for Repository variables that predicted child going into care, for children with no *BabyFirst* screen form, Sample 2, ideal variables*

Variable	Odds Ratio (95% Confidence Interval)
Mother's age at first birth (0-15 yrs)	6.27 (2.78, 14.15)
Mother's age at first birth (16-17 yrs)	4.27 (1.91, 9.55)
Mother's age at first birth (18-19 yrs)	2.93 (1.31, 6.60)
Mother's age at first birth (20-24 yrs)	2.05 (0.90, 4.67)
Mother's age at first birth (30+ yrs)	0.65 (0.17, 2.53)
Marital status	3.01 (1.99, 4.56)
Receipt of income assistance	2.60 (1.92, 3.52)
Complications at birth	1.35 (1.04, 1.76)
Newborn feeding at hospital discharge (breast)	1.41 (1.08, 1.84)
Presence of older siblings (1)	1.16 (0.79, 1.72)
Presence of older siblings (2)	1.43 (0.94, 2.18)
Presence of older siblings (3-5)	2.90 (2.02, 4.16)
Presence of older siblings (6+)	2.04 (0.98, 4.22)

*Variables for this model were derived from the best fitting model for Sample 2, independent of Sample 1 regression results.

Source: Manitoba Centre for Health Policy, 2007

Table A2.19: Odds ratios for Repository variables that predicted child going into care, for children with no *BabyFirst* screen form, Winnipeg only Sample, ideal variables*

Variable	Odds Ratio (95% Confidence Interval)
Mother's age at first birth (0-15 yrs)	47.19 (6.10, 365.18)
Mother's age at first birth (16-17 yrs)	49.45 (6.66, 367.19)
Mother's age at first birth (18-19 yrs)	33.83 (4.54, 252.18)
Mother's age at first birth (20-24 yrs)	9.14 (1.19, 70.06)
Mother's age at first birth (30+ yrs)	2.64 (0.24, 29.36)
Receipt of income assistance	3.27 (2.15, 4.96)
Area-level income (Q1)	4.01 (0.93, 17.26)
Area-level income (Q2)	2.15 (0.48, 9.55)
Area-level income (Q3)	1.08 (0.21, 5.42)
Area-level income (Q4)	1.48 (0.29, 7.65)
Complications at birth	1.59 (1.09, 2.31)
Newborn feeding at hospital discharge (breast)	1.48 (1.01, 2.17)

*Variables for this model were entered derived from the best fitting model for the Winnipeg only Sample, independent of Sample 1 results.

Source: Manitoba Centre for Health Policy, 2007

Table A2.20: Variables from the *BabyFirst* form and Repository data that were significantly related to child ending up in care*

Variable	DF	Sample 1 max_r-squared = 0.4023		Sample 2 max_r-squared = 0.4086		Winnipeg only max_r-squared = 0.4100	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models*							
Mom's age at first birth (repos)	5	56.71	<.0001	33.41	<.0001	44.10	<.0001
Existing file with local child protective services (21)	4	30.88	<.0001	89.44	<.0001	79.98	<.0001
Receipt of income assistance (repos)	1	29.97	<.0001	33.72	<.0001	40.25	<.0001
Area level income quintile (repos)	4	23.96	<.0001	40.06	<.0001	42.31	<.0001
Presence of older siblings (repos)	4	21.66	0.0002	42.94	<.0001	24.08	<.0001
Income assistance or financial difficulties (8)	1	11.58	0.0007	7.43	0.0064	9.80	0.0017
Marital status (repos)	1	10.99	0.0009	22.71	<.0001	14.42	0.0001
Social situation (7)	3	10.44	0.0152	8.03	0.0455	8.10	0.0439
Assessed lack of bonding (12)	1	7.92	0.0049	7.36	0.0067	14.64	0.0001
Breastfeeding not initiated at hospital discharge (repos)	1	6.52	0.0107	8.64	0.0033	12.42	0.0004
Pregnancy complications due to alcohol or drug use in mother (3b)	1	6.32	0.0119	18.62	<.0001	9.82	0.0017
Variables significant in only two of the models							
Parents' own history of child abuse/neglect (22)	4	19.75	0.0006	18.43	0.001	9.36	0.0527
Low education status (13)	1	19.34	<.0001	2.27	0.1319	19.13	<.0001
Prolonged postpartum maternal separation (11)	1	3.85	0.0497	0.00	0.9559	5.94	0.0148
Variables significant in only the Sample 1 model							
Harsh discipline practices (18)	4	18.97	0.0008	3.29	0.5109	1.63	0.8035
Low birth weight/short gestation (2)	4	14.30	0.0064	4.47	0.3461	3.63	0.4585
Infant trauma or illness (4b)	1	9.71	0.0018	0.06	0.8076	2.61	0.1064
Apgar less than 7 at 5 minutes (4c)	1	5.77	0.0163	0.51	0.474	2.89	0.089

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

*The variables from the *BabyFirst* screen and the Repository were entered one at a time for Sample 1 and only significant variables were retained. The final regression model was then applied to Sample 2 and the Winnipeg only Sample. We also ran separate models for Sample 2 and the Winnipeg only Sample where variables were entered and retained independently of results from Sample 1 regressions. Those results are found in Table A2.21.

Source: Manitoba Centre for Health Policy, 2007

Table A2.21: Variables from the *BabyFirst* form and Repository data that were significantly related to child ending up in care*

Variable	DF	Sample 1 max_r-squared = 0.4023		Sample 2 max_r-squared = 0.4049		Winnipeg only max_r-squared = 0.4032	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models*							
Mom's age at first birth (repos)	5	56.71	<.0001	38.00	<.0001	45.19	<.0001
Existing file with local child protective services (21)	4	30.88	<.0001	92.52	<.0001	84.77	<.0001
Receipt of income assistance (repos)	1	29.97	<.0001	33.49	<.0001	42.08	<.0001
Area level income quintile (repos)	4	23.96	<.0001	39.14	<.0001	41.99	<.0001
Presence of older siblings (repos)	4	21.66	0.0002	41.32	<.0001	21.65	0.0002
Income assistance or financial difficulties (8)	1	11.58	0.0007	10.64	0.0011	10.17	0.0014
Marital status (repos)	1	10.99	0.0009	22.07	<.0001	13.65	0.0002
Social situation (7)	3	10.44	0.0152	8.62	0.0347	10.12	0.0176
Newborn breastfeeding at hospital discharge (repos)	1	6.52	0.0107	8.66	0.0033	11.81	0.0006
Pregnancy complications due to alcohol or drug use in mother (3b)	1	6.32	0.0119	15.83	<.0001	8.94	0.0028
Variables significant in 2 models							
Parents' own history of child abuse/neglect (22)	4	19.75	0.0006	17.10	0.0018	ns	ns
Low education status (13)	1	19.34	<.0001	ns	ns	17.98	<.0001
Prolonged postpartum maternal separation (11)	1	3.85	0.0497	ns	ns	15.56	<.0001
Assessed lack of bonding (12)	1	7.92	0.0049	ns	ns	13.31	0.0003
No prenatal care before 6 th month of pregnancy (9)				8.44	0.0037	5.52	0.0187
Variables significant in only 1 model							
Harsh discipline practices (18)	4	18.97		ns	ns	ns	ns
Low birth weight/short gestation (2)	4	14.30		ns	ns	ns	ns
Infant trauma or illness (4b)	1	9.71		ns	ns	ns	ns
Apgar less than 7 at 5 minutes (4c)	1	5.77		ns	ns	ns	ns

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

*These regression models were run separately for each sample. These results represent the best fitting models for each of the samples.

Source: Manitoba Centre for Health Policy, 2007

Table A2.22: Odds ratios for Repository variables and *BabyFirst* items that predicted a child going into care, Sample 1

Variable	Odds Ratio (95% Confidence Interval)
Income assistance or financial difficulties (8)	1.81 (1.29, 2.56)
Existing file with local child protective services (21) - minimal	1.74 (0.96, 3.13)
Existing file with local child protective services (21) - low	2.51 (1.63, 3.87)
Existing file with local child protective services (21) - moderate	3.36 (1.63, 6.91)
Existing file with local child protective services (21) - high	2.70 (1.26, 5.76)
Low education status (13)	1.87 (1.42, 2.48)
Prolonged postpartum maternal separation (11)	1.83 (1.00, 3.36)
Social situation (7) - one parent family with social support	1.25 (0.94, 1.67)
Social situation (7) - one parent family without social support	2.07 (1.16, 3.71)
Social situation (7) - two parent family without social support	1.99 (1.10, 3.61)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.59 (1.11, 2.27)
Infant trauma or illness (4b)	3.23 (1.54, 6.74)
Harsh discipline practices (18) - minimal risk	2.33 (1.14, 4.78)
Harsh discipline practices (18) - low risk	0.00 (0.00, 0.00)
Harsh discipline practices (18) - moderate risk	0.00 (0.00, 0.00)
Harsh discipline practices (18) - high risk	0.00 (0.00, 0.00)
Parents' own history of child abuse/neglect (22) - minimal risk	0.54 (0.24, 1.21)
Parents' own history of child abuse/neglect (22) - low risk	1.42 (0.81, 2.47)
Parents' own history of child abuse/neglect (22) - moderate risk	2.61 (1.24, 5.50)
Parents' own history of child abuse/neglect (22) - high risk	3.56 (1.55, 8.21)
Apgar less than 7 at 5 minutes (4c)	2.66 (1.20, 5.90)
Low birth weight/short gestation (2) - 0-1499 gm	0.91 (0.31, 2.71)
Low birth weight/short gestation (2) - 1500-1999, <38 weeks	0.72 (0.25, 2.03)
Low birth weight/short gestation (2) - 2000-2500 gm, <38 weeks	3.23 (0.68, 6.23)
Low birth weight/short gestation (2) - 1500-2500, 38 weeks+	0.95 (0.22, 4.13)
Assessed lack of bonding (12)	6.14 (1.74, 21.73)
Receipt of income assistance (repos)	2.62 (1.85, 3.69)
Mother's age at first birth (0-15 yrs) (repos)	8.35 (3.99, 17.47)
Mother's age at first birth (16-17 yrs) (repos)	5.15 (2.52, 10.52)
Mother's age at first birth (18-19 yrs) (repos)	3.84 (1.90, 7.76)
Mother's age at first birth (20-24 yrs) (repos)	2.24 (1.11, 4.53)
Mother's age at first birth (30+ yrs) (repos)	1.58 (0.65, 3.86)
Area-level income group (Q1) (repos)	1.69 (0.97, 2.94)
Area-level income group (Q2) (repos)	1.22 (0.68, 2.18)
Area-level income group (Q3) (repos)	0.90 (0.48, 1.70)
Area-level income group (Q4) (repos)	0.47 (0.22, 1.02)
Presence of older siblings (1) (repos)	1.03 (0.74, 1.44)
Presence of older siblings (2) (repos)	1.04 (0.71, 1.52)
Presence of older siblings (3-5) (repos)	2.00 (1.40, 2.84)
Presence of older siblings (6+) (repos)	2.72 (1.15, 6.44)
Marital status (repos)	2.04 (1.34, 3.10)
Newborn feeding (breast) (repos)	1.40 (1.08, 1.82)

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

Source: Manitoba Centre for Health Policy, 2007

Table A2.23: Odds ratios for Repository variables and *BabyFirst* items that predicted a child going into care, Sample 2*

Variable	Odds Ratio (95% Confidence Interval)
Income assistance or financial difficulties (8)	1.60 (1.14, 2.24)
Existing file with local child protective services (21) - minimal	2.93 (1.65, 5.18)
Existing file with local child protective services (21) - low	6.16 (3.97, 9.55)
Existing file with local child protective services (21) - moderate	3.81 (1.93, 7.51)
Existing file with local child protective services (21) - high	3.65 (1.87, 7.12)
Low education status (13)	1.24 (0.94, 1.64)
Prolonged postpartum maternal separation (11)	1.02 (0.51, 2.06)
Social situation (7) - one parent family with social support	1.19 (0.89, 1.59)
Social situation (7) - one parent family without social support	2.38 (1.30, 4.38)
Social situation (7) - two parent family without social support	1.12 (0.57, 2.21)
Pregnancy complications due to alcohol or drug use in mother (3b)	2.18 (1.53, 3.10)
Infant trauma or illness (4b)	1.13 (0.41, 3.11)
Harsh discipline practices (18) - minimal risk	0.78 (0.32, 1.90)
Harsh discipline practices (18) - low risk	0.42 (0.12, 1.53)
Harsh discipline practices (18) - moderate risk	0.00 (0.00, 0.00)
Harsh discipline practices (18) - high risk	0.20 (0.02, 2.58)
Parents' own history of child abuse/neglect (22) - minimal risk	0.51 (0.18, 1.43)
Parents' own history of child abuse/neglect (22) - low risk	2.13 (1.23, 3.69)
Parents' own history of child abuse/neglect (22) - moderate risk	3.35 (1.52, 7.42)
Parents' own history of child abuse/neglect (22) - high risk	1.40 (0.47, 4.19)
Apgar less than 7 at 5 minutes (4c)	0.45 (0.05, 3.94)
Low birth weight/short gestation (2) - 0-1499 gm	2.17 (0.52, 9.01)
Low birth weight/short gestation (2) - 1500-1999, <38 weeks	1.20 (0.42, 3.42)
Low birth weight/short gestation (2) - 2000-2500 gm, <38 weeks	1.79 (0.87, 3.70)
Low birth weight/short gestation (2) - 1500-2500, 38 weeks+	0.33 (0.04, 2.63)
Assessed lack of bonding (12)	3.91 (1.46, 10.48)
Receipt of income assistance (repos)	2.84 (1.99, 4.03)
Mother's age at first birth (0-15 yrs) (Repos)	2.70 (1.44, 5.06)
Mother's age at first birth (16-17 yrs) (Repos)	2.96 (1.66, 5.28)
Mother's age at first birth (18-19 yrs) (Repos)	1.92 (1.07, 3.43)
Mother's age at first birth (20-24 yrs) (Repos)	1.17 (0.65, 2.10)
Mother's age at first birth (30+ yrs) (Repos)	0.89 (0.37, 2.13)
Area-level income group (Q1) (repos)	4.91 (2.18, 11.09)
Area-level income group (Q2) (repos)	2.33 (1.00, 5.44)
Area-level income group (Q3) (repos)	3.12 (1.32, 7.35)
Area-level income group (Q4) (repos)	1.60 (0.63, 4.03)
Presence of older siblings (1) (repos)	1.27 (0.91, 1.78)
Presence of older siblings (2) (repos)	1.68 (1.15, 2.47)
Presence of older siblings (3-5) (repos)	2.96 (2.04, 4.30)
Presence of older siblings (6+) (repos)	4.96 (2.23, 11.03)
Marital status (repos)	2.94 (1.89, 4.58)
Newborn feeding (breast) (repos)	1.48 (1.14, 1.92)

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

*Variables for this model were derived from the best fitting model for Sample 1, and applied to Sample 2.

Table A2.24. Odds ratios for Repository variables and *BabyFirst* items that predicted a child going into care, Winnipeg only*

Variable	Odds Ratio (95% Confidence Interval)
Income assistance or financial difficulties (8)	1.61 (1.19, 2.16)
Existing file with local child protective services (21) - minimal	2.54 (1.57, 4.10)
Existing file with local child protective services (21) - low	3.85 (2.68, 5.52)
Existing file with local child protective services (21) - moderate	4.12 (2.30, 7.36)
Existing file with local child protective services (21) - high	2.50 (1.37, 4.57)
Low education status (13)	1.73 (1.35, 2.20)
Prolonged postpartum maternal separation (11)	1.95 (1.14, 3.33)
Social situation (7) - one parent family with social support	1.11 (0.87, 1.42)
Social situation (7) - one parent family without social support	1.96 (1.14, 3.35)
Social situation (7) - two parent family without social support	1.62 (0.91, 2.89)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.65 (1.21, 2.27)
Infant trauma or illness (4b)	1.83 (0.88, 3.82)
Harsh discipline practices (18) - minimal risk	1.62 (0.77, 3.39)
Harsh discipline practices (18) - low risk	0.00 (0.00, 0.00)
Harsh discipline practices (18) - moderate risk	0.00 (0.00, 0.00)
Harsh discipline practices (18) - high risk	0.00 (0.00, 0.00)
Parents' own history of child abuse/neglect (22) - minimal risk	0.33 (0.13, 0.83)
Parents' own history of child abuse/neglect (22) - low risk	1.34 (0.76, 2.37)
Parents' own history of child abuse/neglect (22) - moderate risk	1.66 (0.74, 3.72)
Parents' own history of child abuse/neglect (22) - high risk	1.60 (0.60, 4.31)
Apgar less than 7 at 5 minutes (4c)	1.99 (0.90, 4.42)
Low birth weight/short gestation (2) - 0-1499 gm	1.26 (0.51, 3.11)
Low birth weight/short gestation (2) - 1500-1999, <38 weeks	0.54 (0.20, 1.49)
Low birth weight/short gestation (2) - 2000-2500 gm, <38 weeks	1.24 (0.62, 2.48)
Low birth weight/short gestation (2) - 1500-2500, 38 weeks+	0.42 (0.09, 1.90)
Assessed lack of bonding (12)	9.10 (2.94, 28.19)
Receipt of income assistance (repos)	2.85 (2.06, 3.94)
Mother's age at first birth (0-15 yrs) (repos)	3.36 (1.92, 5.88)
Mother's age at first birth (16-17 yrs) (repos)	2.78 (1.63, 4.74)
Mother's age at first birth (18-19 yrs) (repos)	1.97 (1.16, 3.35)
Mother's age at first birth (20-24 yrs) (repos)	1.31 (0.77, 2.23)
Mother's age at first birth (30+ yrs) (repos)	0.65 (0.29, 1.45)
Area-level income group (Q1) (repos)	7.84 (2.41, 25.48)
Area-level income group (Q2) (repos)	4.47 (1.36, 14.72)
Area-level income group (Q3) (repos)	3.28 (0.96, 11.17)
Area-level income group (Q4) (repos)	2.40 (0.65, 8.83)
Presence of older siblings (1) (repos)	1.03 (0.77, 1.37)
Presence of older siblings (2) (repos)	1.28 (0.93, 1.77)
Presence of older siblings (3-5) (repos)	1.85 (1.34, 2.54)
Presence of older siblings (6+) (repos)	3.16 (1.58, 6.31)
Marital status (repos)	2.10 (1.43, 3.08)
Newborn feeding (breast) (repos)	1.50 (1.20, 1.88)

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

*Variables for this model were derived from the best fitting model for Sample 1 and applied to the Winnipeg only Sample.

Source: Manitoba Centre for Health Policy, 2007

Table A2.25: Odds Ratios for Repository variables from *BabyFirst* form and Repository variables that predicted going into care, Sample 2, ideal variables*

Variable	Odds Ratio (95% Confidence Interval)
Existing file with local child protective services (21) - minimal	2.71 (1.55, 4.73)
Existing file with local child protective services (21) - low	6.12 (3.97, 9.45)
Existing file with local child protective services (21) - moderate	4.02 (2.08, 7.76)
Existing file with local child protective services (21) - high	3.75 (1.94, 7.26)
Income assistance or financial difficulties (8)	1.73 (1.24, 2.40)
Pregnancy complications due to alcohol or drug use in mother (3b)	2.04 (1.44, 2.90)
Social situation (7) - one parent family with social support	1.19 (0.89, 1.59)
Social situation (7) - one parent family without social support	2.45 (1.34, 4.49)
Social situation (7) - two parent family without social support	1.19 (0.62, 2.30)
No prenatal care before 6th month of pregnancy (9)	1.78 (1.21, 2.63)
Parents' own history of child abuse/neglect (22) - minimal risk	0.45 (0.19, 1.09)
Parents' own history of child abuse/neglect (22) - low risk	1.98 (1.16, 3.36)
Parents' own history of child abuse/neglect (22) - moderate risk	2.91 (1.34, 6.34)
Parents' own history of child abuse/neglect (22) - high risk	1.34 (0.47, 3.84)
Receipt of income assistance (repos)	2.81 (1.98, 3.98)
Mother's age at first birth (0-15 yrs) (repos)	2.86 (1.54, 5.31)
Mother's age at first birth (16-17 yrs) (repos)	3.07 (1.73, 5.46)
Mother's age at first birth (18-19 yrs) (repos)	1.98 (1.12, 3.53)
Mother's age at first birth (20-24 yrs) (repos)	1.17 (0.65, 2.10)
Mother's age at first birth (30+ yrs) (repos)	0.88 (0.37, 2.08)
Area-level income group (Q1) (repos)	4.75 (2.12, 10.67)
Area-level income group (Q2)(repos)	2.20 (0.95, 5.13)
Area-level income group (Q3)(repos)	2.98 (1.27, 7.00)
Area-level income group (Q4) (repos)	1.66 (0.66, 4.17)
Presence of older siblings (1) (repos)	1.23 (0.88, 1.72)
Presence of older siblings (2) (repos)	1.55 (1.06, 2.27)
Presence of older siblings (3-5) (repos)	2.83 (1.96, 4.09)
Presence of older siblings (6+) (repos)	4.77 (2.17, 10.45)
Marital status (repos)	2.88 (1.85, 4.48)
Newborn feeding (breast) (repos)	1.48 (1.14, 1.91)

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

*Variables for this model were derived from the best fitting model for Sample 2, independent of Sample 1 regression results.

Source: Manitoba Centre for Health Policy, 2007

Table A2.26: Odds ratios for Repository variables and *BabyFirst* items that predicted going into care, Winnipeg only Sample, ideal variables*

Variable	Odds Ratio (95% Confidence Interval)
Existing file with local child protective services (21) - minimal	1.99 (1.32, 3.00)
Existing file with local child protective services (21) - low	3.95 (2.76, 5.65)
Existing file with local child protective services (21) - moderate	4.28 (2.45, 7.46)
Existing file with local child protective services (21) - high	2.75 (1.54, 4.90)
Income assistance or financial difficulties (8)	1.61 (1.20, 2.16)
Low education status (13)	1.69 (1.32, 2.15)
Social situation (7) - one parent family with social support	1.08 (0.85, 1.38)
Social situation (7) - one parent family without social support	2.13 (1.26, 3.60)
Social situation (7) - two parent family without social support	1.64 (0.92, 2.91)
Prolonged postpartum maternal separation (11)	2.33 (1.53, 3.56)
No prenatal care before 6th month of pregnancy (9)	1.49 (1.07, 2.07)
Assessed lack of bonding (12)	7.83 (2.59, 23.63)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.61 (1.18, 2.20)
Mother's age at first birth(0-15 yrs) (repos)	3.36 (1.92, 5.87)
Mother's age at first birth (16-17 yrs) (repos)	2.78 (1.64, 4.73)
Mother's age at first birth (18-19 yrs) (repos)	2.02 (1.19, 3.42)
Mother's age at first birth (20-24 yrs) (repos)	1.31 (0.77, 2.22)
Mother's age at first birth (30+ yrs) (repos)	0.63 (0.28, 1.41)
Marital status (repos)	2.05 (1.40, 3.00)
Receipt of income assistance (repos)	2.90 (2.10, 4.01)
Area-level income group (Q1) (repos)	7.70 (2.37, 24.98)
Area-level income group (Q2) (repos)	4.42 (1.34, 14.55)
Area-level income group (Q3) (repos)	3.28 (0.97, 11.14)
Area-level income group (Q4) (repos)	2.34 (0.64, 8.61)
Newborn feeding (breast) (repos)	1.48 (1.18, 1.85)
Presence of older siblings (1) (repos)	1.02 (0.76, 1.35)
Presence of older siblings (2) (repos)	1.22 (0.89, 1.69)
Presence of older siblings (3-5) (repos)	1.79 (1.31, 2.45)
Presence of older siblings (6+) (repos)	2.78 (1.41, 5.51)

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

*Variables for this model were derived from the best fitting model for the Winnipeg only Sample, independent of Sample 1 results.

Table A.2.27: Variables from the *BabyFirst* form that were significantly related to family receiving protection and support services*

Variable (item number on <i>BabyFirst</i> form)	DF	Sample 1 max_r-squared =0.3239		Sample 2 max_r-squared =0.3084		Winnipeg only max_r-squared =0.3228	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models							
Mother's age at child's birth (6)	3	326.31	<.0001	301.21	<.0001	348.56	<.0001
Income assistance or financial difficulties (8)	1	294.70	<.0001	378.07	<.0001	417.02	<.0001
Social situation (7)	3	90.42	<.0001	22.36	<.0001	43.40	<.0001
Existing file with local child protective services (21)	4	69.03	<.0001	128.39	<.0001	117.95	<.0001
Maternal smoking during pregnancy (17)	4	62.21	<.0001	72.26	<.0001	92.83	<.0001
Low education status (13)	1	46.12	<.0001	29.44	<.0001	79.12	<.0001
Depression in mother or father (10b)	1	16.80	<.0001	15.28	<.0001	11.18	0.0008
Anxiety disorder (19)	4	12.36	0.0149	14.48	0.0059	14.18	0.0067
No prenatal care before 6th month of pregnancy (9)	1	10.84	0.001	12.49	0.0004	17.83	<.0001
Variables significant in only two of the models							
Multiple births (15)	4	25.03	<.0001	ns	ns	22.46	0.0002
Pregnancy complications due to alcohol or drug use in mother (3b)	1	12.50	0.0004	ns	ns	11.04	0.0009
Schizophrenia or bipolar affective disorder (10a)	1	6.92	0.0085	9.25	0.0024	ns	ns
Infant trauma or illness (4b)	1	6.12	0.01	ns	ns	5.72	0.0167
Prolonged postpartum maternal separation (11)	1	ns	ns	17.51	<.0001	5.41	0.02
Apgar less than 7 at 5 minutes (4c)	1	ns	ns	12.92	0.0003	8.74	0.0031
Relationship distress (14)	4	ns	ns	11.72	0.0196	11.15	0.025
Mentally disabled/challenged parent (10c)	1	ns	ns	11.66	0.0006	4.20	0.0403
Variables significant in only the Sample 1 model							
Parents' own history of child abuse/neglect (22)	4	13.48	0.0092	ns	ns	ns	ns
Low birth weight/short gestation (2)	4	12.08	0.0168	ns	ns	ns	ns
No prenatal class attendance (16)	4	11.60	0.0206	ns	ns	ns	ns
Current substance abuse (20)	4	ns	ns	23.89	<.0001	ns	ns
Complications of labour and delivery (4a)	1	ns	ns	6.89	0.0087	ns	ns
Family history of disability not detectable at birth (5)	1	ns	ns	ns	ns	4.96	0.026

*Regression models were run separately for each sample. These results represent the best fitting models for each of the samples.

Source: Manitoba Centre for Health Policy, 2007

Table A2.28: Odds ratios for *BabyFirst* screen items that predicted receipt of services, Sample 2*

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance or experiencing financial difficulty (8)	4.76 (4.08, 5.56)
Mother's age at child's birth - 15 and under (6a)	11.02 (5.61, 21.64)
Mother's age at child's birth - 16 or 17 (6b)	15.88 (11.36, 22.19)
Mother's age at child's birth - 18 or 19 (6c)	1.34 (1.08, 1.67)
Social situation (7) - one parent family with social support	1.58 (1.34, 1.87)
Social situation (7) - one parent family without social support	1.94 (1.19, 3.16)
Social situation (7) - two parent family without social support	1.14 (0.83, 1.57)
Maternal smoking during pregnancy (17) - minimal risk	1.61 (1.33, 1.94)
Maternal smoking during pregnancy (17) - low risk	2.08 (1.69, 2.55)
Maternal smoking during pregnancy (17) - moderate risk	2.29 (1.32, 3.96)
Maternal smoking during pregnancy (17) - high risk	4.55 (1.41, 14.69)
Existing file with local child protective services (21) - minimal	3.58 (2.22, 5.77)
Existing file with local child protective services (21) - low	4.78 (3.22, 7.09)
Existing file with local child protective services (21) - moderate	3.93 (2.09, 7.37)
Existing file with local child protective services (21) - high	16.73 (7.17, 39.04)
Low education status (13)	1.54 (1.32, 1.78)
Multiple births (15) - minimal risk	0.71 (0.43, 1.16)
Multiple births (15) - low risk	1.03 (0.63, 1.70)
Multiple births (15) - moderate risk	2.24 (0.73, 6.81)
Multiple births (15) - high risk	3.71 (1.19, 11.59)
Depression in mother or father (10b)	1.66 (1.32, 2.10)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.22 (0.94, 1.58)
Parents' own history of child abuse/neglect (22) - minimal risk	0.99 (0.56, 1.76)
Parents' own history of child abuse/neglect (22) - low risk	1.18 (0.79, 1.75)
Parents' own history of child abuse/neglect (22) - moderate risk	1.94 (1.06, 3.56)
Parents' own history of child abuse/neglect (22) - high risk	0.78 (0.35, 1.74)
No prenatal care before 6th month of pregnancy (9)	1.80 (1.34, 2.40)
Infant trauma or illness (4b)	1.83 (1.21, 2.79)
Anxiety disorder (19) - minimal risk	0.34 (0.17, 0.70)
Anxiety disorder (19) - low risk	1.43 (0.82, 2.49)
Anxiety disorder (19) - moderate risk	1.62 (0.47, 5.60)
Anxiety disorder (19) - high risk	1.07 (0.19, 5.92)
Schizophrenia or bipolar affective disorder (10a)	4.11 (1.78, 9.48)
Low birth weight/short gestation (2) - 0-1499 gm	1.83 (0.96, 3.48)
Low birth weight/short gestation (2) - 1500-1999, <38 weeks	1.32 (0.74, 2.35)
Low birth weight/short gestation (2) - 2000-2500 gm, <38 weeks	1.24 (0.83, 1.85)
Low birth weight/short gestation (2) - 1500-2500, 38 weeks+	0.94 (0.42, 2.08)
No prenatal class attendance (16) - minimal risk	0.91 (0.72, 1.15)
No prenatal class attendance (16) - low risk	0.78 (0.57, 1.08)
No prenatal class attendance (16) - moderate risk	0.65 (0.30, 1.41)
No prenatal class attendance (16) - high risk	0.97 (0.21, 4.37)

*Variables for this model were derived from the best fitting model for Sample 1 and applied to Sample 2.

Source: Manitoba Centre for Health Policy, 2007

Table A2.29: Odds ratios for *BabyFirst* screen items that predicted receipt of services, Winnipeg only Sample*

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance or experiencing financial difficulty (8)	4.48 (3.89, 5.16)
Mother's age at child's birth - 15 and under (6a)	23.85 (10.71, 53.14)
Mother's age at child's birth - 16 or 17 (6b)	33.50 (22.51, 49.86)
Mother's age at child's birth - 18 or 19 (6c)	1.20 (0.98, 1.46)
Social situation (7) - one parent family with social support	1.62 (1.40, 1.88)
Social situation (7) - one parent family without social support	2.45 (1.59, 3.77)
Social situation (7) - two parent family without social support	1.29 (0.98, 1.70)
Maternal smoking during pregnancy (17) - minimal risk	1.80 (1.52, 2.12)
Maternal smoking during pregnancy (17) - low risk	2.03 (1.67, 2.48)
Maternal smoking during pregnancy (17) - moderate risk	4.20 (2.11, 8.37)
Maternal smoking during pregnancy (17) - high risk	2.28 (0.58, 8.99)
Existing file with local child protective services (21) - minimal	3.23 (2.07, 5.05)
Existing file with local child protective services (21) - low	4.09 (2.81, 5.95)
Existing file with local child protective services (21) - moderate	3.17 (1.77, 5.68)
Existing file with local child protective services (21) - high	9.81 (4.73, 20.32)
Low education status (13)	1.93 (1.67, 2.24)
Multiple births (15) - minimal risk	0.50 (0.31, 0.80)
Multiple births (15) - low risk	0.74 (0.45, 1.22)
Multiple births (15) - moderate risk	4.64 (1.48, 14.53)
Multiple births (15) - high risk	20.78 (2.31, 186.70)
Depression in mother or father (10b)	1.43 (1.16, 1.77)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.54 (1.20, 1.98)
Parents' own history of child abuse/neglect (22) - minimal risk	1.10 (0.61, 1.96)
Parents' own history of child abuse/neglect (22) - low risk	1.29 (0.83, 1.98)
Parents' own history of child abuse/neglect (22) - moderate risk	2.13 (1.12, 4.03)
Parents' own history of child abuse/neglect (22) - high risk	0.59 (0.26, 1.32)
No prenatal care before 6th month of pregnancy (9)	1.71 (1.33, 2.19)
Infant trauma or illness (4b)	2.03 (1.35, 3.07)
Anxiety disorder (19) - minimal risk	0.60 (0.31, 1.16)
Anxiety disorder (19) - low risk	1.78 (1.07, 2.95)
Anxiety disorder (19) - moderate risk	0.32 (0.04, 2.29)
Anxiety disorder (19) - high risk	8.23 (1.10, 61.29)
Schizophrenia or bipolar affective disorder (10a)	1.50 (0.60, 3.74)
Low birth weight/short gestation (2) - 0-1499 gm	1.42 (0.80, 2.50)
Low birth weight/short gestation (2) - 1500-1999, <38 weeks	1.02 (0.58, 1.80)
Low birth weight/short gestation (2) - 2000-2500 gm, <38 weeks	1.30 (0.89, 1.88)
Low birth weight/short gestation (2) - 1500-2500, 38 weeks+	1.02 (0.55, 1.88)
No prenatal class attendance (16) - minimal risk	0.80 (0.64, 0.99)
No prenatal class attendance (16) - low risk	0.89 (0.65, 1.22)
No prenatal class attendance (16) - moderate risk	1.75 (0.57, 5.36)
No prenatal class attendance (16) - high risk	1.89 (0.31, 11.49)

*Variables for this model were derived from the best fitting model for the Sample 1 and applied to the Winnipeg only Sample.

Table A2.30: Odds ratios for *BabyFirst* screen items that predicted receipt of services, Sample 2, ideal variables*

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance or experiencing financial difficulty (8)	4.65 (3.98, 5.43)
Mother's age at child's birth - 15 and under (6a)	11.61 (5.91, 22.82)
Mother's age at child's birth - 16 or 17 (6b)	16.21 (11.59, 22.66)
Mother's age at child's birth - 18 or 19 (6c)	1.36 (1.10, 1.69)
Existing file with local child protective services (21) - minimal	3.77 (2.35, 6.06)
Existing file with local child protective services (21) - low	4.58 (3.09, 6.79)
Existing file with local child protective services (21) - moderate	4.08 (2.15, 7.74)
Existing file with local child protective services (21) - high	14.32 (6.10, 33.60)
Maternal smoking during pregnancy (17) - minimal risk	1.62 (1.35, 1.96)
Maternal smoking during pregnancy (17) - low risk	2.10 (1.71, 2.57)
Maternal smoking during pregnancy (17) - moderate risk	2.02 (1.17, 3.48)
Maternal smoking during pregnancy (17) - high risk	4.91 (1.46, 16.49)
Current substance abuse (20) - minimal risk	0.47 (0.24, 0.92)
Current substance abuse (20) - low risk	1.13 (0.60, 2.13)
Current substance abuse (20) - moderate risk	4.26 (1.89, 9.58)
Current substance abuse (20) - high risk	2.41 (1.02, 5.65)
Low education status (13)	1.51 (1.30, 1.75)
Social situation (7) - one parent family with social support	1.48 (1.25, 1.76)
Social situation (7) - one parent family without social support	1.65 (1.00, 2.72)
Social situation (7) - two parent family without social support	1.09 (0.78, 1.50)
Prolonged postpartum maternal separation (11)	1.90 (1.41, 2.58)
Depression in mother or father (10b)	1.59 (1.26, 2.01)
No prenatal care before 6th month of pregnancy (9)	1.69 (1.26, 2.26)
Apgar less than 7 at 5 minutes (4c)	2.43 (1.50, 1.50)
Mentally disabled/challenged parent (10c)	3.72 (1.75, 7.91)
Schizophrenia or bipolar affective disorder (10a)	3.73 (1.60, 8.71)
Complications of labour and delivery (4a)	0.73 (0.57, 0.92)
Anxiety disorder (19) - minimal risk	0.31 (0.15, 0.64)
Anxiety disorder (19) - low risk	1.43 (0.82, 2.48)
Anxiety disorder (19) - moderate risk	1.71 (0.49, 5.98)
Anxiety disorder (19) - high risk	0.36 (0.06, 2.20)
Relationship distress (14) - minimal risk	1.29 (0.93, 1.79)
Relationship distress (14) - low risk	1.34 (1.02, 1.75)
Relationship distress (14) - moderate risk	1.39 (0.87, 2.23)
Relationship distress (14) - high risk	2.16 (1.15, 4.06)

*Variables for this model were derived from the best fitting model for Sample 2, independent of Sample 1 regression models.

Table A2.31: Odds ratios for *BabyFirst* screen items that predicted receipt of services, Winnipeg only Sample, ideal variables*

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance or experiencing financial difficulty (8)	4.37 (3.79, 5.03)
Mother's age at child's birth - 15 and under (6a)	23.10 (10.44, 51.13)
Mother's age at child's birth - 16 or 17 (6b)	33.32 (22.42, 49.51)
Mother's age at child's birth - 18 or 19 (6c)	1.19 (0.97, 1.45)
Existing file with local child protective services (21) - minimal	3.05 (1.98, 4.71)
Existing file with local child protective services (21) - low	3.95 (2.71, 5.74)
Existing file with local child protective services (21) - moderate	3.26 (1.82, 5.83)
Existing file with local child protective services (21) - high	9.66 (4.71, 19.80)
Maternal smoking during pregnancy (17) - minimal risk	1.77 (1.50, 2.09)
Maternal smoking during pregnancy (17) - low risk	2.03 (1.67, 2.46)
Maternal smoking during pregnancy (17) - moderate risk	4.25 (2.13, 8.49)
Maternal smoking during pregnancy (17) - high risk	2.41 (0.62, 9.40)
Low education status (13)	1.94 (1.67, 2.24)
Social situation (7) - one parent family with social support	1.58 (1.36, 1.83)
Social situation (7) - one parent family without social support	2.29 (1.48, 3.54)
Social situation (7) - two parent family without social support	1.25 (0.95, 1.66)
Multiple births (15) - minimal risk	0.45 (0.28, 0.73)
Multiple births (15) - low risk	0.74 (0.46, 1.21)
Multiple births (15) - moderate risk	3.05 (0.99, 9.47)
Multiple births (15) - high risk	18.10 (2.06, 158.83)
No prenatal care before 6th month of pregnancy (9)	1.70 (1.33, 2.18)
Depression in mother or father (10b)	1.43 (1.16, 1.76)
Apgar less than 7 at 5 minutes (4c)	1.89 (1.24, 2.88)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.53 (1.19, 1.97)
Infant trauma or illness (4b)	1.69 (1.10, 2.59)
Anxiety disorder (19) - minimal risk	0.55 (0.30, 1.02)
Anxiety disorder (19) - low risk	1.77 (1.07, 2.91)
Anxiety disorder (19) - moderate risk	0.36 (0.05, 2.33)
Anxiety disorder (19) - high risk	8.86 (1.10, 71.03)
Family history of disability not detectable at birth (5)	1.69 (1.06, 2.69)
Prolonged postpartum maternal separation (11)	1.38 (1.05, 1.82)
Relationship distress (14) - minimal risk	1.15 (0.85, 1.56)
Relationship distress (14) - low risk	1.27 (0.98, 1.65)
Relationship distress (14) - moderate risk	1.89 (1.21, 2.95)
Relationship distress (14) - high risk	1.30 (0.70, 2.40)
Mentally disabled/challenged parent (10c)	2.37 (1.04, 5.39)

*Variables for this model were derived from the best fitting model for the Winnipeg only Sample, independent of Sample 1 regression models.

Source: Manitoba Centre for Health Policy, 2007

Table A2.32: Variables from the Repository that were significantly related to family receiving protection or support services*

Variable	DF	Sample 1 max_r-squared = 0.3384		Sample 2 max_r-squared =0.3339		Winnipeg only max_r-squared =0.3839	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models							
Mother's age at first birth	5	612.63	<.0001	562.86	<.0001	753.30	<.0001
Receipt of income assistance	1	284.39	<.0001	243.97	<.0001	315.35	<.0001
Marital status	1	69.81	<.0001	69.70	<.0001	64.65	<.0001
Area-level income quintile	4	30.27	<.0001	53.94	<.0001	86.80	<.0001
Presence of older siblings	4	19.36	0.0007	32.41	<.0001	47.17	<.0001
Newborn feeding (breast) at hospital discharge	1	13.74	0.0002	24.77	<.0001	41.09	<.0001
Variables significant in only the Sample 1 model							
Area (Winnipeg or non-Winnipeg)	1	4.309	0.0379	2.9801	0.0843	n/a	n/a

*Variables from the *BabyFirst* screen were entered into the regression models for Sample 1 and only significant variables were retained. The final regression model was then applied to Sample 2 and the Winnipeg only Sample. We also ran separate models for Sample 2 and the Winnipeg only Sample where variables were entered and retained independent of results from Sample 1 regressions. Those results can be found in Table A2.33.

Source: Manitoba Centre for Health Policy, 2007

Table A2.33: Variables from the Repository that were significantly related to family receiving protection or support services*

Variable	DF	Sample 1 max_r-squared = 0.3384		Sample 2 max_r-squared = 0.3346		Winnipeg only max_r-squared = 0.3839	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models							
Mother's age at first birth	5	612.63	<.0001	566.50	<.0001	753.30	<.0001
Receipt of income assistance	1	284.39	<.0001	244.99	<.0001	315.35	<.0001
Marital status	1	69.81	<.0001	69.31	<.0001	64.65	<.0001
Area-level income quintile	4	30.27	<.0001	52.29	<.0001	86.80	<.0001
Presence of older siblings	4	19.36	0.0007	30.22	<.0001	47.17	<.0001
Newborn feeding (breast) at hospital discharge	1	13.74	0.0002	24.19	<.0001	41.09	<.0001
Variables significant in only two models							
Area (Winnipeg or non-Winnipeg)	1	4.31	0.0379	4.09	0.0431	n/a	n/a
Variables significant in only one model							
Birth complications	1	ns	ns	5.98	0.0145	ns	ns

*Regression models were run separately for each sample. These results represent the best fitting models for each of the samples.

Source: Manitoba Centre for Health Policy, 2007

Table A2.34: Odds ratios for Repository variables that predicted receipt of services, for children with a *BabyFirst* screen, Sample 1

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance	3.41 (2.96, 3.94)
Mother's age at first birth (0-15 yrs)	9.10 (6.76, 12.24)
Mother's age at first birth (16-17 yrs)	13.02 (10.14, 16.73)
Mother's age at first birth (18-19 yrs)	5.45 (4.27, 6.96)
Mother's age at first birth (20-24 yrs)	2.92 (2.32, 3.68)
Mother's age at first birth (30+ yrs)	0.97 (0.71, 1.33)
Marital status	1.91 (1.64, 2.22)
Area-level income quintile (Q1)	1.68 (1.32, 2.13)
Area-level income quintile (Q2)	1.39 (1.09, 1.77)
Area-level income quintile (Q3)	1.13 (0.87, 1.45)
Area-level income quintile (Q4)	1.19 (0.91, 1.54)
Newborn feeding (breast) at hospital discharge (No)	1.31 (1.14, 1.51)
Presence of older siblings (1)	0.74 (0.64, 0.86)
Presence of older siblings (2)	0.77 (0.64, 0.92)
Presence of older siblings (3-5)	0.91 (0.74, 1.12)
Presence of older siblings (6+)	0.94 (0.49, 1.78)
Area (Winnipeg or non-Winnipeg) Wpg	1.15 (1.01, 1.30)

Source: Manitoba Centre for Health Policy, 2007

Table A2.35: Odds ratios for Repository variables that predicted receipt of services, for children with a *BabyFirst* screen, Sample 2*

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance	3.12 (2.71, 3.61)
Mother's age at first birth (0-15 yrs)	9.81 (7.34, 13.13)
Mother's age at first birth (16-17 yrs)	10.29 (8.07, 13.12)
Mother's age at first birth (18-19 yrs)	4.56 (3.60, 5.77)
Mother's age at first birth (20-24 yrs)	2.39 (1.91, 2.98)
Mother's age at first birth (30+ yrs)	0.97 (0.72, 1.31)
Marital status	1.90 (1.63, 2.21)
Area-level income quintile (Q1)	2.08 (1.64, 2.65)
Area-level income quintile (Q2)	1.66 (1.30, 2.13)
Area-level income quintile (Q3)	1.45 (1.12, 1.88)
Area-level income quintile (Q4)	1.16 (0.89, 1.53)
Newborn feeding (breast) at hospital discharge (No)	1.43 (1.24, 1.65)
Presence of older siblings (1)	0.67 (0.58, 0.78)
Presence of older siblings (2)	0.82 (0.69, 0.99)
Presence of older siblings (3-5)	1.05 (0.86, 1.28)
Presence of older siblings (6+)	0.89 (0.51, 1.58)
Area (Winnipeg or non-Winnipeg) Wpg	1.12 (0.98, 1.28)

*The variables for this model were derived from the best fitting model for Sample 1 and applied to Sample 2.

Source: Manitoba Centre for Health Policy, 2007

Table A2.36: Odds ratios for Repository variables that predicted receipt of services, for children with a *BabyFirst* screen, Winnipeg only Sample*

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance	3.20 (2.81, 3.63)
Mother's age at first birth (0-15 yrs)	9.56 (7.37, 12.40)
Mother's age at first birth (16-17 yrs)	11.54 (9.26, 14.39)
Mother's age at first birth (18-19 yrs)	4.89 (3.95, 6.06)
Mother's age at first birth (20-24 yrs)	2.67 (2.19, 3.27)
Mother's age at first birth (30+ yrs)	0.78 (0.59, 1.03)
Marital status	1.77 (1.54, 2.03)
Area-level income quintile (Q1)	2.44 (1.87, 3.17)
Area-level income quintile (Q2)	1.95 (1.49, 2.54)
Area-level income quintile (Q3)	1.50 (1.13, 1.99)
Area-level income quintile (Q4)	1.18 (0.88, 1.60)
Newborn feeding (breast) at hospital discharge (No)	1.52 (1.34, 1.73)
Presence of older siblings (1)	0.64 (0.56, 0.73)
Presence of older siblings (2)	0.82 (0.69, 0.96)
Presence of older siblings (3-5)	0.91 (0.76, 1.11)
Presence of older siblings (6+)	1.17 (0.66, 2.06)

*The variables for this model were derived from the best fitting model for Sample 1 and applied to the Winnipeg only Sample.

Source: Manitoba Centre for Health Policy, 2007

Table A2.37: Odds ratios for Repository variables that predicted receipt of services, for children with a *BabyFirst* screen, Sample 2, ideal variables*

Variable	Odds Ratio (95% Confidence Interval)
Mother's age at first birth (0-15 yrs)	9.94 (7.43, 13.30)
Mother's age at first birth (16-17 yrs)	10.38 (8.14, 13.25)
Mother's age at first birth (18-19 yrs)	4.60 (3.63, 5.82)
Mother's age at first birth (20-24 yrs)	2.41 (1.93, 3.01)
Mother's age at first birth (30+ yrs)	0.96 (0.71, 1.29)
Receipt of income assistance	3.14 (2.72, 3.62)
Marital status	1.90 (1.63, 2.20)
Area-level income quintile (Q1)	2.06 (1.62, 2.62)
Area-level income quintile (Q2)	1.65 (1.29, 2.12)
Area-level income quintile (Q3)	1.44 (1.11, 1.86)
Area-level income quintile (Q4)	1.16 (0.88, 1.53)
Newborn feeding (breast) at hospital discharge (No)	1.43 (1.24, 1.65)
Presence of older siblings (1)	0.69 (0.59, 0.80)
Presence of older siblings (2)	0.84 (0.70, 1.01)
Presence of older siblings (3-5)	1.07 (0.87, 1.31)
Presence of older siblings (6+)	0.90 (0.51, 1.59)
Birth complications	1.17 (1.03, 1.32)
Area (Winnipeg or non-Winnipeg) (Wpg)	1.14 (1.00, 1.30)

*Variables for this model were derived from the best fitting model for Sample 2, independent of Sample 1 regression results.

Source: Manitoba Centre for Health Policy, 2007

Table A2.38: Odds ratios for Repository variables that predicted receipt of services, for children with a *BabyFirst* screen, Winnipeg only Sample, ideal variables*

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance	3.20 (2.81, 3.63)
Mother's age at first birth (0-15 yrs)	9.56 (7.37, 12.40)
Mother's age at first birth (16-17 yrs)	11.54 (9.26, 14.39)
Mother's age at first birth (18-19 yrs)	4.89 (3.95, 6.06)
Mother's age at first birth (20-24 yrs)	2.67 (2.19, 3.27)
Mother's age at first birth (30+ yrs)	0.78 (0.59, 1.03)
Area-level income quintile (Q1)	2.44 (1.87, 3.17)
Area-level income quintile (Q2)	1.95 (1.49, 2.54)
Area-level income quintile (Q3)	1.50 (1.13, 1.99)
Area-level income quintile (Q4)	1.18 (0.88, 1.60)
Newborn feeding (breast) at hospital discharge (No)	1.52 (1.34, 1.73)
Presence of older siblings (1)	0.64 (0.56, 0.73)
Presence of older siblings (2)	0.82 (0.69, 0.96)
Presence of older siblings(3-5)	0.91 (0.76, 1.11)
Presence of older siblings (6+)	1.17 (0.66, 2.06)
Marital status	1.77 (1.54, 2.03)

*Variables for this model were derived from the best fitting model for the Winnipeg only Sample, independent of Sample 1 results.

Source: Manitoba Centre for Health Policy, 2007

Table A2.39: Variables from the Repository that were significantly related to family receiving protection or support services for children that did not get the *BabyFirst* screen*

Variable	DF	Sample 1 max_r-squared = 0.1882		Sample 2 max_r-squared =0.1878		Winnipeg only max_r-squared =0.3262	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models							
Receipt of income assistance	1	110.53	<.0001	133.92	<.0001	66.83	<.0001
Mother's age at first birth	5	110.28	<.0001	104.27	<.0001	192.80	<.0001
Marital status	1	24.21	<.0001	19.11	<.0001	13.56	0.0002
Variables significant in only two models							
Presence of older siblings	4	14.51	0.0058	5.99	0.2	11.84	0.0186
Variables significant in only the Sample 1 model							
Area (Winnipeg or non-Winnipeg)	1	31.39	<.0001	28.30	<.0001	n/a	n/a

*The variables from the Repository were entered one at a time for Sample 1 and only significant variables were retained. The final regression model was then applied to Sample 2 and the Winnipeg only Sample. We also ran separate models for Sample 2 and the Winnipeg only Sample where variables were entered and retained independent of Sample 1 regression results. The results from those models can be found in Table A2.40.

Source: Manitoba Centre for Health Policy, 2007

Table A2.40: Variables from the Repository that were significantly related to family receiving protection or support services for children that did not get the *BabyFirst* screen*

Variable	DF	Sample 1 max_r-squared = 0.1882		Sample 2 max_r-squared =0.1876		Winnipeg only max_r-squared =0.3262	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models							
Receipt of income assistance	1	110.53	<.0001	135.53	<.0001	66.83	<.0001
Mother's age at first birth	5	110.28	<.0001	117.46	<.0001	192.80	<.0001
Marital status	1	24.21	<.0001	18.81	<.0001	13.56	0.0002
Variables significant in only two models							
Area (Winnipeg or non-Winnipeg)	1	31.39	<.0001	30.57	<.0001	ns	ns
Presence of older siblings	4	14.51	0.0058	ns	ns	11.84	0.0186
Variables significant in only one model							
Birth complications	1	ns	ns	6.47	0.0109	ns	ns

*Regression models were run separately for each sample.
These results represent the best fitting models for each of the samples.

Source: Manitoba Centre for Health Policy, 2007

Table A2.41: Odds ratios for Repository variables that predicted receipt of services, for children without a *BabyFirst* screen, Sample 1

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance	3.42 (2.72, 4.30)
Mother's age at first birth (0-15 yrs)	6.03 (3.56, 10.22)
Mother's age at first birth (16-17 yrs)	7.05 (4.31, 11.53)
Mother's age at first birth (18-19 yrs)	5.08 (3.10, 8.31)
Mother's age at first birth (20-24 yrs)	2.83 (1.74, 4.62)
Mother's age at first birth 30+ yrs)	1.01 (0.52, 1.97)
Area (Winnipeg or non-Winnipeg) (Wpg)	1.87 (1.50, 2.32)
Marital status	1.91 (1.48, 2.47)
Presence of older siblings (1)	0.78 (0.61, 1.00)
Presence of older siblings (2)	0.75 (0.56, 1.00)
Presence of older siblings (3-5)	1.19 (0.91, 1.54)
Presence of older siblings (6+)	0.64 (0.34, 1.19)

Source: Manitoba Centre for Health Policy, 2007

Table A2.42: Odds ratios for Repository variables that predicted receipt of services, for children without a *BabyFirst* screen, Sample 2*

Variable	Odds Ratio(95% Confidence Interval)
Receipt of income assistance	4.00 (3.16, 5.05)
Mother's age at first birth (0-15 yrs)	4.42 (2.74, 7.12)
Mother's age at first birth (16-17 yrs)	5.11 (3.31, 7.88)
Mother's age at first birth (18-19 yrs)	2.83 (1.82, 4.41)
Mother's age at first birth (20-24 yrs)	2.01 (1.31, 3.09)
Mother's age at first birth 30+ yrs)	0.62 (0.32, 1.21)
Area (Winnipeg or non-Winnipeg) (Wpg)	1.82 (1.46, 2.27)
Marital status	1.77 (1.37, 2.28)
Presence of older siblings (1)	0.93 (0.72, 1.19)
Presence of older siblings (2)	0.85 (0.64, 1.14)
Presence of older siblings (3-5)	1.19 (0.91, 1.57)
Presence of older siblings (6+)	0.75 (0.38, 1.50)

*The variables for this model were derived from the best fitting model for Sample 1 and applied to Sample 2.

Source: Manitoba Centre for Health Policy, 2007

Table A2.43: Odds ratios for Repository variables that predicted receipt of services, for children without a *BabyFirst* screen, Winnipeg only Sample*

Variable	Odds Ratio (95% Confidence Interval)
Receipt of income assistance	2.79 (2.18, 3.57)
Mother's age at first birth (0-15 yrs)	9.87 (5.48, 17.78)
Mother's age at first birth (16-17 yrs)	15.39 (9.35, 25.34)
Mother's age at first birth (18-19 yrs)	6.54 (3.95, 10.82)
Mother's age at first birth (20-24 yrs)	3.28 (2.02, 5.34)
Mother's age at first birth (30+ yrs)	1.34 (0.74, 2.41)
Marital status	1.72 (1.29, 2.29)
Presence of older siblings (1)	0.74 (0.56, 0.98)
Presence of older siblings (2)	1.03 (0.74, 1.44)
Presence of older siblings (3-5)	1.41 (0.98, 2.02)
Presence of older siblings (6+)	0.87 (0.29, 2.60)

*Variables for this model were derived from the best fitting model for Sample 1 and applied to the Winnipeg only Sample.

Source: Manitoba Centre for Health Policy, 2007

Table A2.44: Odds ratios for Repository variables that predicted receipt of services, for children without a *BabyFirst* screen, Sample 2 ideal variables*

Variable	Odds Ratio (95% Confidence Interval)
Mother's age at first birth (0-15 yrs)	4.71 (2.95, 7.53)
Mother's age at first birth (16-17 yrs)	5.32 (3.47, 8.14)
Mother's age at first birth (18-19 yrs)	2.96 (1.91, 4.59)
Mother's age at first birth (20-24 yrs)	2.05 (1.33, 3.14)
Mother's age at first birth (30+ yrs)	0.61 (0.32, 1.19)
Marital status	1.74 (1.35, 2.24)
Receipt of income assistance	4.00 (3.17, 5.05)
Area (Winnipeg or non-Winnipeg) (Wpg)	1.86 (1.49, 2.31)
Complications at birth	1.28 (1.06, 1.55)

*Variables for this model were derived from the best fitting model for Sample 2, independent of Sample 1 regression results.

Source: Manitoba Centre for Health Policy, 2007

Table A2.45: Odds ratios for Repository variables that predicted receipt of services, for children without a *BabyFirst* screen, Winnipeg only Sample, ideal variables*

Variable	Odds Ratio (95% Confidence Interval)
Mother's age at first birth (0-15 yrs)	9.87 (5.48, 17.78)
Mother's age at first birth (16-17 yrs)	15.39 (9.35, 25.34)
Mother's age at first birth (18-19 yrs)	6.54 (3.95, 10.82)
Mother's age at first birth (20-24 yrs)	3.29 (2.02, 5.34)
Mother's age at first birth (30+ yrs)	1.34 (0.74, 2.41)
Marital status	1.72 (1.29, 2.29)
Receipt of income assistance	2.79 (2.18, 3.57)
Presence of older siblings (1)	0.74 (0.56, 0.98)
Presence of older siblings (2)	1.03 (0.74, 1.44)
Presence of older siblings (3-5)	1.41 (0.98, 2.02)
Presence of older siblings (6+)	0.87 (0.29, 2.60)

*Variables for this model were entered derived from the best fitting model for the Winnipeg only Sample, independent of Sample 1 results.

Source: Manitoba Centre for Health Policy, 2007

Table A2.46: Variables from the *BabyFirst* form and Repository data that were significantly related to child receiving services*

Variable (item number on <i>BabyFirst</i> form)	DF	Sample 1 max_r-squared = 0.4124		Sample 2 max_r-squared = 0.4035		Winnipeg only max_r-squared = 0.4607	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models**							
Mother's age at child's birth (6)	3	197.73	<.0001	160.10	<.0001	273.74	<.0001
Mother's age at first birth (repos)	5	178.52	<.0001	152.85	<.0001	198.16	<.0001
Receipt of income assistance (repos)	1	78.66	<.0001	52.26	<.0001	119.64	<.0001
Multiple birth (15)	4	41.06	<.0001	18.33	0.0011	33.23	<.0001
Existing file with local child protective services (21)	4	32.66	<.0001	84.57	<.0001	72.63	<.0001
Income assistance or financial difficulties (8)	1	31.27	<.0001	63.14	<.0001	40.30	<.0001
Maternal smoking during pregnancy (17)	4	23.20	0.0001	24.92	<.0001	30.63	<.0001
Marital status (repos)	1	21.73	<.0001	23.62	<.0001	17.20	<.0001
Area (Winnipeg or non-Winnipeg) (repos)	1	20.69	<.0001	11.34	0.0008		
Parents' own history of child abuse/neglect (22)	4	16.77	0.0021	12.74	0.0126	14.12	0.0069
Depression in mother or father (10b)	1	14.04	0.0002	15.35	<.0001	7.10	0.0077
Area-level income quintile (repos)	4	13.77	0.0081	32.76	<.0001	58.70	<.0001
Presence of older siblings (repos)	4	11.99	0.0174	25.25	<.0001	28.85	<.0001
Anxiety disorder (19)	4	11.52	0.0213	9.53	0.0492	12.50	0.014
Infant trauma or illness (4b)	1	7.46	0.0063	13.32	0.0003	7.56	0.006
Newborn feeding (breast) at hospital discharge (repos)	1	5.85	0.0155	13.33	0.0003	23.39	<.0001
Variables significant in only two models							
Social situation (7)	3	30.16	<.0001	4.27	0.2333	11.49	0.0093
Schizophrenia or bipolar affective disorder (10a)	1	6.71	0.0096	7.63	0.0057	0.26	0.6099
Pregnancy complications due to alcohol or drug use in mother (3b)	1	5.53	0.0187	0.24	0.6234	4.67	0.0307
Low education status (13)	1	5.30	0.0214	2.18	0.1397	3.88	0.0488
Variables significant in only one model							
No prenatal class attendance (16)	4	12.51	0.0139	1.29	0.8633	3.30	0.509

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

*The variables from the *BabyFirst* screen and the Repository were entered one at a time for Sample 1 and only significant variables were retained. The final regression model was then run on Sample 2 and the Winnipeg Only Sample. We also ran separate models for Sample 2 and the Winnipeg only Sample where variables were entered and retained independent of Sample 1 regression results. Those results are found in Table A2.47 in Appendix 2.

Source: Manitoba Centre for Health Policy, 2007

Table A2.47: Variables from the *BabyFirst* form and Repository data that were significantly related to child receiving services*

Variable (item number on <i>BabyFirst</i> form)	DF	Sample 1 max_r-squared = 0.4124		Sample 2 max_r-squared = 0.4035		Winnipeg only max_r-squared = 0.4607	
		WaldChi-Square	Probability	WaldChi-Square	Probability	WaldChi-Square	Probability
Variables significant in all three models*							
Mother's age at child's birth (6)	3	197.73	<.0001	173.43	<.0001	276.49	<.0001
Mother's age at first birth (repos)	5	178.52	<.0001	156.47	<.0001	197.87	<.0001
Receipt of income assistance (repos)	1	78.66	<.0001	50.89	<.0001	116.36	<.0001
Existing file with local child protective services (21)	4	32.66	<.0001	81.41	<.0001	70.42	<.0001
Income assistance or financial difficulties (8)	1	31.27	<.0001	71.17	<.0001	37.19	<.0001
Maternal smoking during pregnancy (17)	4	23.20	0.0001	28.95	<.0001	32.83	<.0001
Marital status (repos)	1	21.73	<.0001	20.42	<.0001	17.40	<.0001
Depression in mother or father (10b)	1	14.04	0.0002	13.17	0.0003	7.68	0.0056
Area-level income quintile (repos)	4	13.77	0.0081	36.63	<.0001	60.77	<.0001
Presence of older siblings (repos)	4	11.99	0.0174	24.45	<.0001	28.91	<.0001
Anxiety disorder (19)	4	11.52	0.0213	11.23	0.0241	13.08	0.0109
Newborn feeding (breast) at hospital discharge (repos)	1	5.85	0.0155	12.34	0.0004	21.98	<.0001
Variables significant in only two models							
Multiple birth (15)	4	41.06	<.0001	ns	ns	27.06	<.0001
Social situation (7)	3	30.16	<.0001	ns	ns	9.56	0.0227
Area (Winnipeg or non-Winnipeg) (repos)	1	20.69	<.0001	8.94	0.0028	ns	ns
Schizophrenia or bipolar affective disorder (10a)	1	6.71	0.0096	7.18	0.0074	ns	ns
Pregnancy complications due to alcohol or drug use in mother (3b)	1	5.53	0.0187	ns	ns	5.10	0.0239
Low education status (13)	1	5.30	0.0214	ns	ns	4.52	0.0336
Relationship distress (14)		ns	ns	16.59	0.0023	12.99	0.0113
Mentally disabled/challenged parent (10c)		ns	ns	15.13	0.0001	6.37	0.0116
Prolonged postpartum maternal separation (11)		ns	ns	13.73	0.0002	6.18	0.0129
Apgar less than 7 at 5 minutes (4c)		ns	ns	9.15	0.0025	9.41	0.0022
Variables significant in only one model							
Parent's own history of child abuse/neglect (22)	4	16.77	0.0021	ns	ns	ns	ns
No prenatal class attendance (16)	4	12.51	0.0139	ns	ns	ns	ns
Infant trauma or illness (4b)	1	7.46	0.0063	ns	ns	ns	ns
Current substance abuse (20)		ns	ns	21.02	0.0003	ns	ns
No prenatal care before 6 th month of pregnancy (9)		ns	ns	4.07	0.0437	ns	ns

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

*These regression models were run separately for each sample. Only variables that remained significant were retained.

Table A2.48: Odds ratios for *BabyFirst* items and Repository variables that predicted receipt of services, Sample 1

Variable	Odd Ratios (95% Confidence Interval)
Income assistance or financial difficulties (8)	1.65 (1.38, 1.97)
Mother's age at child's birth (6) - 15 and under	16.28 (6.98, 37.98)
Mother's age at child's birth (6) - 16-17	11.04 (7.62, 15.99)
Mother's age at child's birth (6) - 18-19	1.00 (0.78, 1.27)
Social situation (7) - one parent family with social support	1.31 (1.10, 1.55)
Social situation (7) - one parent family without social support	1.83 (1.18, 2.84)
Social situation (7) - two parent family without social support	2.00 (1.47, 2.70)
Maternal smoking during pregnancy (17) - minimal risk	1.34 (1.11, 1.62)
Maternal smoking during pregnancy (17) - low risk	1.42 (1.16, 1.75)
Maternal smoking during pregnancy (17) - moderate risk	1.67 (0.89, 3.13)
Maternal smoking during pregnancy (17) - high risk	3.80 (1.35, 10.70)
Existing file with local child protective services (21) - minimal	2.10 (1.33, 3.30)
Existing file with local child protective services (21) - low	2.24 (1.49, 3.36)
Existing file with local child protective services (21) - moderate	1.97 (0.98, 3.99)
Existing file with local child protective services (21) - high	2.90 (1.41, 5.97)
Low education status (13)	1.20 (1.03, 1.41)
Multiple births (15) - minimal risk	0.95 (0.60, 1.51)
Multiple births (15) - low risk	1.78 (1.12, 2.82)
Multiple births (15) - moderate risk	9.75 (3.13, 30.39)
Multiple births (15) - high risk	42.63 (8.12, 223.80)
Depression in mother or father (10b)	1.58 (1.24, 2.00)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.40 (1.06, 1.86)
Parents' own history of child abuse/neglect (22) - minimal risk	0.64 (0.36, 1.14)
Parents' own history of child abuse/neglect (22) - low risk	1.49 (0.99, 2.25)
Parents' own history of child abuse/neglect (22) - moderate risk	2.08 (1.19, 3.64)
Parents' own history of child abuse/neglect (22) - high risk	2.03 (0.94, 4.41)
Infant trauma or illness (4b)	1.89 (1.20, 2.99)
Anxiety disorder (19) - minimal risk	0.56 (0.30, 1.07)
Anxiety disorder (19) - low risk	1.78 (1.02, 3.10)
Anxiety disorder (19) - moderate risk	0.60 (0.13, 2.74)
Anxiety disorder (19) - high risk	9.26 (0.89, 96.35)
Schizophrenia or bipolar affective disorder (10a)	3.02 (1.31, 6.96)
No prenatal class attendance (16) - minimal risk	0.84 (0.66, 1.08)
No prenatal class attendance (16) - low risk	1.35 (1.00, 1.84)
No prenatal class attendance (16) - moderate risk	1.00 (0.46, 2.18)
No prenatal class attendance (16) - high risk	4.64 (1.40, 15.45)
Receipt of income assistance (repos)	2.31 (1.92, 2.78)
Mother's age at first birth (0-15 yrs) (repos)	3.82 (2.70, 5.40)
Mother's age at first birth (16-17 yrs) (repos)	5.25 (3.94, 7.00)
Mother's age at first birth (18-19 yrs) (repos)	4.18 (3.20, 5.45)
Mother's age at first birth (20-24 yrs) (repos)	2.66 (2.10, 3.37)
Mother's age at first birth (30+ yrs) (repos)	1.05 (0.77, 1.45)
Marital status (repos)	1.49 (1.26, 1.76)
Area-level income (Q1) (repos)	1.43 (1.11, 1.84)
Area-level income (Q2) (repos)	1.32 (1.02, 1.71)
Area-level income (Q3) (repos)	1.08 (0.82, 1.41)
Area-level income (Q4) (repos)	1.10 (0.83, 1.45)
Newborn feeding at hospital discharge (breast) (repos)	1.21 (1.04, 1.41)
Presence of older siblings (1) (repos)	1.15 (0.97, 1.36)
Presence of older siblings (2) (repos)	1.24 (1.01, 1.53)
Presence of older siblings (3-5) (repos)	1.50 (1.18, 1.91)
Presence of older siblings (6+) (repos)	1.57 (0.80, 3.09)
Winnipeg or non-Winnipeg area (repos)	1.39 (1.21, 1.61)

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

Table A2.49: Odds ratios for *BabyFirst* items and Repository variables that predicted receipt of services, Sample 2*

Variable	Odd Ratios (95% Confidence Interval)
Income assistance or financial difficulties (8)	2.05 (1.72, 2.45)
Mother's age at child's birth (6) - 15 and under	6.88 (3.37, 14.05)
Mother's age at child's birth (6) - 16-17	10.05 (6.83, 14.81)
Mother's age at child's birth (6) - 18-19	1.01 (0.79, 1.29)
Social situation (7) - one parent family with social support	1.06 (0.89, 1.26)
Social situation (7) - one parent family without social support	1.49 (0.90, 2.47)
Social situation (7) - two parent family without social support	1.28 (0.91, 1.79)
Maternal smoking during pregnancy (17) - minimal risk	1.19 (0.98, 1.44)
Maternal smoking during pregnancy (17) - low risk	1.52 (1.23, 1.88)
Maternal smoking during pregnancy (17) - moderate risk	1.87 (1.08, 3.25)
Maternal smoking during pregnancy (17) - high risk	4.51 (1.46, 13.98)
Existing file with local child protective services (21) - minimal	3.27 (2.02, 5.28)
Existing file with local child protective services (21) - low	3.10 (2.08, 4.61)
Existing file with local child protective services (21) - moderate	2.72 (1.45, 5.10)
Existing file with local child protective services (21) - high	11.08 (4.76, 25.79)
Low education status (13)	1.13 (0.96, 1.32)
Multiple births (15) - minimal risk	0.76 (0.45, 1.26)
Multiple births (15) - low risk	1.09 (0.65, 1.82)
Multiple births (15) - moderate risk	6.21 (1.91, 20.17)
Multiple births (15) - high risk	6.21 (1.74, 22.16)
Depression in mother or father (10b)	1.62 (1.27, 2.05)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.07 (0.82, 1.39)
Parents' own history of child abuse/neglect (22) - minimal risk	1.16 (0.65, 2.06)
Parents' own history of child abuse/neglect (22) - low risk	1.39 (0.93, 2.07)
Parents' own history of child abuse/neglect (22) - moderate risk	2.72 (1.49, 4.99)
Parents' own history of child abuse/neglect (22) - high risk	1.01 (0.44, 2.29)
Infant trauma or illness (4b)	2.22 (1.45, 3.40)
Anxiety disorder (19) - minimal risk	0.38 (0.18, 0.79)
Anxiety disorder (19) - low risk	1.42 (0.81, 2.49)
Anxiety disorder (19) - moderate risk	1.62 (0.44, 5.93)
Anxiety disorder (19) - high risk	1.52 (0.27, 8.47)
Schizophrenia or bipolar affective disorder (10a)	3.23 (1.41, 7.41)
No prenatal class attendance (16) - minimal risk	0.91 (0.72, 1.16)
No prenatal class attendance (16) - low risk	0.90 (0.65, 1.25)
No prenatal class attendance (16) - moderate risk	1.12 (0.52, 2.41)
No prenatal class attendance (16) - high risk	1.45 (0.35, 6.04)
Receipt of income assistance (repos)	1.98 (1.65, 2.38)
Mother's age at first birth (0-15 yrs) (repos)	4.58 (3.28, 6.40)
Mother's age at first birth (16-17 yrs) (repos)	4.30 (3.25, 5.69)
Mother's age at first birth (18-19 yrs) (repos)	3.40 (2.63, 4.39)
Mother's age at first birth (20-24 yrs) (repos)	2.08 (1.66, 2.62)
Mother's age at first birth (30+ yrs) (repos)	1.00 (0.74, 1.36)
Marital status (repos)	1.50 (1.27, 1.77)
Area-level income (Q1) (repos)	1.76 (1.36, 2.27)
Area-level income (Q2) (repos)	1.55 (1.20, 2.01)
Area-level income (Q3) (repos)	1.28 (0.98, 1.69)
Area-level income (Q4) (repos)	1.06 (0.80, 1.42)
Newborn feeding at hospital discharge (breast) (repos)	1.33 (1.14, 1.55)
Presence of older siblings (1) (repos)	0.97 (0.82, 1.16)
Presence of older siblings (2) (repos)	1.25 (1.01, 1.55)
Presence of older siblings (3-5) (repos)	1.65 (1.30, 2.08)
Presence of older siblings (6+) (repos)	1.20 (0.64, 2.23)
Winnipeg or non-Winnipeg area (repos)	1.28 (1.11, 1.47)

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

*The variables for this model were derived from the best fitting model for Sample 1 and applied to Sample 2.

Table A2.50: Odds ratios for *BabyFirst* items and Repository variables that predicted receipt of services, Winnipeg only Sample*

Variable	Odds Ratios (95% Confidence Interval)
Income assistance or financial difficulties (8)	1.67 (1.43, 1.96)
Mother's age at child's birth (6) - 15 and under	19.88 (8.81, 44.85)
Mother's age at child's birth (6) - 16-17	30.36 (19.38, 47.54)
Mother's age at child's birth (6) - 18-19	0.91 (0.73, 1.14)
Social situation (7) - one parent family with social support	1.06 (0.91, 1.24)
Social situation (7) - one parent family without social support	1.61 (1.03, 2.51)
Social situation (7) - two parent family without social support	1.52 (1.13, 2.04)
Maternal smoking during pregnancy (17) - minimal risk	1.27 (1.07, 1.50)
Maternal smoking during pregnancy (17) - low risk	1.41 (1.16, 1.72)
Maternal smoking during pregnancy (17) - moderate risk	3.87 (1.91, 7.84)
Maternal smoking during pregnancy (17) - high risk	3.32 (0.83, 13.32)
Existing file with local child protective services (21) - minimal	2.82 (1.83, 4.35)
Existing file with local child protective services (21) - low	2.62 (1.80, 3.81)
Existing file with local child protective services (21) - moderate	2.37 (1.31, 4.27)
Existing file with local child protective services (21) - high	6.50 (3.16, 13.36)
Low education status (13)	1.16 (1.00, 1.35)
Multiple births (15) - minimal risk	0.52 (0.31, 0.86)
Multiple births (15) - low risk	0.68 (0.41, 1.13)
Multiple births (15) - moderate risk	8.47 (2.61, 27.52)
Multiple births (15) - high risk	65.32 (6.25, 683.16)
Depression in mother or father (10b)	1.34 (1.08, 1.66)
Pregnancy complications due to alcohol or drug use in mother (3b)	1.32 (1.03, 1.70)
Parents' own history of child abuse/neglect (22) - minimal risk	1.22 (0.68, 2.18)
Parents' own history of child abuse/neglect (22) - low risk	1.44 (0.94, 2.19)
Parents' own history of child abuse/neglect (22) - moderate risk	2.65 (1.41, 4.98)
Parents' own history of child abuse/neglect (22) - high risk	0.56 (0.24, 1.29)
Infant trauma or illness (4b)	1.85 (1.19, 2.87)
Anxiety disorder (19) - minimal risk	0.60 (0.30, 1.18)
Anxiety disorder (19) - low risk	1.66 (0.98, 2.81)
Anxiety disorder (19) - moderate risk	0.49 (0.07, 3.71)
Anxiety disorder (19) - high risk	12.81 (1.71, 95.91)
Schizophrenia or bipolar affective disorder (10a)	1.26 (0.51, 3.10)
No prenatal class attendance (16) - minimal risk	0.86 (0.69, 1.08)
No prenatal class attendance (16) - low risk	1.06 (0.77, 1.46)
No prenatal class attendance (16) - moderate risk	1.73 (0.57, 5.26)
No prenatal class attendance (16) - high risk	1.81 (0.33, 9.93)
Receipt of income assistance (repos)	2.52 (2.14, 2.98)
Mother's age at first birth (0-15 yrs) (repos)	3.78 (2.79, 5.12)
Mother's age at first birth (16-17 yrs) (repos)	3.98 (3.08, 5.13)
Mother's age at first birth (18-19 yrs) (repos)	3.75 (2.97, 4.73)
Mother's age at first birth (20-24 yrs) (repos)	2.34 (1.90, 2.88)
Mother's age at first birth (30+ yrs) (repos)	0.82 (0.62, 1.09)
Marital status (repos)	1.38 (1.19, 1.61)
Area-level income (Q1) (repos)	2.20 (1.65, 2.91)
Area-level income (Q2) (repos)	2.02 (1.52, 2.68)
Area-level income (Q3) (repos)	1.47 (1.09, 1.98)
Area-level income (Q4) (repos)	1.15 (0.83, 1.58)
Newborn feeding at hospital discharge (breast) (repos)	1.40 (1.22, 1.61)
Presence of older siblings (1) (repos)	0.99 (0.85, 1.16)
Presence of older siblings (2) (repos)	1.35 (1.12, 1.63)
Presence of older siblings (3-5) (repos)	1.59 (1.28, 1.99)
Presence of older siblings (6+) (repos)	1.84 (1.00, 3.39)

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

*Variables for this model were derived from the best fitting model for Sample 1 and applied to the Winnipeg only Sample.

Table A2.51: Odds ratios for *BabyFirst* items and Repository variables that predicted receipt of services, Sample 2, ideal variables*

Variable	Odd Ratios (95% Confidence Interval)
Income assistance or financial difficulties (8)	2.09 (1.76, 2.49)
Mother's age at child's birth (6) - 15 and under	7.58 (3.74, 15.34)
Mother's age at child's birth (6) - 16-17	10.61 (7.25, 15.52)
Mother's age at child's birth (6) - 18-19	1.04 (0.81, 1.33)
Existing file with local child protective services (21) - minimal	3.37 (2.09, 5.42)
Existing file with local child protective services (21) - low	3.01 (2.02, 4.47)
Existing file with local child protective services (21) - moderate	2.85 (1.52, 5.36)
Existing file with local child protective services (21) - high	9.55 (4.05, 22.53)
Maternal smoking during pregnancy (17) - minimal risk	1.21 (1.00, 1.46)
Maternal smoking during pregnancy (17) - low risk	1.57 (1.28, 1.94)
Maternal smoking during pregnancy (17) - moderate risk	1.84 (1.06, 3.18)
Maternal smoking during pregnancy (17) - high risk	5.06 (1.64, 15.62)
Current substance abuse (20) - minimal risk	0.57 (0.29, 1.11)
Current substance abuse (20) - low risk	1.01 (0.53, 1.91)
Current substance abuse (20) - moderate risk	4.33 (1.84, 10.20)
Current substance abuse (20) - high risk	2.67 (1.15, 6.22)
Prolonged postpartum maternal separation (11)	1.81 (1.32, 2.49)
Depression in mother or father (10b)	1.57 (1.23, 2.00)
No prenatal care before 6th month of pregnancy (9)	1.35 (1.01, 1.81)
Apgar less than 7 at 5 minutes (4c)	2.26 (1.33, 3.83)
Mentally disabled/challenged parent (10c)	4.73 (2.16, 10.35)
Schizophrenia or bipolar affective disorder (10a)	3.14 (1.36, 7.25)
Anxiety disorder (19) - minimal risk	0.37 (0.18, 0.77)
Anxiety disorder (19) - low risk	1.52 (0.87, 2.64)
Anxiety disorder (19) - moderate risk	1.78 (0.47, 6.76)
Anxiety disorder (19) - high risk	0.59 (0.10, 3.55)
Relationship distress (14) - minimal risk	1.27 (0.91, 1.77)
Relationship distress (14) - low risk	1.45 (1.10, 1.91)
Relationship distress (14) - moderate risk	1.73 (1.08, 2.77)
Relationship distress (14) - high risk	2.19 (1.14, 4.20)
Mother's age at first birth (0-15 yrs)	4.51 (3.23, 6.32)
Mother's age at first birth (16-17 yrs)	4.42 (3.33, 5.85)
Mother's age at first birth (18-19 yrs)	3.46 (2.67, 4.47)
Mother's age at first birth (20-24 yrs)	2.04 (1.62, 2.57)
Mother's age at first birth (30+ yrs)	1.02 (0.75, 1.38)
Receipt of income assistance (repos)	1.92 (1.61, 2.30)
Marital status (repos)	1.45 (1.24, 1.71)
Area-level income (Q1) (repos)	1.87 (1.45, 2.42)
Area-level income (Q2) (repos)	1.58 (1.22, 2.05)
Area-level income (Q3) (repos)	1.34 (1.02, 1.76)
Area-level income (Q4) (repos)	1.11 (0.83, 1.48)
Newborn feeding at hospital discharge (breast) (repos)	1.31 (1.13, 1.53)
Presence of older siblings (1) (repos)	0.98 (0.83, 1.17)
Presence of older siblings (2) (repos)	1.25 (1.02, 1.55)
Presence of older siblings (3-5) (repos)	1.64 (1.30, 2.07)
Presence of older siblings (6+) (repos)	1.18 (0.63, 2.21)
Winnipeg or non-Winnipeg area (repos)	1.24 (1.08, 1.43)

Note: Variables from the Repository are indicated by "(repos)". Variables from the *BabyFirst* form have the item number in parentheses.

*Variables for this model were derived from the best fitting model for Sample 2 independent of Sample 1 results.

Table A2.52: Odds ratios for *BabyFirst* items and Repository variables that predicted receipt of services, Winnipeg only Sample, ideal variables*

Variable	Odds Ratios (95% Confidence Interval)
Income assistance or financial difficulties (8)	2.09 (1.76, 2.49)
Mother's age at child's birth (6) - 15 and under	7.58 (3.74, 15.34)
Mother's age at child's birth (6) - 16-17	10.61 (7.25, 15.52)
Mother's age at child's birth (6) - 18-19	1.04 (0.81, 1.33)
Existing file with local child protective services (21) - minimal	3.37 (2.09, 5.42)
Existing file with local child protective services (21) - low	3.01 (2.02, 4.47)
Existing file with local child protective services (21) - moderate	2.85 (1.52, 5.36)
Existing file with local child protective services (21) - high	9.55 (4.05, 22.53)
Maternal smoking during pregnancy (17) - minimal risk	1.21 (1.00, 1.46)
Maternal smoking during pregnancy (17) - low risk	1.57 (1.28, 1.94)
Maternal smoking during pregnancy (17) - moderate risk	1.84 (1.06, 3.18)
Maternal smoking during pregnancy (17) - high risk	5.06 (1.64, 15.62)
Current substance abuse (20) - minimal risk	0.57 (0.29, 1.11)
Current substance abuse (20) - low risk	1.01 (0.53, 1.91)
Current substance abuse (20) - moderate risk	4.33 (0.84, 10.20)
Current substance abuse (20) - high risk	2.67 (1.15, 6.22)
Prolonged postpartum maternal separation (11)	1.81 (1.32, 2.49)
Depression in mother or father (10b)	1.57 (1.23, 2.00)
No prenatal care before 6th month of pregnancy (9)	1.35 (1.01, 1.81)
Apgar less than 7 at 5 minutes (4c)	2.26 (1.33, 3.83)
Mentally disabled/challenged parent (10c)	4.73 (2.16, 10.35)
Schizophrenia or bipolar affective disorder (10a)	3.14 (1.36, 7.25)
Anxiety disorder (19) - minimal risk	0.37 (0.18, 0.77)
Anxiety disorder (19) - low risk	1.52 (0.87, 2.64)
Anxiety disorder (19) - moderate risk	1.78 (0.47, 6.76)
Anxiety disorder (19) - high risk	0.59 (0.10, 3.55)
Relationship distress (14) - minimal risk	1.27 (0.91, 1.77)
Relationship distress (14) - low risk	1.45 (1.10, 1.91)
Relationship distress (14) - moderate risk	1.73 (1.08, 2.77)
Relationship distress (14) - high risk	2.19 (1.14, 4.20)
Mother's age at first birth (0-15 yrs)	4.51 (3.23, 6.32)
Mother's age at first birth (16-17 yrs)	4.42 (3.33, 5.85)
Mother's age at first birth (18-19 yrs)	3.46 (2.67, 4.47)
Mother's age at first birth (20-24 yrs)	2.04 (1.62, 2.57)
Mother's age at first birth (30+ yrs)	1.02 (0.75, 1.38)
Receipt of income assistance (repos)	1.92 (1.61, 2.30)
Marital status (repos)	1.45 (1.24, 1.71)
Area-level income (Q1) (repos)	1.87 (1.45, 2.42)
Area-level income (Q2) (repos)	1.58 (1.22, 2.05)
Area-level income (Q3) (repos)	1.34 (1.02, 1.76)
Area-level income (Q4) (repos)	1.11 (0.83, 1.48)
Newborn feeding at hospital discharge (breast) (repos)	1.31 (1.13, 1.53)
Presence of older siblings (1) (repos)	0.98 (0.83, 1.17)
Presence of older siblings (2) (repos)	1.25 (1.02, 1.55)
Presence of older siblings (3-5) (repos)	1.64 (1.30, 2.07)
Presence of older siblings (6+) (repos)	1.18 (0.63, 2.21)
Winnipeg or non-Winnipeg area (repos)	1.24 (1.08, 1.43)

*Variables for this model were derived from the best fitting model for the Winnipeg only Sample, independent of Sample 1 results.

Source: Manitoba Centre for Health Policy, 2007

APPENDIX 3: *BABYFIRST* HOME VISITING PROGRAM TABLES

Table A3.1: Results for RDD regression of association between group (Program or Comparison) and receipt of services

Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	-3.27	1.15	-5.51	-1.02	8.15	0.00
Fscgroup	1	2.39	1.17	0.09	4.69	4.14	0.04
Fsc tot25	1	-0.06	0.07	-0.20	0.08	0.72	0.40
Fscgroup*Fsc_tot25	1	0.08	0.07	-0.06	0.22	1.30	0.25
Scale	0	1.00	0.00	1.00	1.00		

Note: The scale parameter was held fixed.

Table A3.2a: Results for RDD regression of association between group (Program or Comparison), first year immunization rates

Analysis of Parameter Estimates							
Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	3.74	1.46	0.87	6.61	6.54	0.01
Fscgroup	1	-1.35	1.52	-4.33	1.62	0.80	0.37
Fsc tot25	1	0.06	0.09	-0.12	0.23	0.38	0.54
Fscgroup*Fsc_tot25	1	-0.07	0.09	-0.25	0.11	0.59	0.44

Table A3.2b: Results for RDD regression of association between group (Program or Comparison) and second year immunization rates

Analysis of Parameter Estimates							
Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	1.83	0.73	0.40	3.25	6.30	0.01
Fscgroup	1	-0.13	0.79	-1.69	1.42	0.03	0.87
Fsc tot25	1	0.03	0.05	-0.06	0.13	0.40	0.53
Fscgroup*Fsc_tot25	1	-0.05	0.05	-0.14	0.05	0.89	0.34

Table A3.3: Results for RDD regression of association between group (Program or Comparison) and continuity of care

Analysis of Parameter Estimates							
Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	0.64	0.24	0.18	1.11	7.41	0.01
Fscgroup	1	0.33	0.26	-0.19	0.84	1.57	0.21
Fsc tot25	1	0.01	0.02	-0.02	0.04	0.38	0.54
Fscgroup*Fsc_tot25	1	-0.03	0.02	-0.08	0.01	2.07	0.15
Fsc_tot25sq	1	0.00	0.00	0.00	0.00	7.48	0.01
Scale	1	0.86	0.04	0.78	0.94		

Note: continuity has been modeled as inverse for ease of modeling.

APPENDIX 4: CHANGES TO THE FAMILIES FIRST PROGRAM SINCE 2003

When the *BabyFirst* program began, universal screening of risk factors (particularly social risk factors) represented a shift in philosophy and the practice of public health. It is likely that the comfort level of the public health nurses with collecting this kind of information has increased since its introduction. In 2003 the format of the screen was changed in response to feedback from the public health nurses and emerging research; weights on items were removed to decrease subjectivity (i.e., responses to items became either “yes” or “no”) and “risk” was identified as a cumulative risk score (3 or more risk factors) rather than a score of 9 plus positive scores in Sections C and/or D. As well, some of the items changed: the question on single/dual parent status and social support was split into two questions – one on single parent status and the other on social support; parent’s history of child maltreatment was split into two questions pertaining to the mother and the father/partner; the question on Apgar scores was dropped²²; the question on birthweight and gestation has been separated into three questions—one on low birthweight, one on high birthweight and the third on prematurity; the question on alcohol or drug use by mother during pregnancy has been split into two questions—one on alcohol use, the second on drug use; the question on criminal or antisocial behaviour has been expanded into two questions: one on antisocial behaviour, the second on current or history of criminal activity by mother or parenting partner; a question has been added regarding current or history of violence between parenting partners.

RHAs across the province are currently making concentrated efforts to improve prenatal access to home visiting programs to high-risk families. The Program Standard indicates that the Families First screen should be initiated within the second prenatal contact, rather than waiting until after the child is born. This fits with research by Olds and colleagues (Eckenrode et al., 2000; Olds et al., 2002; Olds et al., 1997) that indicates that home visiting programs with vulnerable families are more effective if they are initiated during the prenatal period.

²² The question on Apgar score was found to be a significant predictor for both going into care and receiving services in some, but not all, of the regression models in this report. This suggests it might be useful to add this item back to the screen. Recording whether the 5-minute Apgar score was less than 7 would simplify this question.

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