COMPARISON OF PERINATAL HEALTH PRIOR TO AND AFTER THE NORTHERN COD FISHERY CLOSURE IN SELECTED NEWFOUNDLAND COMMUNITIES

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by

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ABSTRACT

Comparison of Perinatal Health Prior To and After the Northern Cod Fishery Closure in Selected Newfoundland Communities

This study was descriptive, retrospective, and comparative in nature and was an adjunct to the health section of an interdisciplinary study funded by the Tri-Council Eco-Research Program. The study focused on the possible impact on perinatal health of the northern cod fishery closure that occurred in select areas of Atlantic Canada in July 1992. The purpose of this study was to compare the perinatal health of women and their infants in communities in the Bonavista headland area of Newfoundland during the period 1990-1992 inclusive (pre-fishery closure, $n = 396$) and 1993-1995 inclusive (post-fishery closure, $n = 345$) to determine if there was any difference in indicators of perinatal health. Data were used from the Live Birth Notification Forms for the Bonavista headland communities obtained from the Department of Health, the Government of Newfoundland and Labrador. One of the primary objectives of this research was to identify if there was an increase in the number of low birthweight infants (< 2,500 g). The data set contained all the births in the area for the selected periods and, therefore, analysis was based on a population. Descriptive statistics were employed and results showed some differences between the two groups. Specifically, the post fishery closure group had a higher percentage of mothers beginning prenatal care earlier and experiencing pregnancy

complications. Furthermore, the mean birthweight was 88.6 g lower for this group and there was a higher percentage of infants born under 2,500 g and below 37 weeks gestation. Although no causal conclusions may be made overall, these results indicate that positive and negative differences have occurred in perinatal health since the close of the fishery. These results hold important implications for nursing on a population health level.

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CHAPTER 1

INTRODUCTION

Downturns in the economy negatively affect the health of individuals (Flemming & Cheshire, 1989; Graetz, 1993). Much of the research related to economic downturns has dealt with the general health or mental health of workers who have been directly affected by unemployment resulting from economic downturns (Buss & Redburn, 1983; Heaney, Israel, & House, 1994; Viinamaki, Koskela, Niskanen, Arnkill, & Tikkanen, 1993) and to a lesser extent the health effects on the family (Friedemann & Webb, 1995; Voydanoff & Donnelly, 1989). Miles (1987) argues that too little research has been undertaken that deals with unemployment and specific groups. Women as a group have been under represented in research on unemployment and its effects on health, although this is changing. The Provincial Advisory Group on the Status of Women (1994) identified women as a group left out of the policy and research agendas when it came to searching for information on how the cod moratorium affects people. This under representation is especially true for women during pregnancy, as well as for their infants. The purpose of this research is to address this lack of research by studying the perinatal health of women and their infants in the aftermath of the northern cod fishery closure in Newfoundland.

Background of the Study

As a result of the collapse of the northern cod stocks, the federal Government implemented a moratorium on the commercial fishing of northern cod on July 2, 1992 (Smith, 1994). For people living in Newfoundland this announcement was devastating as 40% of the landed fish in the province was northern cod. Initially the cod moratorium directly affected approximately 10,000 fishers and 12,400 plant workers in 400 communities across Newfoundland and Labrador. This loss of employment was the largest loss of jobs in the history of Canada (Storey & Smith, 1995). Many of those who lost their jobs were women who in 1987 had 40% of the employment in the fishery processing sector (Women's Policy Office, 1991). Many of these women would be 20 to 35 years of age, the prime child bearing years (Reeder, Martin, & Koniak-Griffin, 1997).

Income supplement in the form of The Atlantic Groundfish Strategy (TAGS) became the main source of income for many fishers and fish plant workers. Eligibility for this program was based on how dependent an individual was on the groundfish fishery. This was called the "duration of eligibility" and determined the length of time the person would receive financial compensation (Williams, 1996). Not all fishers and plant workers qualified for TAGS income. Furthermore, women had greater difficulty becoming eligible for TAGS and those who were eligible had a shorter duration in the program compared with men. Criteria used to qualify for TAGS made it more difficult for some women to be eligible for this program if they had less regular attachment to

fishery related jobs because of factors, such as, maternity and other family leave. It was also a relatively short-lived program and came to an end in August 1998.

This environmental disaster caused economic hardship for many more families than just those directly displaced by the moratorium. The cod moratorium created a ripple effect of negative consequences. For example, almost one in four persons who worked in the goods-producing sector in Newfoundland relied on the fishery for employment (Fisheries & Oceans, 1993). Therefore, many of these individuals also had their livelihood threatened based on the expectation that the retail trade would be directly affected as people cut back on spending. This projection is well founded in that a survey conducted by Gien and Solberg (1995) on the Bonavista Peninsula found that a large percentage of the respondents reduced spending on goods (48.2%), clothing and personal items (50.2%), entertainment (51.33%), and vacations (38.9%). Thus individuals employed in these sectors may also face unemployment.

The unemployed in an area are not the only ones whose health is affected. Those who remain employed may also suffer negative health consequences. Added work stress, possible worsening working conditions, and the fear that they may face unemployment are factors that place the employed person at risk (Svensson, 1987). The health of spouses and children is likewise affected (Kirby & Lucker, 1986). Some women who worked in the fishing industry not only have to deal with their own unemployment but have to support their families through this difficult time (The Working Group on Women's Health, 1994). Furthermore, women in the fishery worked mainly in the direct

processing sector whereas men had varied employment in this area. As a result men gained skills that made them more employable in other sectors and industries than was the case for women (Women's Policy Office, 1991).

A review of the 1996 Statistics Canada Census reveals the depressed economic state of some individuals living in Newfoundland. A comparison of the average income in 1990 and 1995 shows that in that time period in Newfoundland males 15-44 years of age had a drop in annual income of $3086. Females in the same age group, who had a lower income to start with, had a decrease in yearly income of $1500. An analysis of Bonavista, Newfoundland, a fishing community that was negatively affected by the fishery closure and within the region of this study, revealed an unemployment rate of 41.8% in 1995 compared with the provincial rate of 25.1%. Furthermore, the average 1995 total income of individuals in this community 15 years and older was $3000 less than the provincial average.

A large interdisciplinary project entitled *Sustainability in a Changing Cold Ocean Coastal Environment* at Memorial University of Newfoundland was conducted in response to the closure of the northern cod fishery. It had as the primary objective to identify factors needed to attain sustainability of communities in cold ocean coastal areas (Ommer, 1998). In particular, the health section of this study explored how the northern cod fishery crisis affected the health of individuals and communities in the headland of the Bonavista Peninsula and the Isthmus of the Avalon Peninsula (see Appendix A for the map of the study area). Objectives of this section included assessing individuals'

perceptions of the meaning of the crisis and its effect on the physical and psychological health of people, identifying what impact the crisis had on the roles and interactions of family members, and finally identifying coping strategies, coping patterns, and factors that aided in positive coping. The present study is part of that larger study and will specifically examine how the crisis may have affected women's and their infants' perinatal health.

Rationale for the Study

The population health approach presents a framework of interrelated factors that are viewed as determinants of health. The population health approach focuses on "the entire range of individual and collective factors and conditions, and the interactions among them, that determine the well-being of Canadians" (Health Canada, 1996, p.4). One of the assumptions underlying this approach is that by targeting interventions at the entire population, or significant sub-populations, rather than individuals, it is possible to achieve important health gains. However, in order to design targeted interventions it is necessary to understand the health status of the population or sub-groups and what may be determining their health status.

With the changes in the health care system occurring within the context of health care reform, it is recommended that health professionals focus on health promotion, increased community involvement, and the social determinants of health (Reutter & Ford, 1998). As nurses interact with groups in various settings in the community they are able to identify some of the effects of the social determinants of health on the health status of

the population. The identification of the determinants of health that put a population at risk for adverse health effects enables nurses to shape policy and emphasize programs that focus on having a positive impact on these determinants. Community health nurses frequently work at the population level, designing and carrying out interventions to improve health. Maternal and child health programs are among the targeted programs that community health nurses carry out in a community. In order to design programs that are relevant to that particular group, it is important that the community health nurse knows the health status of that group and what may be affecting their health. Policy and programs that focus on population health will then act to empower and encourage citizens to become responsible for their own health (Halbert et al., 1993).

Key determinants of health are income and social status, social support networks, education, employment/working conditions, social environments, physical environments, personal health practices and coping skills, healthy child development, biology and genetic endowment, health services, gender, and culture (Health Canada, 1996, pp. 15-16). The northern cod crisis has negatively affected several, if not all of these determinants of health. A pregnant woman living in the study area who experiences these negative effects may in turn affect another determinant of health - healthy child development.

Increasingly, research is demonstrating that the effect of prenatal and early childhood experiences is strong and can have a detrimental influence on individuals throughout their lives (Advisory Committee on Population Health, 1994). Furthermore,

low birthweight is regarded as the primary cause of perinatal mortality and contributes to more than 50% of long term neurological problems (Goldenberg, 1994). The prevention of low birthweight is one of the most important issues in perinatal care in Canada and throughout the world (Canadian Institute of Child Health, 1992; Paneth, 1995). According to Schwartz (1990) defining risk factors and evaluating strategies for preventing low birthweight and other perinatal risks are vital. Therefore, it would be important to see if there is an increase in the number of infants with low birthweight.

During periods of high unemployment and economic uncertainty there is an increase in the stress experienced by many of the people affected. Stress during pregnancy can increase the uncertainty of the outcome for the mother and her infant and may increase anxiety to the degree that family and interpersonal relationships are influenced (Mercer, Ferketich, DeJoseph, May, & Sollid, 1988). If pregnant women in Newfoundland and Labrador are experiencing greater stress and uncertainty and a lower socioeconomic status, an increase in negative perinatal health outcomes including the rate of low birthweight infants may occur. Since low birthweight infants are more likely to have long term health problems, there would be a greater burden on families and society to care for these children (Canadian Institute of Child Health, 1994). The nurse's role in these circumstances would be to determine if healthy child development is at risk so public policies and programs can be developed that address this negative effect and support and empower individuals in maintaining and achieving health. However, in order

to take these actions nurses need to know if there are any differences in the health status of mothers and their infants after an economic downturn occurs.

Purpose of the Study

The purpose of this study is to compare the perinatal health of women and their infants during the period 1990 to 1992 inclusive (pre-fishery closure) with that of the period 1993 to 1995 inclusive (post-fishery closure) to determine if there are any differences in selected demographic variables, pregnancy characteristics, labour and delivery characteristics, the number and type of complications, and infant characteristics. One of the primary objectives of this research is to identify if there is an increase in the number of low birthweight infants (infants weighing less than 2,500 g at birth) which is a sensitive indicator of perinatal health (Canadian Institute of Child Health, 1992).

Research Questions

The main research question guiding this study asks if there is any difference in the perinatal health of mothers and infants immediately prior and after the fishery closure in the Bonavista headland area of Newfoundland. The specific questions are:

1. Are there differences in selected sociodemographic characteristics of parents of live births recorded prior to and after the fishery closure?
2. Are there differences in the pregnancy characteristics of mothers of live births recorded prior to and after the fishery closure?
3. Are there differences in the type and number of pregnancy complications among live births recorded prior to and after the fishery closure?

4. Are there differences in labour and delivery characteristics of live births recorded prior to and after the fishery closure?

5. Are there differences in the type and number of labour and delivery complications among live births recorded prior to and after the fishery closure?

6. Are there differences in the condition of the infant at birth (Apgar scores, birthweight, gestation, neonatal injury, and congenital anomalies) in infants born prior to and after the fishery closure?

Definitions of Terms

There are a number of terms important to the present study. These terms and their definitions are as follows:

Perinatal period: The period from 22 completed weeks of gestation to seven completed days after birth (World Health Organization, 1993).

Pregnancy characteristics: These are data collected on the Live Birth Notification Form (LBNF) and include the use of prenatal care, trimester that prenatal care began, whether or not the woman was followed by a specialist, and which trimester of her pregnancy specialist consultation began.

Complications of pregnancy: These are data collected on the LBNF and include, but are not limited, to the following conditions that occur during pregnancy: pregnancy induced hypertension, antepartum hemorrhage, gestational diabetes, anemia, and intrauterine growth retardation (IUGR).

Labour and delivery characteristics: These are data collected on the LBNF and include type of birth (single, twin, or triplet), delivery presentation, mode of delivery, and induction of labour.

Labour and delivery complications: These are data collected on the LBNF and include but are not limited to the following conditions that occur during labour and delivery: obstruction, premature rupture of membranes (PROM), prolonged labour, malposition/malpresentation, hypertensive conditions, and hemorrhage during delivery.

Low birthweight: Less than 2,500 g regardless of gestational age (World Health Organization, 1993).

Gestational age: Number of weeks gestation. Full term gestation is 38-40 weeks (World Health Organization, 1993).

Premature Infant: An infant born before completing 37 weeks gestation (World Health Organization, 1993).

Apgar score: A system that employs a numerical rating (range 0 to 10) to determine the condition of the infant at one and five minutes after birth based on heart rate, respiratory effort, muscle tone, reflex irritability, and colour (Reeder et al., 1997).

Conceptual Framework

The conceptual framework for the study is based on possible interrelationships of selected determinants of health that may be affected by the current economic crisis brought on by the moratorium of the northern cod fishery and that may result in adverse outcomes in perinatal health of women and their infants (See Figure 1). A review of the literature on perinatal health during adverse situations, such as an economic crisis, risk factors associated with low birthweight, and fisheries crises supports these relationships and are explored in greater detail in the review of the literature. The framework constructed by the author provides an understanding of the possible effects of an economic crisis on perinatal health. It is not a model to test relationships as the study is limited to data on perinatal health outcomes.

The northern cod fisheries closure is viewed as the stimulus that caused the economic crisis and negatively affected some of the social determinants of health resulting in possible adverse perinatal health outcomes. This crisis has caused individuals to lose their jobs (Storey & Smith, 1995) and for others it has caused reduced job security (Fisheries & Oceans, 1993). As a result of the crisis, individuals are experiencing increased stress and lower socioeconomic conditions (Gien & Solberg, 1995). The variables of stress and socioeconomic conditions are interrelated; as a person's socioeconomic status decreases their stress level may increase. The variables of economic crisis, increased stress, and lower socioeconomic conditions can result in

Figure 1. Conceptual framework explaining the effect of an economic crisis on perinatal health.

adverse perinatal health outcomes (Gould & LeRoy, 1988).

Increased stress from unemployment results in greater financial concerns (Gien & Solberg, 1995), increased smoking and drinking (Canadian Public Health Association, 1996), increased family violence (Brinkley, 1995; Jentoft, 1993), and an increased risk of physical and mental disorders (Canadian Public Health Association).

For women, the literature shows that individuals have a loss of their support network (Extension Community Development Cooperative (ECDC), 1993; Williams, 1996) and increased responsibility in relation to their household role as a result of unemployment (Jentoft, 1993). As well, pregnant women may, because of the stress of unemployment, exhibit negative maternal health behaviours such as smoking and not seeking antenatal care (Golding, Thomas, & Peters, 1986).

Several outcomes of lower socioeconomic conditions for individuals and families were identified from the literature that have a direct effect on perinatal health. These include poor nutrition (Brzezinski & Szamotulska, 1994) and more adolescent pregnancies (Gould & LeRoy, 1988). Economic crises and the resulting increased stress and lower socioeconomic conditions have been shown in the literature to be related to poor perinatal health. Specifically, the following outcomes have been identified; complications of pregnancy (Gudmundsson, Bjorgvindottir, Molin, Gunnarsson, & Marsal, 1997; Norbeck & Tilden, 1983), lower birthweights (Manitoba Centre for Health Policy & Evaluation, 1991), more premature births (Wilkins, Sherman, & Best, 1991), lower Apgar scores (Gudmundsson et al.) and less prenatal care (Gould & LeRoy).

CHAPTER 2

LITERATURE REVIEW

The goal of this review of the literature is to provide an overview of the possible effects of changes in the social determinants of health on the perinatal health outcomes of women and their infants and to relate these where possible to economic crises. The main research covered is that related to selected social determinants of health, such as poverty or low income, employment status, stress and coping skills, social support, and their effects on perinatal health. These are the determinants that might be most affected by an economic crisis. The review will also contain research that has examined risk factors associated with low birthweights and effects of fishery crises on the health of individuals in the community and what effects it may have on women. There is a large amount of literature on infant mortality, however, since morbidity, not mortality is the focus of this study, literature related to infant mortality is not included in this review.

Social Determinants of Health and Effects on Perinatal Health

Maternal and infant health have long been the concern of governments and social reformers alike. We measure our progress as a society and the standard of our health care system, among other health indicators, on how low our infant and maternal mortality and morbidity rates are (York & Brooten, 1992). As a consequence, a great deal of research has been conducted on factors associated with poor perinatal health. In particular, much of what we know on perinatal health outcomes is from work on women experiencing

pregnancy in adverse socioeconomic circumstances; women with low income and lower socioeconomic status.

Income and social status

It has been shown that as a person's income decreases, their health status also decreases (Walters, Lenton, & McKeary, 1995). It is not surprising then that income and social status are determinants of health. Consequently, a pregnant woman's health status may be negatively affected by a decrease in her socioeconomic level. In the Western world during the past hundred years, there have been considerable improvements in fetal and infant mortality which are mainly a result of an increase in socioeconomic level (Cnattingius & Haglund, 1992). Poor birth outcome and increased mortality in the first year of life were found to be some of the results of poverty or very low income (West, Bavington, James, Ryan, & Longerich, 1996). Specifically, perinatal morbidity and mortality was twice as high in low income groups as compared to high income groups (Angus & Turbayne, 1995). Many studies have shown that poverty negatively influenced perinatal health and birth outcome (Bakketeig, Cnattingius, & Knudsen, 1993; Berkowitz, 1981; Elbourne, Pritchard, & Dauncey, 1986; Fedrick & Adelstein, 1978; Lieberman, Ryan, Monson, & Schoenbaum, 1987; Wilkins et al., 1991). As well, these findings have held across a variety of countries, that have found a link between low income and birth outcome.

Early research by Berkowitz (1981) that demonstrated the effect of lower socioeconomic status on perinatal health was from a case control study of preterm

deliveries in Connecticut. The sample included 175 mothers of singleton preterm births and 313 mothers of singleton term births. Socioeconomic status was classified using Hollingshead's two-factor index of social position. The researcher found that one of the significant risk factors for preterm birth was low socioeconomic status. The results showed that women who delivered a preterm infant were more likely to be young, single, and of low socioeconomic status.

A large-scale study by Elbourne et al. (1986) compared three perinatal data bases in England ($n = 16,841$). The purpose of the study was to examine geographical area and social class differences in perinatal outcome and any associated factors. The social class of the women was based on the occupation of their husbands. Women who were not married were placed in a separate category. Results showed that women who were in a lower socioeconomic class were more likely to have premature deliveries and lower birthweight babies.

Gould and LeRoy (1988) conducted a study that examined the relationship between socioeconomic status, low birthweight, and inadequate prenatal care in Los Angeles County. They had two groups in the study: black infants and their mothers and white infants and their mothers. The researchers found that for both groups the deterioration of socioeconomic status (mean income) was associated with an increase in the percentage of teenage mothers, of mothers with no or only third trimester or unknown prenatal care, and in the rate of low birthweight infants. The research only considered two risk factors - adolescence and lack of prenatal care. Other factors such as marital

status, education, and parity were not taken into consideration.

A study conducted in Boston by Lieberman et al. (1987) focused on the risk factors that accounted for differences in the rate of premature births between black and white women. The sample consisted of 8,903 women. Medical and socioeconomic risk factors were studied to determine the increase of premature births among black women. Economic, demographic, and behavioural risk factors for prematurity were investigated (age less than 20 years, single marital status, welfare recipient, and not having completed high school). Results showed that the presence of one of these risk factors increased the chance of having a premature infant from 4.7% to 7%. If two of these risk factors were present the risk increased to 11.2%.

Collins and David (1990) studied the effect of traditional risk factors on infant birthweight among blacks and whites in Chicago. Records from 103,072 births that occurred in 1982 and 1983 were analyzed along with census data of median family income. The association between residential environment and pregnancy outcome was explored. Results showed that among all mothers, low income was associated with a higher risk of low birthweight.

Several Canadian studies discussed below supported that low income is associated with higher rates of low birthweight. Computerized hospital records were the source of data for a study conducted in Manitoba by the Manitoba Center for Health Policy and Evaluation in 1991. Records were studied for six alternate years between 1979 and 1989. This data included discharge diagnoses, surgical procedures, length of stay, maternal

parity, number of previous pregnancies, duration of gestation, risk assessment scores established during prenatal care, the number of episodes of prenatal care, and whether a referral was made to a regionalized high risk fetal assessment unit. Newborn birth records were also employed. Data on the average household income were obtained from the 1986 census. The results showed that urban women from the lowest income neighbourhoods had a low birthweight rate of 57.8/1,000 births compared to women from wealthier areas who had a low birthweight rate of 39.5/1,000 births. As the level of income increased so did the birthweight. This trend was not seen in women who lived in rural areas.

The findings in Manitoba were congruent with other areas of Canada. Wilkins et al. (1991) studied 219,470 live births in Canada in 1986. Information included on the birth registration was used to determine the census tract where the mother lived. Data were also obtained for 1,650 infant deaths in 1986. This information was then used to calculate rates of infant mortality, low birthweight, very low birthweight, prematurity, small for gestational age, and total fertility. The percentage of low-income women was strongly related to these birth outcomes; as the rates of low income increased so did the unfavourable outcome. Another Canadian study based in London, Ontario by Crosse, Alder, Ostbye, and Campbell (1997) found that income was a good indicator of low birthweight. Using multiple regression and comparing census tracts of close to 20,000 births from 1984-1989 these researchers found that low income explained 54% of the inter-area variation in birthweight.

A population-based study of the Central West Region of Ontario looked at trends and variation in perinatal mortality and low birthweight of live births and the association of socioeconomic variables (Luginaah, Lee, Abernathy, Sheehan, & Webster, 1999). Births from 1988-1995 (approximately 28,000 births per year) were analyzed. Results showed that while there was no significant change in perinatal mortality, the low birthweight rate increased from 49.7 to 54.8 per 1,000 births and the prematurity rate increased from 56.1 to 75.8 per 1,000 births. The researchers contend that these results may be indicative of the health and social welfare environment of Ontario where there is a decrease in social assistance, a need for more health care professionals that would deliver prenatal care, and a need for more comprehensive prenatal programming. Furthermore, the researchers argue that the decrease in economic prosperity may also be playing a role in the increased rate of low birthweight and prematurity.

Similar findings were also seen in Scandinavia where there was a large decrease in infant mortality in the twentieth century (Bakketeig et al., 1993). This was attributed to an improvement in health care and the standard of living. Pregnant women in Scandinavia, regardless of socioeconomic differences, utilized health care to similar degrees. This led to the conclusion that socioeconomic differences only had a small effect on birth outcome. Medical birth records and census data in Denmark, Norway, and Sweden were used and these researchers examined over 100,000 births in each country. The number of years of education was used as a basis for socioeconomic level. Results showed that negative pregnancy outcomes such as low birthweight and perinatal death

were closely related to socioeconomic status and parental education. When birthweight was considered as an outcome, infants born to parents who had lower levels of education weighed 122 g less then the average birthweight of 3,575 g. These authors proposed that more research was needed in the area of social variables and health.

Another Swedish study conducted by Gudmundsson et al. (1997) had similar findings. Data for this study were obtained from a perinatal and delivery database for the region for 7,056 deliveries. The outcome of the pregnancy was related to socioeconomic characteristics. Results showed that for lower income groups the maternal age was lower, parity and number of abortions was higher, and perinatal complications were higher such as low birthweight, small for gestational age, maternal anemia, infections and low Apgar scores at one and five minutes, and PROM. The authors argued that these findings showed that although prenatal care was free for all socioeconomic levels in Sweden, if birth outcome was to improve in the lower income group "antenatal surveillance should be intensified" (p. 318).

Roberts (1997) studied community level indicators such as economic hardship, socioeconomic status, and median rent in Chicago to determine if there was an association with these and low birthweight. Data were obtained from vital records and included information regarding birthweight, maternal characteristics, and characteristics of the community where the mother lived. The total sample was 131,457 births to residents in 1990. Economic hardship was defined as the percentage of unemployed adults and the percentage of families living in poverty. Results showed that economic

hardship was associated with low birthweight and was the highest risk factor after race.

In summary, lower socioeconomic status has been shown to be a risk factor for adverse perinatal health conditions. In particular a number of studies have linked poor socioeconomic conditions with lower birth weight, premature deliveries, and less prenatal care. An increase in births to teenage mothers has also been linked to lower socioeconomic status.

Employment status

A second determinant of health is employment status. A number of researchers have linked employment status, specifically unemployment, with adverse perinatal health outcomes (Cornu et al., 1995; Golding et al, 1986; Stein, Campbell, Day, McPherson, & Cooper, 1987). However, some studies were located that did not demonstrate this association.

A study conducted in Britain by Golding et al. (1986) considered how the father's employment status affected the health of the fetus. Birth survey records obtained in 1970 were used and 15,037 deliveries were studied. Of this total number, in 3.5% of the households the father was unemployed at the time of delivery. No significant difference was found in the outcomes of preterm delivery, low birthweight, or perinatal death. However, a significant difference was found regarding maternal behaviour. For example, wives of unemployed husbands were less likely to know the date of their last menstrual period, to seek antenatal care in the first two trimesters or enroll in prenatal classes, and more likely to smoke during their pregnancy. This study also made a comparison between

those whose husbands were employed at the time of delivery and were able to remain employed for five years after the birth and those whose husbands became unemployed after the birth. Findings showed that the unemployed group at the time of delivery and the group that became unemployed after delivery were similar in that both groups showed a low complication rate but demonstrated similar negative health behaviours. The researchers argued that the findings implied that maternal health behaviour may be linked to her husband's "ability or determination" to remain employed (p.708).

Similarly, a study by Catalano, Hansen, and Hartig (1999) focused on how a quarterly rise in the unemployment rate among males affected the low birthweight rate in Norway and Sweden. Studying quarterly births from 1973-1995 (sample size of approximately 13,000) these researchers found that increases in unemployment among males were associated with an increased risk of very low birthweight infants.

Another study supported the finding that unemployment and low income resulted in an unfavourable birth outcome. Stein et al. (1987) used a prospective study of 483 women and examined whether or not any association existed between social and psychiatric factors and low birthweight and preterm delivery. Fourteen of these women had infants who were less than 2,500 g. They found that low income was an independent predictor of birthweight when birthweight was a continuous and dichotomous variable. As well, unemployment was associated with absolute low birthweight. None of the factors were associated with length of gestation. The small number of low birthweight infants limited the interpretation of these findings. Although this research did not support

studies that found an association between social class, social adversity, psychiatric morbidity, and low birthweight, the authors argued that low income may be an important factor that connected social adversity and low birthweight.

An economic crisis provided the main context for a study by Whiteford (1993) to explore the relationship between employment and perinatal health. This researcher, a medical anthropologist, studied perinatal health in the Dominican Republic in the midst of an economic crisis that began there in the early 1980s. This crisis caused unemployment, underemployment, malnutrition, and maldistribution of resources. In 1986, 56% of the total labour force was unemployed. Data for this study were obtained from first hand observations over several years, key informants, and analysis of economic and health indicators. Results showed that both direct and indirect effects on health were seen. Indirect effects were described as changes in nutritional patterns, increased nutritional risk, and increased rate of infectious diseases. The author argued that these effects would eventually cause an increase in mortality among women and children. Direct effects on health were seen in higher unemployment, decreased wages, increased prices, and decreased government support for public health.

A retrospective study conducted by Brzezinski and Szamotulska (1994) focused on the widening gap in low birthweight rates between social groups in Poland between 1985 and 1990. In this time frame there was an increase in the low birthweight rate from 8.1% in 1985 to 8.4% in 1990. Results showed that the highest increase in low birthweight occurred in mothers who had a low education and this was especially true of

mothers who lived in urban areas. Analysis of urban mothers who only had a primary level education showed an increased incidence of low birthweight from 14.7% in 1985 to 16.2% in 1990. Analysis of mothers who had the same level of education but resided outside urban areas showed an increased rate of low birthweight from 10.6% in 1985 to 12.5% in 1990. When the mothers' age, parity, education, and place of residence were controlled there was no change in the significance of the increase in low birthweight. The authors suggested the increased rate of low birthweight may have resulted from a decrease in nutrition among lower income groups.

Catalano and Serxner (1992) studied the effects of job insecurity on low birthweight in two different areas of California. The first area was Sacramento where a threatened reduction in government employees was occurring in 1978. Using time series methods, birthweight was studied for a 59-month period. The second area was Los Angeles where the association between unexpected high periods of unemployment and birthweight for a 159-month period was studied. Results from both sites showed that white males without Spanish surnames and Spanish-surname males were at an increased risk of low birthweight during periods of economic insecurity. The researchers suggest that these findings indicate that the maternal anxiety caused by unexpected unemployment can increase low birthweight among this group.

Cornu et al. (1995) studied how an economic crisis in the Congo in 1986 affected nutrition and the subsequent birth outcomes. They studied an urban community between the time period 1986 and 1991. The primary objective was to identify groups that have

suffered decreased nutritional status as a result of the crisis, however, they also examined perinatal health. Two cross sectional surveys were conducted on a representative sample. Data analysis showed a dramatic increase in the percentage of low birthweight infants, from 10.2% in 1985 to 18.7% in 1990.

Two studies found no association between unemployment and low birthweight. Research conducted by Joyce (1989) did not support an hypothesis that unemployment had a negative impact on birth outcome. Data for this study included monthly vital statistics for New York City through January 1970 to December 1986. There was an average of 100,000 births a year for each of the study years. The employment-population ratio for New York City was used as the source of employment data. Overall, the results showed that changes in the unemployment rate did not have a negative effect on birth outcome. However among blacks, as the unemployment rate increased, the low birthweight rate decreased. This last finding may be related to the kind of jobs they had as employment that is physical and requires long hours of standing can contribute to low birthweight. If they were no longer employed in these positions their risk for low birthweight would decrease.

Najman, Morrison, Williams, Keeping, and Anderson (1989) also found no direct association between unemployment and low birthweight. These researchers used a longitudinal study design and studied 8,168 pregnant women in Australia who were divided into groups based on their own and their partner's employment status. The four groups included mother unemployed, partner employed; mother employed and partner

unemployed; mother and partner unemployed; and both mother and partner employed. Results showed that the three groups that had one or both partners unemployed did not have higher rates of preterm delivery. The mean unadjusted birthweight of the unemployed groups was 50 - 100 g lower than the group that had both partners employed. When both the woman and her partner were unemployed there was a greater risk of having a low birthweight or small for gestational age infant. This may have indicated that unemployment can influence lifestyle choices such as smoking that would, in turn, influence birth outcome. These researchers contended that knowledge of the employment status of both parents was important in "understanding the outcome of a pregnancy" (p.311).

The relationships between unemployment and perinatal health outcomes are less definitive. Some researchers have found no direct effects between the mother's unemployment status and unfavourable health outcomes for the newborn. Others have found an indirect relationship; women of unemployed men sought prenatal care later. One of the effects of unemployment is that the woman may have had poorer nutrition than those with higher incomes.

Stress and coping skills

A third determinant of health is coping skills. Significant life crisis and stress in the absence of adequate coping skills has been linked to low birthweight (Canadian Institute of Child Health, 1992). For stress to have an adverse effect on birthweight suggests some women do not have adequate coping skills or their stress exceeds the limit

of their coping. The belief that emotional factors contributed to obstetric problems had its beginning in folk wisdom and western cultural traditions. However, few studies have been conducted in the last twenty-five years on the topic of stress, anxiety, and birth outcome (Istvan, 1986). Stress has been described as an "evolving risk" (Yawn, 1990, p. 8). Maternal stress has been postulated to bring about catecholamine stimulation and in the preterm pregnancy can be accompanied by alpha adrenergic stimulation, increased muscle tone, vasoconstriction, and uterine contractions.

Several studies found that anxiety can have an impact on birth outcome. Nuckolls, Cassel, and Kaplan (1972) studied life crisis, psychosocial assets, and pregnancy. The sample in this study consisted of 172 white primigravidas married to enlisted men. The Adaptive Potential for Pregnancy Questionnaire (TAPPS) was used to measure psychosocial assets and included the categories of self, marriage, extended family, social resources, and definition of pregnancy. They found that women who experienced increased life change and had high psychosocial assets had only one third the pregnancy complication rate of women who scored low on psychosocial assets. When life change was removed from the equation there was no significant relationship between psychosocial assets and complications. Since life change for women affected by the fishery crisis may have came from strain at home or for those who were still working from strain in the workplace, studies that addressed anxiety and perinatal health outcomes were reviewed.

Cooper et al., (1996) used a prospective research design to study whether poor

psychosocial status in pregnancy was associated with prematurity and low birthweight. Various measures of psychosocial status (anxiety, stress, self-esteem, mastery, and depression) were assessed between 25 to 29 weeks gestation in 2943 pregnant women. Results showed that stress was significantly associated with preterm birth and low birthweight.

Two studies were identified that considered the relationship between anxiety in the home and in the workplace and birth outcome. Pritchard and Mfphm (1994) studied preterm birth, low birthweight, and the stressfulness of the household role for pregnant women. The results of this study showed that the rates of low birthweight and preterm birth increased with increased levels of strain at 20 and 30 weeks. Strain at 20 weeks was significantly associated with both preterm birth ($p < 0.05$) and low birthweight.

Henriksen, Hedegaard, and Secher (1994) studied the relationship between psychosocial job strain and job control and preterm delivery and low birthweight for gestational age. The sample included 3,503 Danish women with singleton pregnancies between 1989 and 1991 who worked at least 30 hours a week during the first trimester. Interviews were conducted at 16 weeks gestation to determine medical and obstetric history, psychosocial and lifestyle factors, and occupational exposures. From this, four exposure categories were determined: relaxed jobs (low demand and high control), passive jobs (low demand and low control), active jobs (high demand and high control), and high-strain jobs (high demand and low control). Results showed that women who had the least chance of having a low birthweight infant were women with passive jobs.

However, none of the findings were statistically significant. The researchers contended that this result might have been attributed to the strong support system in this country and the presence of few other occupational hazards.

The findings of Stein et al., (1987) conflicts with other research. These researchers found that social class, adverse life events, long-term social difficulties, and psychiatric states were not associated with birth outcome. Likewise, Doucet, Baumgarten, and Infante-Rivard (1992) found similar results. They studied the risk of low birthweight and prematurity among foreign-born mothers. They hypothesized that emotional distress experienced by immigrants would place these women at risk for poor pregnancy outcomes. Immigrant women were divided into three groups based on the amount of time they had lived in Canada (less than a year, 1-3 years, and more than 3 years). Comparisons were also made with Canadian-born mothers. Findings showed that immigrant women were not at higher risk for having low birthweight or premature infants.

Stress has been demonstrated to be associated with complications of pregnancy, preterm birth, and low birthweight infants in some research but not in others. One of the mediating factors thought to influence the relationship between stress and adverse perinatal health is coping skills. Women with good coping skills have better perinatal health outcomes than those with poorer skills.

Social support

Some studies were located on the relationship of social support and stress and the effect on birth outcome. Norbeck and Tilden (1983) used Sarason's model of stress and a multivariate approach to determine the effects of selected psychosocial variables on pregnancy complications. The sample consisted of 117 medically normal women without preexisting medical risk factors. This study hypothesized that high life stress, low social support, and high emotional disequilibrium were positively related to complications of pregnancy. Complications of pregnancy were defined as difficulties during gestation, problems of labour and delivery, and complications in the infant. Emotional disequilibrium included variables of anxiety, depression, and low self-esteem. Pregnancy complications were obtained from a chart review. Using discriminant analysis, they found that only parity and life stress were significantly related to complications of pregnancy. The interaction of life stress during pregnancy with tangible support factors was significant for each type of complication. The interaction explained 7.4% of the variance in gestation complications, 5.7% in labour and delivery complications, and 9.1% in infant condition complications. Furthermore, infants in the high stress/ low support quadrant had the highest rate of complications. A limitation of this study was that the sample included predominantly middle class white women (61%).

Norbeck and Anderson (1989) attempted to extend the findings of Norbeck and Tilden (1983) to a population of lower socioeconomic women from three ethnic groups.

This study hypothesized that as life stress increased, complications of pregnancy would increase and gestational age, birthweight, and Apgar scores would decrease. It was also hypothesized that a low degree of social support would be related to a decrease in gestational age, birthweight, and Apgar scores. Findings indicated that for the black and Hispanic groups, life stress was not a significant indicator of pregnancy complications. However, it was found that white women who had high stress and high support had longer labours, greater rate of cesarean sections, and were more likely to be smokers.

Factors Associated with Low Birthweight

Most of the research in relation to perinatal health and birth outcome has focused on risk factors associated with low birthweight as low birthweight infants are at greatest risk for long-term health problems such as cerebral palsy. As a result of the large amount of research in this area, this section of this literature review is limited to studies that have focused on risk factors for low birthweight in the last ten years.

Individual risk factors for low birthweight included demographic, medical, behavioural, environmental, and health care risks (York & Brooten, 1992). These factors are closely linked with the key determinants of health in that possession of any one of these risk factors indicates that one or several determinants of health are negatively impacted. The Canadian Institute of Child Health (1992) has identified some of these risks as being modifiable. They include smoking, nutrition, use of alcohol and other drugs, poverty, stress and lack of social support, teenage pregnancy, type of occupation, and amount of prenatal care. An interaction of multiple factors occurs to cause low

birthweight. For example, a pregnant woman from a low socioeconomic class may have both poor nutrition and less prenatal care. Thus, all three of these factors could contribute to low birthweight.

Demographic risks

Demographic factors have been associated with increased risk in pregnancy. Age of mother less than 14 and greater than 45 years, race (black), low socioeconomic status, marital status (unmarried), low level of education, and geographic location were all demographic risks associated with low birthweight (Gould & LeRoy, 1988; Moore, et al, 1994; Stein et al., 1987; York & Brooten, 1992). O'Callaghan, Harvey, Tudehope, and Gray (1997) studied 84 small-for-gestational-age infants and 81 controls and found that low parental education and unemployment were higher in the study group. DuPlessis, Bell, and Richards (1997) studied the impact of age and race on pregnancy outcomes and found that females between the ages of 10 and 13 years were 2.5 times more likely to have a low birthweight infant and 3.4 times more likely to have a preterm birth.

Behavioural risks

Behavioural risk factors that predisposed a woman to having a low birthweight baby include smoking, poor nutrition, and substance abuse (Yawn, 1990). Smoking has been established as the most preventable factor associated with low birthweight and was independent of other factors such as socioeconomic status and maternal age (Canadian Institute of Child Health, 1993). Nandi and Nelson (1992) reported that women older than 30 years who smoked and were underweight were at high risk for having low

birthweight babies. O'Callaghan et al. (1997) also found that maternal smoking was significantly associated with small for gestational age infants. As well, it was reported that the effect of stress on intrauterine growth was small compared to the effect of smoking (Brooke, Anderson, Bland, Peacock, & Stewart, 1989). Other studies that have identified smoking as a risk factor for low birthweight include Faden, Graubard, and Dufour (1997) and Meis et al. (1997). Furthermore, Faden et al. found that women who drank more also smoked more, were less educated, and younger than women who drank less.

Poor nutrition is also a behavioural risk factor for low birthweight. James, Nelson, Ralph, and Leather (1997) studied nutrition as a socioeconomic determinant of health. They argued that the diet of lower socioeconomic groups tended to include a high intake of foods such as meat products, full cream, fats, sugars, preserves, potatoes, and cereals and a low intake of vegetables, fruits, and wholewheat bread. As a result of this type of diet there was a low intake of calcium, iron, magnesium, folate, and vitamin C. Furthermore, the nutritional requirement for women is different than children and men because of the demands placed on their bodies by menstruation, childbearing, and menopause. These high demands placed on women combined with poor nutrition causes them to be at risk for poor health outcomes (The Working Group on Women's Health, 1994). The health survey conducted as part of the sustainability project in the Bonavista area showed that people had decreased spending on food and groceries (Gien & Solberg,

1995). This may, in turn, have affected the nutritional intake of pregnant women in this area and thus, have a negative impact on the outcome of their pregnancies.

Medical risks

Medical risks that predisposed women to having low birthweight infants included primipara or grand multipara, being underweight, genitourinary abnormality, chronic diseases, nonimmune status for rubella, poor obstetric history, and maternal genetic factors (Canadian Institute of Child Health, 1993; Yawn, 1990). Of these risk factors, multiple births accounted for 16% of all low birthweight babies in Canada (Canadian Institute of Child Health). Many of these risks, such as rubella, status and control of chronic illnesses such as diabetes, can be modified.

Medical conditions during pregnancy that place the woman at risk include multiple gestation, poor weight gain, short inter-pregnancy interval, pregnancy-induced hypertension, bleeding, complications of pregnancy and anemia, incompetent cervix, fetal anomalies, and spontaneous rupture of membranes (Canadian Institute of Child Health, 1993; Yawn, 1990). O'Callaghan et al. (1997) found that women who had poor weight gain during pregnancy, were small prior to the pregnancy, had previous low birthweight infants, or demonstrated a higher degree of hypertensive and depressive symptoms were at risk for having a small for gestational age infant. Many of these risks can only be dealt with using supportive medical interventions (Yawn).

Lang, Leiberman, and Cohen (1996) compared risk factors for preterm infants who were the proper size for their gestational age ($n = 9,490$) and term infants small for

gestational age (n = 10,889). They found risk factors for preterm birth included young maternal age, nulliparity, previous preterm birth, histories of two or more induced abortions, spontaneous abortions, or still births, exposure to diethylstilbestrol, incompetent cervix, uterine anomaly, and pyelonephritis. Small for gestational age was associated with being black, young age of mother, short stature of mother, prepregnancy weight below normal, small weekly weight gain during pregnancy, smoking, nulliparity, previous preterm birth, three or more abortions, uterine anomaly, and exposure to diethylstilbestrol. This study showed that there were similar factors that could place a woman at high risk to have a preterm or small for gestational age infant.

Effects of Fishery Crises on Health

The fishery is a large source of employment for many parts of the world. The over fishing of stocks by various countries has caused an economic crisis for those who depend on the fishery for their livelihood. However, there were only a few studies located that focused on the effect of fisheries crises on health. This literature related to the collapse of the fishery in Newfoundland, Norway, and Nova Scotia will be included in this section.

A survey of 681 residents conducted by Gien and Solberg (1995) on the Bonavista headland in Newfoundland found that the fishery crisis affected stress levels. On a scale of 1-7, 64.1% of the respondents rated stress, anxiety and uncertainty as a problem in their community (rated greater than 5 out of 7). When respondents were asked to compare their own stress level at present and three years ago, 16.7% felt their lives were

much more stressful and 29.1% felt their lives were somewhat more stressful. When asked what their main source of stress was 27.3% stated finances and money and 25.3% stated unemployment. A survey of 40 community leaders in the study area confirmed these results. Mental health, depression, and stress were viewed by 45.5% of the key informants as serious health issues that faced their communities (Gien & Solberg, 1996). The health professionals and community leaders felt that prenatal care was affected by the fishery crisis; 15% of respondents felt that mothers were receiving less prenatal care.

Jentoft (1993) examined a similar crisis in the fishery that occurred in the late 1980's in Norway. He noted a number of stress-related health problems such as sleep disorders and depression. A Newfoundland study that added support to these findings was a 1993 needs assessment conducted by the ECDC (1993) in conjunction with the Canadian Mental Health Association. Using a participatory action research model in two areas of Newfoundland that were affected by the fisheries crisis, 48 family interviews were completed. Thirty out of 48 families felt that they experienced some health problems associated with the moratorium. Stress, worry, and anxiety were the most commonly reported conditions, accounting for 76.6% of the responses (ECDC).

Family life is likely to be negatively affected if the income provider(s) is unemployed. Jentoft (1993) stated that there was a correlation noted between the fishing moratorium in Norway and family violence. Similarly, a qualitative study that focused on how the northern cod fisheries crisis affected families of offshore fishermen in Nova Scotia found that in some instances the frustration related to this crisis led to violence

(Brinkley, 1995). The survey of key informants conducted by the Eco-Research Project in the Bonavista area found the majority of them felt that family stress was a significant or serious problem (Gien & Solberg, 1996).

The ECDC (1993) also found evidence of increased conflict in the home. In the study 14 out of 48 families stated that they quarreled more with their spouse or partner, 10 of these stated that the arguing was only minor. Some of the arguing appeared to be the result of having the husband or partner around the house more. However, 76% of families stated that they had drawn closer together as a result of the fisheries crisis.

A study conducted by the Women's Policy Office, Government of Newfoundland and Labrador (1991) used a case study approach to research the effect of the crisis in the fishery on women. Interviews were conducted with plant workers, plant managers, women's organizations, chairs of significant groups, local government, and the labour union. Many informants reported that loss of employment and uncertainty about jobs and income levels caused stress in the home. Informants who were involved in organizations for women stated either that family violence increased or that they expected this to occur.

Another study in Newfoundland inadvertently found problems of abuse. The Women's Committee of the Fishermen, Food and Allied Workers Union (1994) had consultation with 1000 women in more than 20 communities across Newfoundland and Labrador. Many of these women stated that they were worried about the future for themselves, families, and communities. Several women spoke privately regarding problems of physical and/or verbal abuse in the home. The researchers stated that this

abuse seemed to be present prior to the moratorium and it was difficult to ascertain whether or not the moratorium exacerbated these problems.

The role of women may become more stressful when an economic crisis occurs. When the husband's job was lost the wife's job increased in importance (Jentoft, 1993). This may have placed more responsibility on the woman and caused increased stress. If she was not working, she may have tried to find some form of employment and a new job would add to this woman's daily workload. In Newfoundland, women still held primary responsibility for home and family duties within the household whether they were employed outside the home or not (The Working Group on Women's Health, 1994). A woman who became employed to compensate for her husband's job loss had to deal with her husband's unemployment, her new job, and her everyday tasks of running a home. This added responsibility increased stress.

Another effect on women that caused increased stress was the loss of a support network. Women who were employed outside the home lost their support network when they became unemployed. Several women affected by the moratorium indicated that they missed work (ECDC, 1993). Williams (1996) reviewed interviews with women in the fishery and stated that several women spoke of their loss of the support network they had with other women in the fish plant. Social support networks were also in jeopardy because of out migration. Family and friends leaving the area caused a decrease in social support for those left behind.

None of the studies that considered the impact of fisheries crises specifically focused on healthy child development in terms of perinatal health. However, results from these studies indicate that a woman who is pregnant in a community affected by the fisheries crisis is at risk for adverse health effects as a result of increased stress and lower socioeconomic conditions.

Summary

There is support from the literature to suggest that a number of the social determinants of health affect perinatal health, as well as health in general. Research has shown that women who lived in lower socioeconomic conditions especially those living in poverty are at greater risk for poor birth outcomes. However, there is some controversy regarding whether factors such as stress and anxiety, which are linked with low socioeconomic status, are interacting to cause the poor birth outcome.

There was conflicting evidence in the few studies found in the literature as to whether or not an economic crisis negatively affected birth outcome. The majority of these studies showed that when an economic crisis occurred pregnant women were affected and this had a negative influence on their pregnancies and on the health of their infants.

Recent fisheries crises that affect the lives of many individuals in a community are an important context within which to examine perinatal health outcomes. Studies done in this area suggest that women may be at risk for adverse health effects as unemployment rises and stress and uncertainty increase. None of the studies on fisheries

crises specifically looked at this particular group. The present study is an attempt to address that gap in the research literature from a population health perspective.

CHAPTER 3

METHOD

This present study was an adjunct to the health section of an interdisciplinary study entitled *Sustainability in a Cold Ocean Coastal Environment* funded by the Tri-Council Eco-Research Program. This interdisciplinary study, conducted by 30 researchers from the social and natural sciences, education, and nursing developed in response to the northern cod fishery moratorium in selected research areas in Newfoundland. One of the main objectives of this study was to identify what was needed for cold ocean communities to remain sustainable in the face of such an environmental crisis. Sustainability was defined as "people acting in harmony with natural systems to maintain health and integrity of both the environment and human communities" (Ommer, 1998, p.1). Specifically, the project focused on four main areas: first, the characteristics that contributed to sustainability, second, identification of how, when and where these characteristics changed, third, how these changes affected individuals in the areas of lifestyle, economy, health, and education, and fourth, to develop a framework to be employed when making policy decisions for these communities and the effect these decisions would have on sustainability (Ommer).

The health section of this study focused on the perceived effect of the northern cod fishery crisis on the health of individuals living on the headland of the Bonavista peninsula and the Isthmus of the Avalon peninsula (Ommer, 1998). The effects of the northern cod closure on community health and hope for the future were also studied. This present study supplements the work in the health section by focusing on perinatal health outcomes. It is an attempt to understand in more depth the maternal and child health of the people living in the Bonavista headland area and how it may have been affected by the fishery crisis.

The purpose of this study is to compare the perinatal health of women and their infants as represented by the data on the LBNF for a three-year period prior to the fishery closure with a three year period immediately after the closure. One of the main objectives is to see if there was an increase in the number of low birthweight infants (infants weighing less than 2,500g at birth) in the post moratorium period.

Design

The design of the study is descriptive, comparative, and retrospective in nature. It consisted of using data from the LBNFs (see Appendix B) obtained from the Department of Health, the Government of Newfoundland and Labrador. The forms contain information pertinent to perinatal health conditions and outcomes. The research compares perinatal health between two time periods: three years before the fishery moratorium and three years post moratorium.

Data

The data for this study were taken from the information recorded on the LBNF for the Bonavista headland (see Appendix B). The Government of Newfoundland and Labrador requires that this form be completed and submitted for each live birth within the province. This is a form that must be filled out by health professionals within 48 hours after delivery of a live infant and is mandatory for registration of birth. Section A of the form includes demographic information regarding the child, mother, and father. The second section of the form includes a health history and medical certification of birth.

The data used in the study included all deliveries resulting in live births by mothers who resided in the communities on the headland of the Bonavista peninsula from 1990 to 1995. The data were divided into two groups; 1990-1992 (inclusive) and 1993-1995 (inclusive). This was thought to be the best approximation of pre and post moratorium effects on perinatal health. Since it is acknowledged that there may be variations in the perinatal health indicators for a number of reasons, e.g., changes in perinatal care, a three year period both pre and post fishery closure were used in the analysis to compensate for these variations.

Setting

The Bonavista headland is a region of the north-east coast of the island of Newfoundland. In 1991 this area had a population of approximately 30,000 residents (Newfoundland Statistics Agency, 1995). As this area is exposed to the Labrador Current

the climate is harsher than other areas of similar latitudes as seen in higher rain fall, a slower increase in temperatures in spring and early summer, a slower decrease in temperature in the autumn, and milder winters. Non-native populations settled this area over 500 years ago and since this time the fishery has played a large role in the economic structure of the Bonavista headland communities. Since Newfoundland joined Canada in 1949 the fishery in this area has become more industrialised as seen in large fish plants in the communities of Bonavista and Catalina (Ommer, 1998). The majority of the residents of this area were dependent on the fishery as a source of employment therefore the depletion of the northern cod stocks and the subsequent moratorium caused many residents to lose their source of livelihood.

Pregnant women living in this area can access prenatal care under the provincial health plan from several sources. Public health nurses offer prenatal education classes in the third month (early bird classes) and sixth month of pregnancy. This prenatal education consists of three two-hour classes. Sessions are offered on an as needed basis and generally class numbers are small. General practitioners in the area provide prenatal care and if necessary they can refer their patients to an obstetrician. This rural area however has difficulty retaining general practitioners and there tends to be a high turnover rate. As a result there are periods when pregnant women have to go to Clarenville to be seen by a general practitioner. Referral to a specialist would entail travelling to a larger centre either one and half-hours away (Clarenville) or three hours away (St. John's). Most women will also travel to these centres for the delivery of their

baby. If the mother is having a high-risk pregnancy then she would have her baby in St. John's (referral centre for the province).

Procedure

The data were obtained from the LBNF used by the Government of Newfoundland and Labrador Department of Health. A letter was written to the Department of Health requesting the data from the headland of the Bonavista peninsula for the two time frames (see Appendix B). The following data were requested: sex of child, hospital/birth location, mother's age, father's age, mother's community of residence, marital status, education of parents, number of children born to this mother, date of last delivery, kind of present delivery (single or twin), birthweight in grams, trimester prenatal care began, Apgar score, (consultation with) a specialist for prenatal care, familial diseases, delivery, labour, complications of pregnancy, neonatal conditions, gestation period, and congenital anomalies.

Data Analysis

Data obtained from the Department of Health were provided in the form of an ASCII file. The data were entered into Statistical Package for the Social Sciences (SPSS) file for analysis. Data were aggregated for the two time periods. Parameters of the population were used to analyze the demographic information, labour and delivery information, birthweight, Apgar scores, gestational age, complications of pregnancy, congenital anomalies, and trimester prenatal care began. This analysis was completed for the two time periods and comparisons were made.

Data analysis consisted of frequencies and means. Absolute and relative frequencies illustrated the number and type of pregnancy and labour and delivery complications. This data analysis presents a summary of important demographic and pregnancy characteristics of the women and their infants. Grouped frequency distributions represented infants' birthweights for comparisons.

The total population (i.e. all live births for the two time frames) was used. Since it is not known how much this region varies from other regions in the province, no generalizations can be made to the province as a whole. The Bonavista headland is unique and is not representative of all areas of Newfoundland negatively affected by the fishery moratorium. Each geographic area relied to varying degrees on the fishery and, therefore, may have had unique effects. As a result, the individuals in this study should not be viewed as a sample of all mothers and infants living in areas of Newfoundland negatively impacted by the fishery closure but as its own unique population.

Data for the whole population were accessible and therefore it was feasible to include all mothers and their infants during the selected time periods. In research studies errors can occur during sampling and in making inferences based on the findings from the sample to the entire population. Use of the whole population in this study eliminated these possible sources of errors and in turn strengthened the research findings.

As a result of the entire population of the area being included in this study, the parameters described present a more complete picture of perinatal health in the selected area during the two time periods. Employing whole populations in research enables

researchers to best answer the questions that are being examined (Young Barhyte, Redman, & Neill, 1990).

Rationale for use of Secondary Data

The use of data sets that are already available, such as health records has become more common (Polit & Hungler, 1995). The rationale for use of data from the LBNF was based on the ability of the data to reflect perinatal health of the population in the area of interest and the advantages of secondary data analysis described below.

The data obtained from the LBNF were able to provide an indication of an important determinant of health; healthy child development. Birth rate, sociodemographic characteristics, pregnancy and labour and delivery characteristics, complications, and condition of the infant at birth are some of the variables obtained from the LBNF. These data provide a picture of perinatal health and, thus, healthy child development during the two timeframes.

The advantages of using health records for data sources are they are more accessible, accurate, efficient, and economical (vonKoss Krowchuck, Moore, & Richardson, 1995). It would have been difficult to identify and expensive to interview the entire population of interest during the period under study. Use of this data was efficient and allowed access to the population of interest in the study area. The use of data from the LBNF was an efficient method that enabled answering the research questions about differences in selected sociodemographic characteristics of parents, pregnancy characteristics and complications, labour and delivery characteristics and

complications, and condition of infant at birth between the two periods. Employing health records to study the perinatal health within the context of the northern cod fishery closure allowed comparisons to be made over time and between two aggregates. A review of the literature identified another study with a similar topic that employed secondary data. Moore et al. (1994) studied the cause of low birthweight and associated factors by reviewing health records over a four-year period.

Employment of the LBNF enables accurate data to be obtained. The decision regarding the type of data to use in childbirth research should be dependent on the type of variables under study (Hewson & Bennett, 1987). Pregnancy, labour and delivery characteristics, and health of the infant were important variables for this study and these are more accurately obtained through health records. Compared with hospital records mothers are inclined to report longer gestations, more problems in labour, overestimate any medical difficulty with the infant, and inaccurately recall the birthweight (Oates & Forest, 1984). Another study found that 51 women out of 397 stated that their baby had jaundice, however, this was not recorded on medical records (Hewson & Bennett, 1987).

Reliability and Validity of Data

While the reliability of the data was outside the control of the researcher, it is still important to consider this aspect of the data. The reliability and validity of the LBNF was reflected in the layout of the form, the comprehensiveness of the form for certain variables, and how and when the form was completed. The LBNF has been developed by the Department of Health to collect data on births in the province and is used for reports

by the Newfoundland and Labrador Centre for Health Information (1998). To complete the form required checking blocks, filling in the blanks, and use of international classification codes and did not require narrative charting. This would serve to decrease subjectivity and increase objectivity of the data. The use of codes from the international classification of diseases provided a comprehensive and uniform picture of family histories, labours and deliveries, neonatal conditions, and congenital anomalies. Furthermore, the form was completed directly after the birth of the infant. This would, in turn, increase the accuracy of the information collected. Finally, the use of a large population size may have helped overcome inaccuracies in the data. Any inexactness in medical records would not lead to wrong conclusions when a large number is used (Hewson & Bennett, 1987).

Ethical Considerations

Even though the study did not involve face to face contact with participants to obtain data from them, it did involve information pertaining to human subjects and therefore it was still important to consider the ethical aspect of the study. The Tri-Council guidelines on ethical research involving humans requires that research using health records are considered and approved by an ethical review board (Tri-Council, 1999). Consequently, the research proposal for the study and plans for protection of information were submitted to and received ethical approval from the Human Investigation Committee of the Faculty of Medicine of Memorial University of Newfoundland prior to obtaining the data.

One of the major ethical considerations when employing health records on individuals is the protection of this information. The LBNF is one such record, therefore a number of measures were taken to protect the anonymity of the individuals whose records form the data set. The researcher did not have access to identifying data (names or addresses), the data were released in the form of an ASCII file, an oath of confidentiality was taken, signed, and witnessed by both the researcher and her thesis supervisor before the data were released to the researcher (see Appendix C). The data were stored on a computer diskette and was only available to this researcher and supervisor in order to maintain confidentiality of the communities in the area under study. No particular community was singled out in the analysis. When completed a copy of the study will be sent to the Government of Newfoundland and Labrador Department of Health. The copy of the data on the diskette will be returned to the Department of Health.

CHAPTER 4

FINDINGS

This chapter includes a presentation of the results under the following headings; demographic characteristics, pregnancy characteristics and complications, labour and delivery characteristics, condition of the infant at birth, and a comparison of births less than 2,500 g for the two time periods.

Demographic Characteristics

Demographic characteristics of the population derived from the LBNF for period 1 (1990 – 1992 inclusive) and period 2 (1993 – 1995 inclusive) are summarized in Table 1. The two groups were similar in terms of maternal and paternal age with only slight variations evident. However, greater differences were seen between the two groups in the areas of mother's education, father's education, and marital status.

Educational level of mothers was generally higher in the post moratorium period. Almost 15.0% more of mothers in period 1 had less than grade 8 education than was recorded in period 2. Although not as marked, a similar pattern held for the fathers. Assessments of marital status showed that a higher percentage of couples were living common law in period 2. However, 4.3% more women were listed as married in the pre moratorium period.

TABLE 1

Demographic Characteristics of Parents for Period 1 and Period 2

Characteristic	Period 1 1990-1992		Period 2 1993-1995	
	Mothers $n = 396$ f(%)	Fathers (*) $n = 327$ f(%)	Mothers $n = 345$ f(%)	Fathers (*) $n = 296$ f(%)
Age	$M = 24.93$ $SD = 5.5$	$M = 28.72$ $SD = 5.91$	$M = 25.21$ $SD = 5.61$	$M = 28.61$ $SD = 6.27$
< 15	3 (.8)	0	2 (.6)	0
16-19	65 (16.4)	12 (3.1)	54 (15.6)	14 (4.1)
20-24	138 (35.0)	69 (17.5)	113 (32.8)	68 (19.8)
25-29	110 (27.8)	119 (30.0)	100 (29.0)	95 (27.5)
30-34	59 (14.9)	75 (18.9)	50 (14.4)	67 (19.4)
35-	21 (5.5)	52 (13.3)	26 (7.5)	52 (15.2)
Years of Education (*)	$M = 10.66$ $SD = 2.63$	$M = 10.65$ $SD = 2.66$	$M = 11.70$ $SD = 2.07$	$M = 11.42$ $SD = 2.27$
< 8	76 (21.7)	52 (13.1)	24 (7.1)	32 (9.4)
9-11	134 (38.2)	135 (34.2)	129 (38.2)	116 (33.6)
12-13	97 (27.7)	48 (12.2)	121 (35.8)	91 (26.4)
>13	43 (12.3)	41 (10.3)	64 (19.0)	50 (14.4)
Marital Status				
Never married	153 (38.6)	**	131 (38.0)	**
Married	228 (57.6)		184 (53.3)	
Common law	4 (1.0)		24 (7.0)	
Separated/divorced/ widowed	11 (2.8)		6 (1.0)	

Note. * Indicates missing data from this section of the LBNF
**Indicates information not contained on LBNF
In Period 1 there were 4 sets of twins.
In Period 2 there were 5 sets of twins and 1 set of triplets.

Pregnancy Characteristics and Complications

Pregnancy characteristics and complications derived from the LBNF for period 1 (1990 – 1992 inclusive) and period 2 (1993 – 1995 inclusive) are summarized in Table 2. Pregnancy characteristics include the use of prenatal care, trimester prenatal care began, whether or not a specialist followed the woman, and what trimester of her pregnancy the specialist consultation began. Pregnancy complications include but are not limited to the following conditions that occur during pregnancy: pregnancy induced hypertension, antepartum hemorrhage, gestational diabetes, anemia, and IUGR.

Overall, a higher percentage of women in period 2 had prenatal care and began prenatal care earlier. Furthermore, of the mothers who received prenatal care, a slightly higher percentage of the mothers in period 2 received prenatal care in the first trimester. A similar percentage of mothers had prenatal care begin in the second and third trimesters.

In period 2 a higher percentage of mothers saw a specialist for prenatal care. During the first and second trimester a specialist followed more mothers from period 2. This changed for the third trimester where a higher percentage of mothers in period 1 saw a specialist for prenatal care. Overall, a specialist followed more mothers in period 2 and this care began earlier than for the mothers in period 1.

TABLE 2

Pregnancy Characteristics and Complications of Women for Period 1 and Period 2

Characteristics	Period 1 1990 – 1992 $n = 396$ births		Period 2 1993 – 1995 $n = 345$ births	
	f	%	*f*	%
Prenatal Care Began:				
None	6	1.5	2	0.6
First trimester	338	85.4	301	87.2
Second trimester	38	9.6	32	9.3
Third trimester	14	3.5	10	2.9
Specialist Seen:				
No	43	10.9	20	5.8
First trimester	24	6.1	35	10.1
Second trimester	124	31.3	168	48.7
Third trimester	205	51.8	122	35.4
Pregnancy Complications: (*)				
None	350	88.4	290	84.1
Eclampsia	31	7.8	28	8.1
Hemorrhage	9	2.3	6	1.7
Diabetes	10	2.6	6	1.7
IUGR	8	2.0	7	2.0
PROM and related complications	2	0.5	13	3.8
Threatened labour	5	1.3	11	3.2
Prolonged pregnancy	5	1.3	7	2.0
Multiple pregnancy	0	0	9	2.6
Anemia	6	1.5	0	0
Infections	2	0.5	3	0.9
Malposition/malpresentation	4	1.0	3	0.9
Edema or Excessive weight gain	6	1.5	0	0
Fatigue/ insufficient weight gain	9	2.3	2	0.6
Systemic dysfunction	5	1.3	1	0.3
Other	4	1.0	9	2.6

Note. * Indicates some mothers may have more than one pregnancy complication.

Overall, pregnancy complications were more prevalent in the post moratorium group. A breakdown of the types of pregnancy complications showed some similarities and differences. The complications of eclampsia, IUGR, prolonged pregnancy, infections, and malposition/malpresentation were similar across both groups. A slightly higher percentage of mothers in period 1 had diabetes, hemorrhage, fatigue/insufficient weight gain, systemic dysfunction, anemia, edema or excessive weight gain as a complication. For period 2, a higher percentage of mothers had PROM and related complications.

Labour and Delivery Characteristics and Complications

Labour and delivery characteristics and complications of the population derived from the LBNF for period 1 (1990 – 1992 inclusive) and period 2 (1993 – 1995 inclusive) are summarized in Table 3. Labour and delivery characteristics include number of births, type of birth, presentation, mode of delivery, and induction of labour. Labour and delivery complications include but are not limited to the following conditions that occur during labour and delivery: obstruction, PROM, prolonged labour, malposition/malpresentation, hypertensive conditions, and hemorrhage.

There were more infants born in the pre moratorium period. An analysis of the kind of birth was divided into single, twin, and triplet. There were a similar number of singleton births for the two time periods. A slight difference was seen between the two groups regarding multiple births, where period 2 had one more twin birth and had one

TABLE 3

Labour Characteristics of Women for Period 1 and Period 2

Characteristic	Period 1 1990-1992 $n = 396$ births		Period 2 1993-1995 $n = 345$ births	
	f	%	*f*	%
Kind of Present Birth				
Single	388	98.0	332	96.2
Twin	8	2.0	10	2.9
Triplet	0	0	3	0.9
Presentation				
Unknown	109	27.5	37	10.7
Cephalic	285	72	295	85.5
Breech	2	2.0	12	3.5
Other	0	0	1	0.3
Mode of Delivery				
Spontaneous	240	60.6	239	69.3
Cesarean Section	93	23.5	69	20.0
Forceps	42	10.6	7	2.0
Vacuum	18	4.5	29	8.4
Forceps/Vacuum	3	0.8	1	0.3
Induction of Labour				
Induced	78	19.7	81	23.5
Labour Complications *				
None	317	80.1	313	90.7
Obstruction	31	7.8	3	0.9
PROM and related complications	18	4.5	9	2.6
Prolonged labour	14	3.5	5	1.4
Malposition/malpresentation	8	2.0	3	0.9
Hemorrhage	5	1.3	2	0.6
Hypertensive conditions	0	0	3	0.9
Threatened labour	2	0.6	2	0.6
Other	8	2.0	6	1.7

Note.* Indicates some mothers may have more than one labour complication.

triplet birth. A higher percentage of unknown presentations are recorded for period 1. This high number makes it difficult to know if there were differences between the two periods in type of presentation.

Mode of delivery was divided into spontaneous, cesarean section, forceps, vacuum, and forceps/vacuum. A comparison of the two groups on these characteristics showed that a greater percentage of the deliveries in period 2 were spontaneous. There were a higher percentage of cesarean section births in period 1. A higher percentage of the deliveries in period 1 used forceps however a greater percentage of deliveries in period 2 used vacuum extraction. A slight difference was seen between the two groups regarding induction of labour with period 2 having a higher percentage of induced deliveries.

Unlike pregnancy complications there were a higher percentage of labour complications in period 1. A further analysis of the types of complications showed some similarities and differences. Threatened labour was equal for the two groups. The complication that showed the greatest difference was obstruction. A higher percentage of women in period 1 had labour complications related to this complication. As well, a slightly higher percentage of women in period 1 had PROM and related complications, malposition/malpresentation and hemorrhage. A slight percentage of mothers in period 2 had hypertensive conditions while in period 1 no mothers had this complication.

Characteristics of the Infant at Birth

The characteristics of the infant that will be discussed in this section include sex, Apgar score at one and five minutes, injury at birth, congenital anomalies, birth weight, and gestation. The infant's condition at birth for periods 1 and 2 as derived from the LBNF is summarized in Table 4. A comparison of the two groups in the areas of neonatal injury and congenital anomalies showed only very small differences between the two groups.

An analysis of the Apgar scores at one and five minutes revealed some differences. Overall, the Apgar scores for period 2 were better at one minute and five minutes than they were for period 1. At one minute a higher percentage of the infants in period 2 had Apgar scores between eight and ten. Whereas for period 1, at one minute, a higher percentage of the infants had scores between one and seven. At five minutes this pattern was also evident but with smaller differences.

The range of birthweight for the population for period 1 and period 2 is shown in Table 5. This comparison demonstrated that there were 3.5% more infants born in period 2 that were below 2,500 g. The mean birthweight for period 1 was 3,473.5 g and for period 2 it was 3,384.9 g, a difference of 88.6 g. The mean birthweight for each individual year from 1990 to 1995 was analysed as seen in Figure 2. This graph showed that the mean birthweight for the study area decreased each year after the fishery closure. As twin and triplet births are more likely to be of lower birthweight, a comparison was

TABLE 4

Infant Condition at Birth for Period 1 and Period 2

Characteristic	Period 1 1990–1992 $n = 396$ births		Period 2 1993 - 1995 $n = 345$ births	
	f	%	*f*	%
Infant sex				
Male	210	53	190	55.1
Female	186	47	155	44.9
Apgar Score at 1 minute	*			
1-4 (high risk)	24	6.2	14	0.3
5-7 (medium risk)	110	27.7	81	2.6
8-10 (low risk)	261	65.9	250	97.1
Apgar Score at 5 minutes	*			
1-4 (high risk)	0	0	1	0.3
5-7(medium risk)	13	3.3	9	2.6
8-10 (low risk)	382	96.5	335	97.1
Neonatal injury at birth				
None	379	95.7	331	95.9
Low birthweight	4	1.0	4	1.2
Respiratory problems	7	1.8	3	0.9
Physical trauma	2	0.5	1	0.3
Infection	1	0.3	2	0.6
Compression of umbilical cord	2	0.5	0	0
Other	1	0.3	4	1.2
Congenital Anomalies				
None	384	97.0	337	97.7
Deformities of hands	4	1.0	3	0.9
Cardiovascular	3	0.8	1	0.3
Chromosomal	2	0.8	0	0
Other	3	0.6	4	1.2

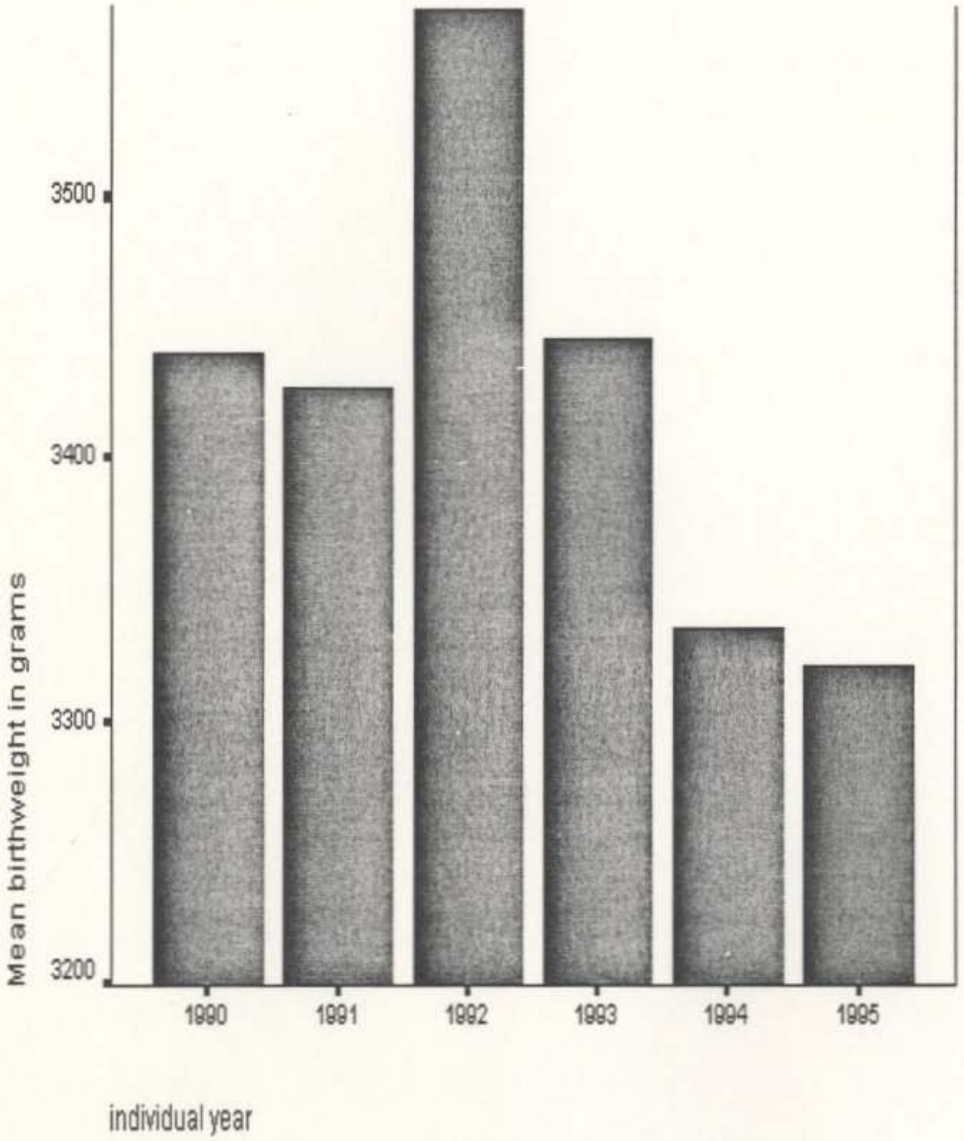
Note. *Indicates missing Apgar scores from 1990-1992

TABLE 5

Range of Birthweight of Infants for Period 1 and Period 2

Birthweight	Period 1 1990 –1992 $n = 396$ births $M = 3473.5$ SD 530.6		Period 2 1993 – 1995 $n = 344$ births $M = 3384.9$ $SD = 658.96$	
	f	%	f	%
501 – 750	0	0	1	0.3
751 – 1000	0	0	1	0.3
1001 – 1250	0	0	1	0.3
1251 – 1500	1	0.3	3	0.9
1501 – 1750	2	0.5	3	0.9
1751 – 2000	1	0.3	5	1.4
2001 – 2250	5	1.3	4	1.2
2251 - 2,500	9	2.3	10	2.9
2501 – 2750	15	3.8	14	4.1
2751 – 3000	37	9.3	39	11.3
3001 – 3250	54	13.6	48	13.9
3251 – 3500	77	19.4	70	20.3
3501 – 3750	78	19.7	53	15.4
3751 – 4000	61	15.4	36	10.4
4001 – 4250	31	7.8	32	9.3
4251 – 4500	17	4.3	10	2.9
4501 – 4750	3	0.8	11	3.2
4751 – 5000	4	1	1	0.3
5001 – 5250	0	0	1	0.3
5251 – 5500	1	0.3	1	0.3

Note. 1993 - 1995 had one birthweight missing in the data set



Individual year

Figure 2. Mean birthweight for each year (1990-1995).

made between the two time periods for singleton births only (see Table 6). Results showed that for period 2 there were 2.9% more infants who were born below 2,500 g than in period 1.

The range of gestation of the infants in period 1 and period 2 is shown in Table 7. A comparison of the gestation for the two periods had similar findings as the comparison of birthweights. For period 2 there were 2.6% more births that were premature (below 37 weeks gestation). The mean gestation for each individual year was analysed in Figure 3. This graph showed that the mean gestation also decreased each year after the fishery closure. As with the birthweight, a comparison was made with singleton births only (see Table 8). When twins and triplets were removed during period 2 there were 2.7% more births that were premature (below 37 weeks gestation).

Comparison of Births Less Than 2,500 g for the Two Time Periods

Sociodemographic, obstetrical, and infant characteristics of births less than 2,500 g were analyzed at both time periods. Several differences were seen between the two groups. When demographic characteristics (see Table 9) were analyzed it was found for period 2 that a higher percentage of mothers were between 16 and 19 years of age. Differences were also seen with regards to education. In period 2 a much higher percentage of mothers and fathers had greater than 12 years education. A difference was also seen between the two time periods with marital status. A higher percentage of mothers were married in period 2.

TABLE 6

Range of Birthweight of Infants for Period 1 and Period 2 for Singleton Births

Birthweight	Period 1 1990 -1992 n = 388 infants M = 3496.11 SD = 508.65		Period 2 (*) 1993 – 1995 n = 332 infants M = 3427.51 SD = 617.24	
	f	%	f	%
501 – 750	0	0	1	0.3
751 - 1,000	0	0	1	0.3
1,001 – 1,250	0	0	0	0
1,251 – 1,500	1	0.3	0	0.9
1,501 – 1,750	1	0.3	2	0.6
1,751 – 2,000	0	0	5	1.5
2,001 – 2,250	4	1.0	3	0.9
2,251 – 2,500	7	1.8	9	2.7
2,501 – 2,750	14	3.6	13	3.9
2,751 - 3,000	35	9.0	37	11.1
3,001 - 3,250	54	13.9	46	13.9
3,251 - 3,500	77	19.8	70	21.1
3,501 - 3,750	78	20.1	52	15.7
3,751 - 4,000	61	15.7	36	10.8
4,001 - 4,250	31	8.0	32	9.6
4,251 - 4,500	17	4.4	10	3.0
4,501 - 4,750	3	0.8	11	3.3
4,751 - 5,000	4	1.0	1	0.3
5,001 - 5,250	0	0	1	0.3
5,251 - 5,500	1	0.3	1	0.3

Note. 1993 - 1995 had one birthweight missing in the data set.

TABLE 7

Range of Gestation of Infants for Period 1 and Period 2

Gestation (in weeks)	Period 1 1990 - 1992 $n = 396$ infants $M = 39.43$ $SD = 1.7$		Period 2 1993 – 1995 $n = 345$ infants $M = 39.22$ $SD = 2.27$	
	f	%	*f*	%
25 – 27	0	0	2	.6
28 – 30	1	0.3	5	1.4
31 – 33	3	0.8	3	0.9
34 – 36	20	5.1	20	5.9
37 – 39	142	35.8	105	30.5
40 – 42	228	57.6	209	60.6
43	2	0.5	1	0.3

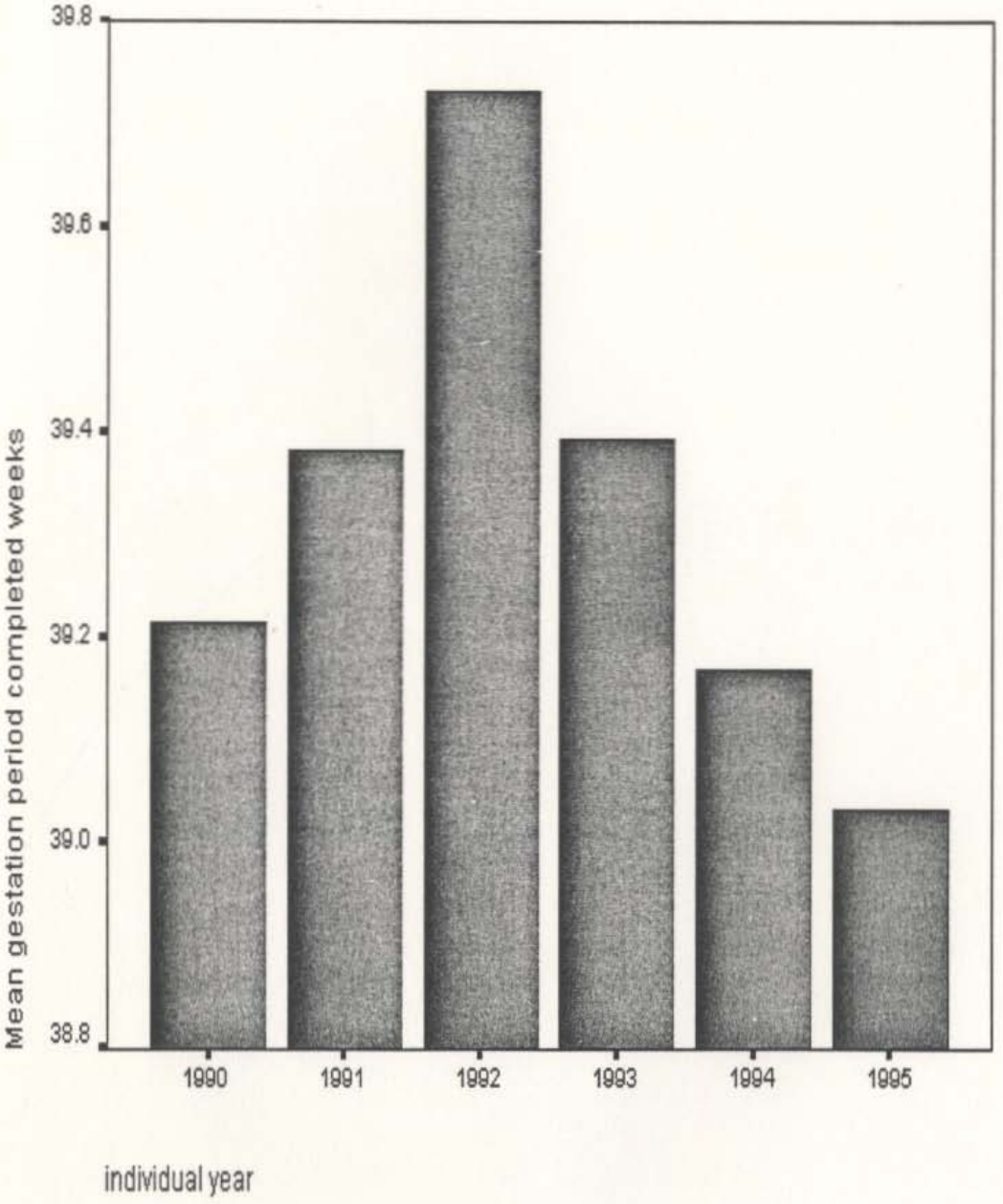


Figure 3. Mean gestation for each year (1990-1995).

TABLE 8

Range of Gestation for Singleton Births for Period 1 and Period 2

Gestation (in weeks)	Period 1 1990 - 1992 $n = 388$ infants $M = 39.52$ $SD = 1.57$		Period 2 1993 – 1995 $n = 332$ infants $M = 39.40$ $SD = 1.99$	
	f	%	*f*	%
25 – 27	0	0	2	0.6
28 – 30	1	0.3	0	0
31 – 33	1	0.3	3	0.9
34 – 36	14	3.6	18	5.4
37 – 39	142	36.5	99	29.8
40 – 42	228	58.8	209	63
43	2	0.5	1	0.3

TABLE 9

Demographic Characteristics of Parents for Period 1 and Period 2 for Births less than 2,500g

Characteristic	Period 1 1990-1992		Period 2 1993-1995	
	Mothers $n = 18$ f(%)	Fathers $n = 12$ f(%)	Mothers $n = 28$ f(%)	Fathers $n = 22$ f(%)
	$M = 26.56$ $SD = 4.96$	$M = 27.67$ $SD = 5.31$	$M = 25.46$ $SD = 5.32$	$M = 29.68$ $SD = 5.58$
Age (*)				
16-19	1 (5.6)	1 (5.6)	4 (14.3)	0 (0)
20-24	6 (33.5)	1 (5.6)	10 (35.7)	4 (18.2)
25-29	6 (33.5)	6 (33.4)	8 (28.6)	6 (27.1)
30-34	4 (22.3)	2 (11.2)	5 (17.8)	7 (31.8)
35-	1 (5.6)	2 (11.2)	1 (3.6)	5 (22.7)
Years of Education	$M = 10.56$ $SD = 1.21$	$M = 10.40$ $SD = 1.35$	$M = 12.0$ $SD = 2.04$	$M = 12.10$ $SD = 2.19$
(*)				
< 8	1 (6.3)	2 (11.1)	0 (0)	1 (4.8)
9-11	13 (81.4)	7 (38.9)	13 (48.1)	7 (33.3)
12-13	2 (12.5)	1 (5.6)	7 (25.9)	7 (33.3)
>13	0 (0)	0 (0)	7 (25.9)	6 (28.6)
Marital Status				
Never married	7 (38.9)	**	8 (28.6)	**
Married	9 (50)		18 (64.3)	
Common law	1 (5.6)		1 (3.6)	
Separated/divorced/ widowed	1 (5.6)		1 (3.6)	

Note. * Indicates missing data from this section of the LBNF.
**Indicates information not contained on LBNF.

Table 10 shows the pregnancy characteristics of the two periods of mothers who had infants weighing less than 2,500 g at birth in both periods. A higher percentage of mothers in period 2 were having their second baby. For both time periods mothers who had newborns weighing less than 2,500 g at birth all received prenatal care. However, a higher percentage of women in period 1 began care in the first trimester. A slightly higher percentage of mothers in period 2 saw a specialist in the first trimester, whereas a higher percentage of mothers in period 1 saw a specialist in the third trimester. When complications of pregnancy were analyzed it was found that a higher percentage of women in period 2 experienced pregnancy complications. When specific complications were considered it was found that more women in period 2 had eclampsia, PROM and related complications, multiple pregnancy complications, and threatened labour.

Labour characteristics for both time periods were also analyzed (see Table 11). In period 1 there was a higher percentage of twins and in period 2 there was a higher percentage of triplets. Overall, there were a higher percentage of labour complications in period 1. However, a slightly higher percentage of mothers in period 2 had PROM and related complications and threatened labour.

The range of gestation for births of infants weighing less than 2,500 g for the two time periods was analyzed (see Table 12). This analysis showed that there were a higher percentage of infants with lower gestation (in weeks) in period 2. Specifically, there were

TABLE 10

Pregnancy Characteristics of Women with Births less than 2,500 g for Period 1 and 2

Characteristics	Period 1 1990 – 1992 $n = 18$ women		Period 2 1993 – 1995 $n = 28$ women	
	f	%	*f*	%
number of live births born to this mother:				
First birth	8	44.4	12	42.9
Second	4	22.2	10	35.7
Third	4	22.2	4	14.3
Fourth	2	11.1	2	7.1
Prenatal Care Began:				
First trimester	15	83.3	22	78.6
Second trimester	2	11.1	5	17.9
Third trimester	1	5.6	1	3.6
Specialist Seen:				
No	2	11.1	3	10.7
First trimester	1	5.6	6	21.4
Second trimester	5	27.8	9	32.1
Third trimester	10	55.6	10	35.7
Pregnancy Complications: *				
None	8	44.4	6	21.4
Eclampsia	1	5.6	4	14.3
Hemorrhage	2	11.1	1	3.6
Diabetes	1	5.6	2	7.1
IUGR	3	16.7	4	14.3
PROM and related complications	0	0	5	17.9
Threatened labour	4	22.3	9	32.1
Multiple pregnancy	0	0	4	14.3

Note. * Indicates some mothers may have more than one pregnancy complication.

TABLE 11

Labour Characteristics of Women with Births less than 2,500 g for Period 1 and 2

Characteristic	Period 1 1990 - 1992 $n = 18$ births		Period 2 1993 - 1995 $n = 28$ births	
	f	%	*f*	%
Kind of Present Birth				
Single	13	72.2	21	75.0
Twin	5	27.8	4	14.3
Triplet	0	0	3	10.7
Presentation:				
Unknown	3	33.3	3	10.7
Cephalic	6	66.7	24	85.7
Breech	0	0	1	3.6
Mode of delivery				
Spontaneous	11	61.1	18	64.3
Cesarean Section	5	27.8	8	28.6
Forceps	1	5.6	1	3.6
Vacuum	1	5.6	1	3.6
Induction of labour				
Induced	3	16.7	8	28.6
Not induced	15	83.3	20	71.4
Labour Complications *				
None	15	83.3	22	78.6
PROM and related complications	2	11.1	4	14.3
Hemorrhage	1	5.6	0	0
Threatened labour	1	5.6	2	7.1
Other	0	0	1	3.6

Note.* Indicates some mothers may have more than one labour complication.

TABLE 12

Range of Gestation for Births less than 2,500 g for Period 1 and Period 2

Gestation (in weeks)	Period 1 1990 – 1992 $n = 18$ births $M = 35.28$ $SD = 2.52$		Period 2 1993 – 1995 $n = 28$ births $M = 34.46$ $SD = 4.01$	
	f	%	*f*	%
25 – 26	0	0	2	7.1
27 – 28	0	0	0	0
29 – 30	1	5.6	5	17.9
31 – 32	3	16.7	0	0
33 – 34	1	5.6	5	17.9
35 – 36	9	50	7	25.0
37- 38	2	11.1	5	17.9
39 –40	2	11.1	4	14.3

18.4 % more infants in period 2 less than 2,500 g with a gestation of less than 30 weeks. A higher percentage of infants in period 2 had a gestation period between 37 and 40 weeks.

The characteristics of the infant at birth for infants less than 2,500 g were also analyzed (see Table 13). An analysis of Apgar scores showed that a higher percentage of infants in period 1 had a score at one minute between 1-4 and a higher percentage of infants in period 2 had a score between 5-7. At five minutes a higher percentage of infants in period 1 had Apgar scores between 5-7 and a higher percentage of infants in period 2 had Apgar scores between 8-10. When the two groups were compared with regards to neonatal injury at birth and congenital anomaly, little difference was seen.

Summary

In summary, analysis of the data showed some differences and some similarities in demographic variables and the health of mothers and infants prior to and after the fishery closure. There were no large differences between the two periods for mothers' and fathers' ages. However, for births less than 2,500 g, a higher percentage of mothers in period 2 were between the ages of 15 and 19. Overall, the educational level of parents was higher after the fishery closure. This was also seen when births less than 2,500 g were analysed. No large difference was seen between the two groups in terms of marital status. However, for births less than 2,500 g a higher percentage of mothers in period 2 were married.

TABLE 13

Infant Characteristics at Birth for Period 1 and Period 2 (infants less than 2,500g)

Characteristic	Period 1 1990 -1992 $n = 18$ infants		Period 2 1993 – 1995 $n = 28$ infants	
	f	%	*f*	%
Infant sex				
Male	8	44.4	15	53.6
Female	10	55.6	13	46.4
Apgar Score at 1 minute	*			
1-4 (high risk)	5	27.8	3	10.7
5-7 (medium risk)	2	11.2	8	28.6
8-10 (low risk)	11	61.1	17	60.7
Apgar Score at 5 minutes	*			
1-4 (high risk)	0	0	0	0
5-7(medium risk)	3	16.7	1	3.6
8-10 (low risk)	15	83.3	27	96.4
Neonatal injury at birth				
None	14	77.8	22	78.6
Respiratory problems	1	5.6	0	0
Infection	0	0	1	3.6
Other	0	0	1	3.6
Congenital Anomalies				
None	17	94.4	28	100
Chromasomal	1	5.6	0	0

Note. * Indicates missing data from this section of the LBNF.

A slightly higher percentage of mothers in period 2 had prenatal care during their pregnancy and began this care earlier compared with period 1. For both time periods mothers who had infants less than 2,500 g all received prenatal care. However, a higher percentage of women in period 1 began prenatal care in the first trimester. A specialist followed a higher percentage of mothers after the fishery closure and this care began earlier than for the mothers in period 1. This pregnancy characteristic was also seen for births less than 2,500 g.

A higher percentage of mothers in period 2 experienced pregnancy complications. A closer look at the type of complications showed some differences between the two groups. The largest difference was seen with PROM and related complications where a higher percentage of the mothers in period 2 experienced this complication. When births less than 2,500 g were analysed for pregnancy complications it was found that a higher percentage of women after the fishery closure had pregnancy complications such as eclampsia, PROM and related complications, threatened labour, and multiple pregnancy.

Only slight differences were seen between the two groups with regards to mode of delivery and induction. However, analysis of complications related to labour and delivery showed that a higher percentage of mothers in period 1had labour complications. This was also true of births less than 2,500g.

Analysis of infant characteristics showed little difference between the two time periods regarding congenital anomalies and birth injury. However, the main differences

were seen in birthweight and length of gestation. After the fishery closure a higher percentage of infants were born under 2,500 g and below 36 weeks gestation.

CHAPTER 5

DISCUSSION

The purpose of this study is to describe how the northern cod fishery crisis might have affected pregnant women and their infants in select communities of the Bonavista peninsula in Newfoundland. One of the primary objectives is to determine if there is an increase in negative perinatal health outcomes since the economic downturn occurred. Specifically, objectives include analyzing demographic and obstetrical factors and infant characteristics such as gestation and birthweight. The following chapter will present an overview of the results of the analysis and relate these findings to previous research.

Demographic Characteristics

In this section the demographic characteristics will be discussed. Specifically, how the population of this study compares to samples in other studies on a similar research topic will be explored. Next, the differences seen between the pre and post moratorium relating to age, education level, and marital status will be examined.

The population of the current study differs from samples in other studies that focused on perinatal outcome, and economic crisis in two ways. First, the population lives in a rural area that is virtually all white, whereas samples of other studies were urban and had mixed races (Cornu et al., 1995; Gould & LeRoy, 1988; Joyce, 1989; Whiteford, 1993). Secondly, availability of health care and social welfare programs to the population in this study were not affected by the fishery crisis. Even though an economic crisis was occurring, women continued to have access to prenatal services, medical care, and to receive financial aid. Other studies that focused on how an

economic crisis affected perinatal health and birth outcome were based in the United States (Catalano & Serxner, 1992; Gould & LeRoy), Congo (Cornu et al.), Poland (Brzezinski & Szamotulska, 1994) and Dominican Republic (Whiteford). In these countries the health care systems do not offer the services that the Canadian system offers. Health care may not be free, health services may be decreased as a result of the economic crisis, and there may not be a welfare system to provide financial aid. For example, in countries like The Congo and the Dominican Republic, health services were negatively affected. The health care and social welfare environment experienced by the population for this study is most similar to that experienced by the samples in Najman et al. (1989), Golding et al. (1986), and Catalano et al., (1999) which were conducted in Australia, England, and Norway and Sweden respectively. In these countries individuals received unemployment benefits and continued to have access to health care services. The continuation of health and welfare services and the provision of the TAGS program to individuals in the study area during the fishery closure may provide a buffer effect. In other words, the negative impact of the fishery closure on perinatal health and birth outcome may be cushioned by the health and welfare systems.

The percentage of teenage mothers, although similar for both time periods is higher than the provincial average for which the latest report is available (Newfoundland and Labrador Centre for Health Information, 1998). In this present study just under 20% of the mothers are under 20 years of age and less than 4% of the fathers fell in the same category. However, when births less than 2,500 g are analysed separately it is found that a higher percentage of mothers in period 2 were between the ages of 16 and 19. This

finding may indicate that as the socioeconomic status of the people living in the area decreased, the number of teenage mothers at risk increased, as did the number of infants weighing less than 2,500 g at birth. This finding is consistent with the results of several other research studies. Gould and LeRoy (1988) studied the relationship between socioeconomic status, low birthweight, and inadequate prenatal care and they also found that with a decrease in socioeconomic status there was an increase in the number of teenage mothers. Furthermore, several researchers found that a young maternal age increased the chances of having a low birthweight infant (Berkowitz, 1981; DuPlessis et al., 1997; Lieberman et al., 1987). Specifically, Lieberman et al. found that maternal age of less than 20, single, being a welfare recipient and not having finished high school were all risk factors for having a premature infant. The presence of one of these factors increased the chances of having a premature infant from 4.7% to 7% and the presence of two factors increased the chance to 11.2%. Therefore, if a young pregnant woman living in this area affected by the fishery closure has one of these risk factors, she is at an increased risk of having a low birthweight infant.

The largest difference in sociodemographic characteristics between the two time periods studied is maternal and paternal education. More new parents after the fishery closure have a higher level of education. This finding is also seen when births of a newborn weighing less than 2,500 g are analysed. Bakketeig et al., (1993) used education as the basis for determining socioeconomic status, with parents who had low education considered to have a low socioeconomic status. These researchers found that parents with lower levels of education have infants that were 122 g lower than the

average birthweight. If education is used to determine socioeconomic status in this current study, this result indicates that parents with a higher socioeconomic status had more infants after the fishery closure and had more infants weighing less than 2,500 g at birth. This would be contrary to the finding of Bakketeig et al. (1993) and other studies that found that low parental education was related to having a low birthweight infant (Brzezinski & Szamotulska, 1994; O'Callaghan et al., 1997). There are several possible explanations for more educated people having children after the fishery closure. First, individuals with more education are able to retain employment and therefore feel they could afford to have a child, whereas individuals who lost their employment feel they are not financially able to have a child. Secondly, individuals returned to school after the close of the fishery and thus increased their education level. Finally, out migration may have played a role with individuals with lower education levels leaving the area to search for employment.

Unmarried mothers were very similar in pre and post moratorium period. The percentage of unmarried mothers was high with almost 40% of the mothers unmarried. What changed most between the two time periods in regards to marital status was the percentage of mothers married and in common-law arrangements. The percentage of those married decreased by 4.3% in the post-moratorium and common-law arrangements increased by 6% in the same time period. However, when births less than 2,500 g are analysed it is found that there are more mothers in period 2 who are married. This finding is in conflict with Berkowitz et al. (1981) who found that women who deliver preterm infants are more likely to be single. This finding raises the question of whether

these mothers had infants less than 2,500 g because of increased stress caused by the fishery closure. For example, a pregnant woman who is married, living in this area, may have an unemployed husband, the added responsibility of other children, and financial obligations. These circumstances may cause added stress and result in poor perinatal health and a negative birth outcome.

Pregnancy, Labour, and Delivery Characteristics

Post moratorium a slightly higher percentage of mothers had prenatal care, and of those mothers who did receive prenatal care, it began earlier. This result is contrary to the Eco Research professional survey finding where key informants felt that mothers were receiving less prenatal care since the fishery closure (Gien & Solberg, 1996). This finding is also in conflict with other research. Gould and LeRoy (1988) found that after a decrease in socioeconomic status there was an increase in mothers with no, only third trimester or unknown prenatal care. As well, Golding et al. (1986) found that wives of unemployed husbands were less likely to seek antenatal care in the first and second trimester or enroll in prenatal classes. Several explanations exist for why more mothers had more prenatal care after the fishery closure. These results may reflect that early prenatal care, possibly as the result of health education, is being viewed by women as being more important. As well, after the fishery closure more women have more time to seek prenatal care because they are unemployed. Finally, women in period 2 are more educated and, thus, are more likely to be aware of the importance of early prenatal care.

Of course with the information available, it is not possible to establish cause and effect. The slight changes observed could be related to variations in health professional

availability and programs offered.

There is a difference between the two groups regarding seeing a specialist for prenatal care. A specialist followed more mothers after the fishery closure and this care began earlier than for the mothers in period 1. This pregnancy characteristic is also seen for births less than 2,500 g. No research was identified that focused on the utilization of a specialist in relation to birth outcome. A possible explanation for this finding could be access to a specialist. In rural areas of Newfoundland doctors are sometimes transient and before the fishery closure there may not have been a specialist available in this area of Newfoundland and, therefore, more mothers were followed by general practitioners. Another possible explanation is that after the fishery closure more mothers are experiencing complications earlier in their pregnancy and, therefore, require medical care from a specialist. As with prenatal care, this difference between the two groups could be attributed to the mothers having more time. If seeing a specialist means going to a neighbouring community several hours away, this may be difficult if the woman is working. However, if she is unemployed she will have the time to travel this distance.

There are some differences between the two groups in the area of labour characteristics. Specifically, pre moratorium there were higher percentages of cesarean sections and forceps deliveries whereas post-moratorium there were a higher percentage of vacuum extraction deliveries. These differences may be attributed to the higher complication rate experienced during period 1 and, thus, the need to employ these interventions. It is not possible to rule out variation in practice among health professionals as a reason for the variation in labour and delivery outcomes.

Analysis shows that in period 1, a higher percentage of mothers have labour and delivery complications. Some of these complications may be a result of their type of employment. Women made up a large percentage of those employed in the fishery processing sector (Women's Policy Office, 1991). If their work required a large degree of physical effort, this may have contributed to certain complications during labour and delivery. Long hours of standing in a cold environment characterize the fish processing industry. As well, these complications may be the result of not receiving prenatal care or receiving late prenatal care.

A higher percentage of mothers in the post moratorium period had pregnancy complications. This finding raises the question of whether the stress of the economic crisis has negatively affected these pregnancies causing complications and, in turn, low birthweight infants. The source of this stress may be the result of unemployment or fear that they may face unemployment. Heaney et al. (1994) found that work conditions characterized by uncertainty and ambiguity were stressors for employees. Results showed that extended periods of uncertainty regarding job security resulted in a decrease in job satisfaction and an increase in physical symptoms such as shortness of breath, racing or pounding heart, chest tightness, and headaches. Thus, pregnant women who are experiencing stress, uncertainty and lower socioeconomic conditions related to the fishery closure may be negatively affected physically and this may increase their risk for pregnancy complications.

These finding are in agreement with several studies that focused on pregnancy complications (Gudmundsson et al., 1997; Norbeck & Tilden, 1983; Nuckolls et al.,

1972). Gudmundsson et al. found that the outcome of pregnancy was related to socioeconomic characteristics. For lower income groups, perinatal complications including PROM were higher. Furthermore, Norbeck and Tilden found that parity and life stress were significantly related to pregnancy complications. Results of Norbeck and Anderson (1989) are contrary to these findings. These researchers found that life stress was not a significant indicator of pregnancy complications. However, they did find that white women who had high stress and high support had longer labours and cesarean sections. Nuckolls et al. studied life crisis, psychosocial assets, and pregnancy and found that women who experienced increased life change and had high psychosocial assets had only half the pregnancy complications than women who scored low on psychosocial assets. Although psychosocial assets are not measured in this current study, the finding of Nuckolls et al. shows that life change can have a negative effect on pregnancy, causing complications.

Infant Characteristics

The specific infant characteristics that will be examined in this section include infant birthweight and gestation. Post moratorium infants have lower birthweights and shorter gestations. When infants born weighing less than 2,500 g are analysed, there are more infants after the fishery closure with a gestation of 37 to 40 weeks and this indicates that some of these infants are small for gestational age. These findings will be discussed in relation to research and other study results.

These results indicate that the high unemployment rate in the study area may be causing negative pregnancy outcomes as a result of increased stress levels. Studies that

have focused on unemployment and health showed that there was a negative effect on health, both physical and psychological, for individuals who are unemployed or are threatened with unemployment (Grayson, 1985; Grayson, 1989; Heaney et al., 1994; Joelson & Wahlquist, 1987). Furthermore, even when individuals were re-employed, they still experienced ill effects related to job loss (Dew, Bromet, & Penkower, 1992; Grayson, 1985). Research has shown that individuals affected by this fishery crisis have increased stress levels and that the family unit can be negatively affected. Specifically, pregnant women are at risk for stress related health problems, family violence, loss of support systems and increased responsibility in relation to their household role. The results of this current study indicate that pregnant women in this area, possibly because of these stressors, are at risk for having low birthweight infants. This finding is consistent with Pritchard and Mfphm (1994) and Norbeck and Tilden (1983) who found high stress levels result in a poor perinatal outcome.

The finding that an economic crisis can result in a higher low birthweight rate is also supported in the literature (Catalano & Serxner, 1992; Catalano et al., 1999; Cornu et al., 1995; Gould & LeRoy, 1988; Najman et al., 1989; Roberts, 1997). It has also been well established that low income and poverty are related to a poor perinatal outcome such as low birthweight and small for gestational age (Collins & David, 1990; Crosse et al., 1999; Elbourne et al., 1986; Manitoba Center for Policy Evaluation, 1991; Stein et al., 1987; Wilkins et al., 1991).

Najman et al. (1989) found that there was an association between unemployment and birthweight in couples where both are unemployed or the male partner is

unemployed. There was a difference of 50-100 g between the group where both partners were employed and the unemployed groups. They found that the high rate of cigarette smoking in these groups was having a negative effect on this outcome. Similarly, Golding et al. (1986) found that unemployment of the father impacted negatively on maternal behaviour. In relation to the current study, these findings indicate that lower birthweights that are found in the post fishery closure group may relate to a number of lifestyle factors such as increased smoking among the unemployed.

Joyce (1989) found no association between unemployment and low birthweight. The unemployment ratio for New York City was used in this study to see if the birthweight decreased as unemployment increased. However, the researchers had no data that indicated that the parents were employed or unemployed. Furthermore, they was no evidence that they were experiencing stress related to job loss. These findings differ from the current study where it is known that the population in the study area is feeling negative effects as a result of the fishery closure and even those who remain employed are feeling economic insecurity.

It has been shown that unemployed individuals have increased levels of urinary catecholamines, which indicates a stress response (Baum, Fleming, & Reddy, 1986). Maternal stress has been postulated to bring about catecholamine stimulation, and in the preterm pregnancy, can be accompanied by alpha adrenergic stimulation, increased muscle tone, vasoconstriction, and uterine contractions (Yawn, 1990). This may be the physiological process that is occurring to cause an increase in low birthweight in infants in the current study. Furthermore, Arnetz et al. (1987) showed that a woman's immune

function might be affected by unemployment. This may also have a negative effect on pregnancy outcome.

Catalano and Serxner (1992) raise an important issue regarding the "characteristics of regional economies"(p. 373) that may create a buffer effect against economic stress or may make individuals more susceptible to this stress. They expand on this by asking the question if the economic history of a community would make individuals more or less stressed when an economic downturn occurs. Individuals living in rural Newfoundland are used to a fluctuating economy. A successful fishing season does not ensure similar success in the following year. Women in Newfoundland have been living and coping with this economic uncertainty for hundreds of years. This history of coping with economic uncertainty may be buffering the effect of the fishery closure. Without this history of coping more of a difference in birthweight and gestation might be seen between the two time periods.

Another factor that may be buffering the effects of stress was the fact that TAGS provided income replacement for fishery workers. Additionally, those outside the fishery if newly unemployed would more than likely receive employment insurance. Rodriguez, Lasch, and Mead (1997) found that these types of programs have a protective effect on mental health for the unemployed.

In the past, another buffer to economic stress for rural Newfoundland women was their social support network. However, this buffer is in jeopardy for many women in communities affected by the cod moratorium. A review of the literature showed that women who are living in areas negatively affected by the northern cod fishery closure felt

that their social network had been affected. Social support networks were also in jeopardy because of out migration. Norbeck and Tilden (1983) studied social support and pregnancy. These researchers found the interaction of life stress during pregnancy with tangible support factors was significant for each type of complication. Furthermore, infants in the high stress/ low support quadrant had the highest rate of complications. In the study area, a decrease in social support may be a factor that is causing an increase in the low birthweight rate. As previously discussed, certain pregnancy complications are higher in period 2 and these may also be the result of a decrease in social support.

Penkower, Bromet, and Dew (1988) identified three risk factors that increased a woman's susceptibility to a long-term negative impact on her mental health; familial psychiatric history, financial difficulties, and low social support from relatives. These findings would indicate that women negatively affected by the fishery crisis, experiencing financial problems and a decrease in social support are at risk for poor mental health. This may, in turn, result in poor perinatal health.

Two studies discussed how a decrease in nutrition resulted in low birthweight (Brzezinski & Szamotulska, 1994; Cornu et al., 1995). Nutritional needs for women are different than those for children and men because of the requirements for menstruation and pregnancy. These high demands placed on women combined with poor nutrition cause women to be at risk for poor health outcomes (The Working Group on Women's Health, 1994). The Eco-Research community survey showed that individuals in the study area are decreasing their spending on food (Gien & Solberg, 1995). The difference in birthweight and certain complications between the pre and post fishery group may

indicate that, because of a decrease in nutrition, women are at increased risk for poor perinatal health and having low birthweight or small for gestational age infants.

Summary

Both positive and negative differences in perinatal health are evident between the pre and post fishery group. A higher percentage of women among the post moratorium group received prenatal care. They also received care at an earlier period. The reason for these changes in care may be related to factors other than the moratorium. However, pregnant women and their infants also appear to be vulnerable to adverse health effects that would accompany an economic downturn as evidenced by poor perinatal health and outcome.

CHAPTER 6

IMPLICATIONS

Implication of Study for Current Theory

The conceptual framework underlying this study is partially supported by the results. The framework is based on possible interrelationships among four main variables; economic crisis, increased stress, lower socioeconomic conditions, and adverse perinatal outcomes. Individuals living in this area are experiencing an economic crisis, more stress, and lower socioeconomic conditions. It was conceptualized that this situation would affect perinatal outcome as evidenced by an increase in complications of pregnancy, congenital anomalies, and premature births. It was believed that there would be lower birth weights and Apgar scores, and mothers would receive less prenatal care. The results show that there are a higher percentage of infants born prematurely and with lower birthweights post moratorium. As well, there is an increase in certain complications. However, there is no increase in the number of congenital anomalies, decrease in Apgar scores or decrease in prenatal care. These results lend support to the growing body of knowledge that conceptualizes that an economic crisis, stress and anxiety will have a negative impact on perinatal outcome in the areas of gestation, birthweight, and complications of pregnancy.

Implications for Nursing

Practice

The results of this descriptive exploratory study indicate that healthy child development, a key determinant of health, may be negatively influenced by the fishery closure as evidenced by a higher percentage of pregnancy complications and low birthweight infants post-moratorium. A review of the literature has shown that other key determinants of health are also negatively affected by this economic crisis – social support, coping skills, and personal health practices. Using this information as a guide the first step nurses should take in the study area is to conduct a needs assessment and have focus groups with women in the area. This would determine to what extent the key determinants of health are impacted, the felt needs of the women, and any barriers that would prevent them from seeking prenatal care. Programs can then be planned based on the results of this assessment. The following paragraphs outline some key concepts that nurses should consider during program planning.

Nurses should be aware of the importance of early prenatal care in the prevention of low birthweight. Prenatal care that occurs during the first trimester would have the greatest chance of positively influencing women's pregnancies and subsequently the outcome (Stewart, Ramsingh, Potter, & Nadon, 1993). The content of prenatal education should include information about pregnancy, birth, infant care, parenting, and the signs and symptoms of pre-term labour (Moore & Freda, 1998). The results of this study have shown that women are receiving prenatal care during their pregnancies. However, there

are some women that are not receiving care until the second and third trimesters. Steps should be taken for all women to have the opportunity to have prenatal care in the first trimester of their pregnancy. Nurses should raise awareness of the community regarding the importance of early prenatal care by using various marketing strategies such as posters, pamphlets and forums. As well, women who are pregnant should be referred to the community health nurse early in their pregnancy through the development of a referral process from educators, social workers, general practitioners, and church workers.

Secondly, nurses should be aware that the content of prenatal programs should reflect the impact that the fishery closure has had on the key determinants of health. These programs should also address stress reduction, healthy lifestyle, and social support. Women who have health education as part of their prenatal care are at lower risk of delivering a low birthweight baby (Kogan, Alexander, Kotelchuck, & Nagey, 1994).

Nurses should explore the use of enhanced prenatal care programs. These types of programs have been shown to decrease the incidence of low birthweight (Moore & Freda, 1998). One method of prenatal care delivery that would meet the needs of pregnant women, especially social support, is pregnancy support groups that utilize the resource mother concept. This type of program would use women from the community to act as a bridge between pregnant women and health care professionals (Moore & Freda). Women would begin attending this group in their first trimester and would receive education and support from the program for the remainder of their pregnancies.

Community health nurses in this area should also be aware that women face

barriers to prenatal care. Lack of transportation (Curry, 1989: Goldenberg, Patterson & Freese, 1992), difficulties with child care (York & Brooten, 1992), fear, or embarrassment about being single are some of the possible barriers that would make obtaining prenatal care difficult for women. Planning and implementation of a program for pregnant women would have to address barriers to prenatal care that were identified during assessment.

Nurses should also recognize that the needs of pregnant adolescents are complex and differ from the needs of older pregnant women. The results of this study showed a higher percentage of mothers in post-moratorium between the ages of 15 and 19 who had infants born weighing less than 2,500g. This may indicate that there is a need for a pregnancy support group that focuses on pregnant adolescents only.

It is important for nurses in the study area to be aware that married and better educated women are also having complication during their pregnancies and low birthweight infants. This differs from the expected finding that a higher percentage of single women with low educational levels would be having poor birth outcomes. In program planning and implementation nurses should be aware that these women are at risk for complications and poor birth outcome.

Nurses should also recognize that several health promotion programs and education initiatives could be targeted to entire populations that would help contribute to healthy child development. Such programs as food banks, healthy eating, family violence, stress reduction, anti-smoking, and environmental improvement (water, sewage)

would all improve health and, in turn, promote health of mothers and children.

Finally, nurses need to be aware of the importance of networking with community agencies and other health care professionals. Nurses should provide information regarding the perinatal health of the area, the causes of preterm labour and the signs and symptoms of early labour. As well, nursing should support any health promotion initiatives that are being made that support healthy child development. For example, a public health nurse could inform church groups running food banks about the type of grocery items that should be provided to pregnant women. Public health nurses can be an important resource for community groups and individuals who are looking for information on determinants of health and what is needed to develop and run programs effectively (Halbert et al., 1993).

In summary, in order to improve healthy child development nurses must employ a population health framework focusing on pregnant women in the study area and deviate from the traditional focus on women who already are experiencing complications. By employing the principles of health promotion with a population health foundation, nurses are investing in healthy child development and, in turn, the health of the whole community.

Education

Nursing curricula need to move more towards population health and away from the traditional methods of focussing on the sick or at risk individuals. The principles of health promotion need to underpin the curriculum in order for population health to become a way

of thinking and not an approach that is foreign to nurses. Students need to gain experience developing and implementing community programs that have a health promotion and disease prevention focus and take into account the determinants of health. Just as importantly, students need to have the opportunity to encourage and empower individuals and communities to achieve and maintain health.

Specifically, the results of this study indicate that nursing curricula should stress how economic crises that cause unemployment and the threat of unemployment have a negative effect on the determinants of health. Maternal child and community health nursing courses need to focus on how healthy child development, a key determinant of health, can be negatively affected by economic downturns as evidenced by an increase in the percentage of pregnancy complications and low birthweight infants. Students then need to learn how to apply the principles of population health to develop strategies to improve birth outcome such as early prenatal care programs.

Research

Heaney et al (1994) argued that effects of job insecurity become more potent as the length of time the individual is exposed to the stressor increases. Furthermore, there is concern that as the income support is phased out there could be a further drop in the economic state of Newfoundland (West et al., 1996). This raises the question of whether the effects identified in this study will become more marked for pregnant women as the economic crisis continues. Therefore, the results of this study should be extended by analyzing data from the next three years in this area to determine if the trend towards an

increase in the low birthweight rate, shorter gestation and the other negative effects discussed continues. Furthermore, the data employed for this study did not include still births or miscarriages. An analysis of this information in conjunction with the data from the LBNF would add to the interpretation of the findings.

A prospective study would eliminate the limitations faced in this research. For example, a sample of pregnant women including some who had been negatively affected by an economic crisis and some who had not been negatively affected should be studied. The perinatal health and birth outcome of the women and their infants would be assessed. This type of study would then allow the researcher to determine whether or not women who are experiencing an economic crisis are more likely to have poor perinatal health and birth outcome. A prospective case control study design would also allow the researcher to control for certain factors such as negative maternal behaviours. This would then eliminate any competing causes of the effects noted in the study.

Implications for Public Policy

Policy should be developed that takes into consideration how the economic crisis caused by the fishery closure has negatively affected perinatal health. Development of policy, especially maternal - child policies, that reflects the determinants of health will ensure programming and services that empower and support individuals and communities to achieve health. Nurses cannot develop policy in isolation from other important parties as many of the determinants of health are not under the umbrella of health. Policy must be developed in collaboration with other organizations from the areas of education,

economics, environment, employment, and social services and the three levels of government. Most importantly, women who are negatively affected by the fishery closure should be an important part of any policy and programming initiative (Advisory Committee on Population Health, 1994).

Other policy implications are identified from completing this study. First, changes are required to the LBNF used by the Government of Newfoundland and Labrador. The form at present does not include several variables that would aid in providing a more comprehensive picture of perinatal health and healthy child development in the province. For example, at present, employment status, income level, attendance at prenatal classes and maternal health behaviours are not included. Therefore, the form should be changed to include this information. A revised form would allow for more comprehensive population health research to be conducted in the area of healthy child development. The information from this research could then be used to develop programs and services that will maintain and achieve healthy communities.

Secondly, how the LBNF is used in practice should be reviewed. The data used for this study had missing information. This may have been because the individual filling out the form had inadequate training in using the tool. Training should be provided to health care providers on how to use the form, and the importance of completing all questions and ensuring the information is accurate.

Limitations

There are several limitations to this study that should be considered when interpreting the research findings. First, the data did not include mediating factors such as social support, which has been identified from the literature as having both a negative and positive effect on birth outcome.

Another possible limitation is the division of the data into the pre and post moratorium groups. Identifying the best approximation of prenatal health was not as simple as dividing the groups at the July 2, 1992 cod moratorium announcement. It was decided that the timeframe used for division of the data (1990-1992, 1993-1995) was the best approximation even though there were some mothers in the pre-moratorium group who had their babies after the announcement of the moratorium. This decision was based on several factors. First, it was difficult to determine when the stress level for individuals in the study area began to increase. Plant closures and fishery quota cuts were occurring prior to the cod moratorium (Women's Policy Office, 1991). Secondly, with the announcement of the moratorium many individuals felt disbelief before stress set in. Finally, because of the protective effect of social programs that were put in place by the Federal Government it is not known when the effects of stress in relation to the moratorium became evident.

vonKoss Krowchuck et al., (1995) identified several limitations of using health records, such as these used in this study, as sources of data. These include; purposes of the record, missing data, information interpretation, and information verification. These

disadvantages can be seen in this study. The information in the LBNF was not recorded for the purposes of research. Therefore, research protocols that would normally be in place when data are obtained were not utilized. In turn, there may be problems with the accuracy of the data and this may have affected the research findings.

Secondly, some of the information from the LBNFs was missing because either it was not recorded or second, it was not available as a result of the design of the record. vonKoss Krowchuck et al. (1995) view the limitation of missing data as most common when using health records. As identified in the results chapter, there was a small amount of missing data. Missing data also resulted in inconsistencies between information in different sections of the form. Furthermore, the design of the form did not include several factors that would have aided in the interpretation of the findings. These include employment status, income level, nutrition of the mother, smoking, and other lifestyle habits of parents.

Another possible limitation relates to the difficulty with information interpretation. Illegible handwriting or poor quality of the copy of the form may make correct interpretation difficult (vonKoss Krowchuck et al., 1995). For this study the data was obtained from the Department of Health on a computer diskette. As a result, it is impossible to know the extent of this problem. However, the person who entered the information may have had difficulty reading the writing on the form and this would negatively affect the data entered and, thus, the results.

Another major disadvantage of using the LBNF is that there is no way to verify

that the information obtained is correct. It must be assumed that the data is accurately recorded by the health care professional responsible.

A final limitation of the study is that no causal connection could be made between the fishery crisis and perinatal health. Although the purpose of the study was limited to comparing health data pre and post moratorium in the selected area, an assumption underlying the study was that economic crises do affect perinatal health. However, changes observed could be due to other factors, such as, changes in health care personnel, programs, and policy.

Conclusion

A review of the literature shows that the northern cod fishery closure has negatively affected the determinants of health of individuals living in communities impacted by this economic crisis. This descriptive exploratory study suggests that healthy child development - a determinant of health - may be negatively affected as a result of this economic crisis. Specifically, differences are seen regarding perinatal health prior to and after the fishery closure. Although limitations exist in the study design, this research raises important questions about perinatal health in communities that are experiencing an economic crisis. Furthermore, the results have direct implications for nursing practice and policy development using a population health framework.

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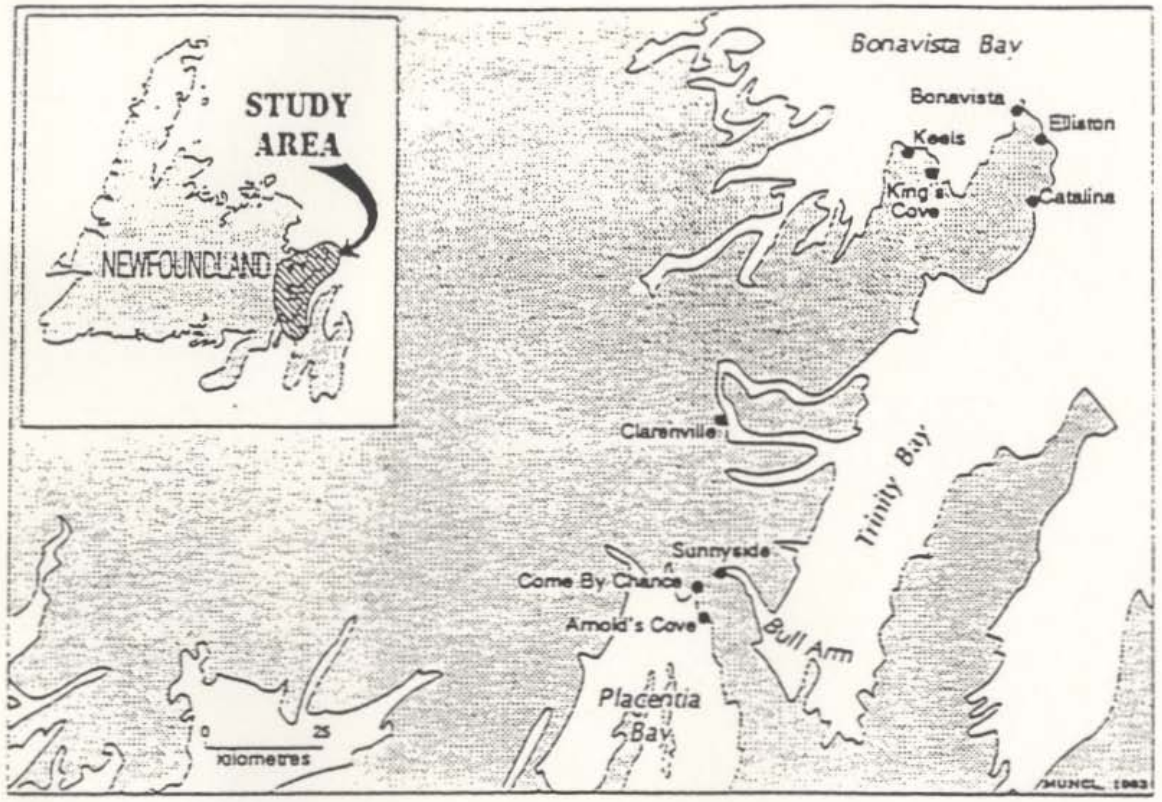
Appendix A

Map of Study Area



Study Area

Appendix B

Live Birth Notification Form

LIVE BIRTH NOTIFICATION

Government of Newfoundland and Labrador
Department of Health

MCP number

Registration number 10

SECTION A – Mandatory for Registration of Birth (required within 48 hours of delivery)

CHILD

1. Surname, Given Name(s)
2. Sex ☐ M ☐ F ☐ Unknown
3. Date of Birth (Y/M/D)
4. Hospital
H. Code
Birth location (City, municipality/place)
SRCode
5. Hosp. Adm. No.

MOTHER

6. Surname, Given Name(s)
Birth Surname
7. MCP#
8. Hosp. Adm. No.
Hosp. chart No
9. Date of Birth (Y/M/D)
10. Age
11. Birthplace (Province/Country outside Canada)
SRCode
12. Mother's Home Address
SRCode
Postal Code
13. Marital Status
1 ☐ Never Married 4 ☐ Divorced
2 ☐ Married 5 ☐ Common Law
3 ☐ Widowed 6 ☐ Separated

FATHER

14. Surname, Given Name(s)
15. Date of Birth (Y/M/D)
16. Age
17. Birthplace (Province/Country outside Canada)
SRCode

SAMPLE

I certify that the information given is true and accurate to the best of my knowledge and belief.

Signature of Mother and/or Father
DATE YEAR MO DY

SECTION B – Health History and Medical Certification of Birth

PART 1 – HEALTH HISTORY

18. Education Attained (Parents)
a. Mother b. Father
19. Baby's Religious Denomination
20. Number of Children Ever Born to this Mother (including this livebirth)
LiveBirth StillBirth
21. Date of Last Delivery (if applicable)
YEAR MO DY
1 ☐ Live
2 ☐ Stillborn
22. Kind of Present Delivery
a. 1 ☐ Single 2 ☐ Twin 3 ☐ Other
b. Number of Stillborn
23. Multiple Birth Sequence
1 ☐ 1st 2 ☐ 2nd
3 ☐ Other – Specify
24. Birthweight (in grams)
g
25. Trimester Prenatal Care Began
1 ☐ None 3 ☐ 2nd
2 ☐ 1st 4 ☐ 3rd
26. Apgar score
1' 5' 10' 15'
27. Family Physician
28. Specialist for Prenatal Care
☐ No
☐ Yes ▶ Trimester ☐ 1st ☐ 2nd ☐ 3rd

PART 2 – PHYSICIAN SECTION

30. Delivery
Presentation
1 ☐ Cephalic 2 ☐ Breech 3 ☐ Other
Mode
1 ☐ Spont. 3 ☐ Forceps 4 ☐ Vacuum
2 ☐ C/S
Indications for C/S:
ICD9 >

31. Labour
1 ☐ Spont. 2 ☐ Induced 3 ☐ VBAC offered 4 ☐ Complications: list
ICD9 > ICD9 >
ICD9 > ICD9 >

32. Complications of Pregnancy
1 ☐ None 4 ☐ Antepartum haemorrhage 7 ☐ Anemia < 100 G/L
2 ☐ Toxaemia or hypertension 5 ☐ Diabetes (Ins. Dep.)
3 ☐ Rhesus isoimmunization 6 ☐ IUGR
10 ☐ Other (Complications of Pregnancy) (List below)
ICD9 > ICD9 >
ICD9 > ICD9 >

33. Neonatal Conditions/Birth Injuries noted at Birth 1 ☐ None 2 ☐ Yes – Specify
ICD9 > ICD9 >

34. Gestation Period completed weeks

35. Congenital Anomalies
1 ☐ None 2 ☐ Anencephalus 3 ☐ Spina bifida
4 ☐ Hydrocephalus 5 ☐ Craniofacial 6 ☐ Fetal alcohol syndrome
7 ☐ T-E fistula 8 ☐ Hypospadias/epispadias 9 ☐ Reduction deformity of limbs
10 ☐ Rectal / anal atresia / stenosis 11 ☐ Omphalocele / gastroschisis
12 ☐ Chromosomal anomalies ICD9 >
13 ☐ Other congenital anomalies ICD9 >

29. Familial Diseases (Up to and including second cousins of parents) 1 ☐ No 2 ☐ Deafness 3 ☐ Other (Please Specify Below)
ICD9 > ICD9 > ICD9 >

36. Delivered By (Surname, Given Names) Code

Position/Title
Signature
DATE YEAR MO DY

Appendix C

Letter to Department of Health

12 Clevedon Cr
Paradise, NF
A1L 1E9
August 1996

Department of Health
Health and Statistics and Research
Confederation Building
Government of Newfoundland and Labrador

Dear Ms. Ryan

I am a Masters of Nursing student with Memorial University of Newfoundland School of Nursing. As a graduate student I am part of an Eco-Research project that is studying the effect of the cod moratorium on health in the Bonavista headland area. For my thesis, I am focusing on how the impact of the moratorium has affected the birthweight and risk factors for low birthweight for this area. I hope to employ data from the Department of Health to complete this thesis. Please accept this letter as a request for data from the Department of Health's Live Birth Notification Form.

Specifically, I am interested in births in two time frames (1990-1992) and (1993-1995) for mothers who reside in the following communities in the Bonavista headland.

- Trinity
- Trinity East
- Port Rexton
- Trouty
- Bonavista
- Port Union
- Catalina
- Little Catalina
- Maberly
- King's Cove
- Champney's
- Champney's East
- Knights Cove
- Melrose
- English Harbour
- Dunfield
- Old Bonaventure
- New Bonaventure
- Goose Cove
- Newman's Cove
- Elliston
- Spillars Cove
- Amherst Cove
- Lancaster
- Keels
- Duntara
- Stock Cove
- Plate Cove East
- Plate Cove West
- Tickle Cove
- Red Cliff
- Open Hall
- Lockston

In relation to the Live Birth Notification Form, the following information about each birth is required.

- hospital/birth location
- sex of child
- date of birth
- mother's age
- father's age
- mother's community of residence
- marital status
- education of parents
- number of children born to this mother
- date of last delivery
- kind of present delivery (single or twin)
- birthweight in grams
- trimester prenatal care began
- Apgar score
- specialist for prenatal care
- familial diseases
- delivery
- labour
- complications of pregnancy
- neonatal conditions
- gestation period
- congenital anomalies

If possible this information would be most useful in the form of an ASCII file. Thanking you in anticipation of any help you can give me in fulfilling this request for data.

Sincerely,

L. Kathy Stevens

Appendix D

Oath of Confidentiality

PRESERVATION OF CONFIDENTIALITY STATEMENT

WHEREAS the information held by the Division of Health Research & Statistics to which I request access is personal and confidential,

I, _____, agree to do my utmost to respect and protect the sensitivity and confidentiality of the information to which I have been granted access in the pursuit of my research.

I further agree that I will ensure that any person working with me or under my direction, who will have access to the confidential information, subject of this statement, will have signed a statement identical in form to this, before gaining access to any of the information.

I further agree that I will ensure that no research data or materials will be gathered or created, in whole or in part, based on the confidential information, which could lead to the identification of any individual.

Dated at _____, Newfoundland,
this _____ day of _____, 19__.

WITNESSED BY:

_____
(Notary, Justice of Peace, Lawyer)

SIGNED BY:

_____