EVALUATING THE EFFECTIVENESS OF A BREASTFEEDING PROMOTION COMMUNITY STRATEGY IN SAGKEENG FIRST NATION

BY

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A Thesis
Submitted to the Faculty of Graduate Studies
in Partial Fulfillment of the Requirements
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DOCTOR OF PHILOSOPHY

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Evaluating the Effectiveness of a Breastfeeding Promotion Community Strategy in Sagkeeng First Nation

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ABSTRACT

Objectives of this research were to evaluate:

1. a peer counsellor (PC) program, designed to increase satisfaction with and duration of breastfeeding;

2. a school adolescent teaching session, designed to create positive breastfeeding beliefs and attitudes;

3. a hospital education program, designed to decrease supplementation rates of breastfed babies, increase compliance with the WHO/UNICEF Baby Friendly Hospital Initiative (BFHI), and create positive beliefs/attitudes;

4. the effectiveness of community breastfeeding promotion activities from 1992 to 1997.

The PC program evaluation was a separate sample pretest - post-test design, (comparing women who did or did not receive the program), using a survey based on the Breastfeeding Decision-Making Model (Martens and Young, 1997), qualitative semi-structured interviews (n=22), and community chart audits. The PC program was associated with a decreased risk of weaning (0.47, 95% CI 0.22-0.99, p=0.04, 1996-97 data adjusted for parity and birth weight), increased satisfaction with breastfeeding (median 5 vs. 4, p=0.07, n=22), decreased number of reported breastfeeding problems (median 1vs. 2, p=0.044), and recognition of the Peer Counsellor as a valuable resource.

The school evaluation was a randomized pretest - post-test control group design. The session was associated with an increase in Breastfeeding Beliefs (true treatment effect TTE 0.85, $p=0.004$). Learning effects were gender-specific. Females experienced an increase in Breastfeeding Beliefs (TTE 1.12, $p=0.004$), decrease in Bottle Feeding Beliefs (TTE -0.77, $p=0.04$), and possible increases in Breastfeeding Attitudes (TTE 0.41, NS). Males showed small, inconsistent learning effects.

The hospital evaluation was a quasi-experimental pretest - post-test design, using staff surveys and chart audits. The intervention hospital experienced an increase in BFHI compliance (24.3 to 31.9, $p=0.0009$) and in breastfeeding knowledge (55.0 to 58.8, $p<0.05$), and a decrease in supplementation of breastfed babies (69% supplemented before, 46% after; $p=0.017$).

The Sagkeeng community breastfeeding initiation rate of 60% in 1997 was higher than any year from 1992 to 1996 (RR = 1.5, adjusted for birth weight and parity, $p=0.0009$). This was associated with promotional efforts, including production of resource materials and changes in prenatal education.

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1.1. Statement of the problem

Child health is an important issue in Canadian First Nations communities. The crude birth rate and fertility rate are almost double the Canadian rate, and the proportion of children ages 0 to 15 years is also double that for the overall Canadian population (Young, 1994). There are elevated morbidity rates of childhood illnesses including gastroenteritis, otitis media, respiratory infections and childhood-onset Type II non-insulin-dependent diabetes (Ellestad-Sayed et al., 1979; Evers and Rand, 1982; Evers and Rand, 1983; Thomson and Philion, 1991; Thomson, 1994; Dean et al., 1992; Gessner et al., 1995). There is some evidence that these pediatric illness rates can be reduced by increasing community breastfeeding rates (Cunningham et al., 1991; Thomson, 1994; Wright et al., 1998; Pettitt et al., 1997). But breastfeeding initiation and duration rates in southern Manitoba First Nations communities are generally lower than overall Canadian rates (Stewart, 1985; Langner, 1988; Martens, 1994; Levitt et al., 1995).

The purpose of my research was to evaluate the effectiveness of a southern Manitoba First Nations community-based program to promote breastfeeding. Three specific program initiatives of Sagkeeng First Nation were evaluated: an individual postpartum peer counselling program designed to increase the duration of breastfeeding; a community adolescent health education program designed to increase community awareness as to the importance of breastfeeding; and a hospital teaching program designed to increase exclusive breastfeeding rates in hospital and to increase compliance with policies and practices protective of breastfeeding. General community breastfeeding trends from 1992 to 1997 inclusive were also examined.

In order to understand the reason why these particular program were implemented and evaluated, Chapter One includes the historical context of First Nations peoples of Canada, the history of Sagkeeng First Nation, its community structure and recent health initiatives. Chapter Two discusses relevant reviews of the existing literature on the relationship of breastfeeding and child health, the effectiveness of breastfeeding promotion programs, and the problems encountered by small numbers analyses. Chapters Three to Six are the evaluations of the programs, including the peer counsellor pilot program, the adolescent health program, the hospital intervention, and the community trends analysis for Sagkeeng.

1.2. Canadian terminology for First Nations peoples and communities

According to the Report of the Royal Commission on Aboriginal Peoples (Royal Commission on Aboriginal Peoples, 1996:xiv-xv), "Aboriginal people" refers to the indigenous inhabitants of Canada. Three Aboriginal groups are recognized within Canada; First Nations people, the Inuit[1] in northern Canada, and the Métis. The term "First Nations people" replaces the terms "Indian" or "Native American", except where historical quotes or specific legislative terms, such as the "Indian Act", uses such terms.

1

The term, "Inuit" was once referred to as "Eskimo", a term still used in Alaska. But the peoples of northern Canada prefer the term 'Inuit", meaning, "the people", and consider the word "Eskimo" to be somewhat derogatory and of non-Inuit derivation (Young, 1994:6; Royal Commission on Aboriginal Peoples, 1996:81)

Métis are distinct Aboriginal peoples of mixed heritage, First Nations and European, who also associate themselves with a distinctive "Métis" culture.

Separate tracts of land called "reserves", set aside through legislation and reserved as "Indian land" differentiates this land from other provincial or territorial boundaries under legal terms and treaties (Royal Commission on Aboriginal Peoples, 1996:261). In the past few years, the term "First Nations community" is also commonly used and is now considered a more appropriate term than "reserve" when referring to "a relatively small group of Aboriginal people residing in a single locality" (Royal Commission on Aboriginal Peoples, 1996:xiv). Throughout this thesis, the term "Sagkeeng First Nation community" refers to a reserve also known as Fort Alexander.

At the beginning of its existence as a confederation in 1867, Canada passed the *British North American Act* or *Constitution Act* which gave federal jurisdiction to "Indians and Lands reserved for the Indians". Terms of the 1876 "Indian Act" further designated "status" (or Treaty, or registered) and "non-status" Indians in legal terms. First Nations women have been considered disadvantaged by this act through discriminatory clauses relating to entitlements of land, voting rights, Treaty-status[2], and Band membership (Royal Commission on Aboriginal Peoples, 1996:300). All "status Indians"

2

In 1876, the Indian Act declared that women became associated with the First Nations community of their husbands. Women who married non-Treaty men forfeited their own Treaty status. But Treaty men who married non-Treaty women kept their status. Thus the European influence encouraged patrilineal and patrilocal culture. It took until 1985, under Bill C-31, to end the discrimination. But some claim that even current attempts to give women Treaty-status has resulted in a further undermining of females - this time, aimed at the grandchildren of the status male having full status, whereas the grandchildren of the status female possibly not. Children of a status woman married to a non-status male can pass on status only if they marry registered (status) Indians [personal communication with Rita Guimond, Sagkeeng Band Office].

are members of a Band, which is a governing body of the local community. Within these communities, housing and land is communally owned and housing is granted to people as the community officials see the need.

The governing body of a First Nations community is the elected Chief and the Band Councillors. This form of government was introduced by the Canadian government early in the history of negotiations, and supplanted the traditional concept of "elders" and spiritual leadership (Young, 1988; Royal Commission on Aboriginal Peoples, 1996:257). In order to restore traditional leadership models, some communities have instituted a variation which includes both elected boards and appointed elder advisors.

1.3. A history of First Nations people within Canada

Prior to contact with Europeans, the Aboriginal peoples of Central Canada occupied large areas of land and lived in small autonomous groups of about forty people (Leacock and Lurie, 1971; Morrison and Wilson, 1986). Qualities essential to survival included self-reliance, mutual co-operation, and the values of sharing, generosity and hospitality (Young, 1988). During the period of European contact, three chronological phases have been identified: first, the era of early contact; next, the stage of stabilized fur trading and missionary activity; and third, the government and industrial stage (Leacock and Lurie, 1971). This section will take a slightly different approach, using thematic rather than chronological analyses and focusing on three themes - the *economic*, *health* and *educational* impact of European contact on Aboriginal people.

First Nations people's *economic* activities in the past three hundred years have been intertwined with European trade, commerce and colonization. The beginning of European contact involved competition between France and Britain for control of the rich fur-trading areas. A British royal charter in 1670 granted the Hudson's Bay Company exclusive trading rights, and resulted in the transition from semi-nomadic lifestyles to settlement lifestyles, where First Nations "middlemen" negotiated between fur trading posts and inland trappers. Game depletion, seasonal fluctuation, world prices and an increasing dependence on the trading company for technological supplies resulted in an increasing dependence on external trade.

In the early to mid 1900's, the emphasis shifted from fur trapping to extractive industry such as mining and lumbering. The latter half of the 1900's has seen the proliferation of seasonal occupations - such as fire-fighting, tourism, tree-planting, logging, mining and construction - temporary employment which fluctuates with world prices and demand. Service industries, such as government, school, social service and health offices, create more permanent jobs in First Nations communities, but these positions are scarce. Unemployment has been described as a way of life. According to Young (1994), 15% to 20% of people living in First Nations communities received social assistance during the 1980's, compared with the overall Canadian average of 6% to 8%.

Health issues have been a concern of First Nations peoples ever since Euro-Canadian contact. Exposure to Europeans brought the rapid spread of infectious diseases, including smallpox, measles, whopping cough and tuberculosis (Young, 1994; Graham-Cumming, 1967). The Aboriginal population was ravaged by infectious disease epidemics. Infectious rates remained high due to famine, poor nutrition, and changes in subsistence strategies, all resulting from pressure of European settlers to populate traditional land territories.

The Canadian government was a major force in the history of Aboriginal health. The signing of the British North America Act of 1867 created the confederation of Canada, a dominion within the British Commonwealth. The BNA Act detailed jurisdiction of the federal government and the provincial governments. This was the beginning of a wide-ranging debate on the area of health care jurisdiction for First Nations people. The "Indians" were identified as a group to whom the federal government was constitutionally responsible, yet health institutions[3] were designated as a provincial concern. Section 91 of the BNA Act states;

> "...the exclusive Legislative Authority of the Parliament of Canada extends to all matters coming within the classes of subjects next hereinafter enumerated, that is to say:-...24. Indians, and Lands reserved for the Indians:"

The subsequent Indian Act of 1869, legally called the "Indian Enfranchisement and Management Act", reinforced the federal government's exclusive powers over the First

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Those areas specifically relating to health care in the 1867 BNA Act under the jurisdiction of the provinces (Section 92) include: "The establishment, maintenance, and management of Hospitals, Asylums, Charities, and Eleemosynary [charitable] Institutions in and for the Provinces, other than Marine Hospitals". Federal responsibilities outlined in Section 91 which pertain to health care include quarantine, establishment and maintenance of "marine hospitals", health responsibility for "Indians", militia, military and naval service, federal public service employees, penitentiary inmates, and immigrants, census and statistics involving health, and aspects of international health.
The Indian Act of 1874 makes an attempt at clarifying the legislative authority of the federal government's jurisdiction over First Nations peoples, culminating with the amendments in 1952. Even though the Act empowers the minister to make regulations to "prevent, mitigate and control the spread of diseases on reserves; to provide medical treatment and health services for Indians, to provide compulsory hospitalization and treatment for infectious diseases, and to provide for sanitary conditions...on reserves", there was always the opinion of the federal departments that this free medical services was not a matter of Indian right, but rather of magnanimity. (Grauer, 1939; Shillington, 1972; Young, 1988)

Nations people and their land (Young, 1988; Elias et al., 1997; Royal Commission on Aboriginal Peoples 1996:274).

In the late 1800's, federal negotiations ensured the surrender of Indian lands for transportation corridors and white settlements. Treaties were signed which exchanged First Nations' land for provision of health benefits, basic education, and annual cash payment to Treaty-status Indians. Aboriginal groups have asserted that health care was a matter of Treaty right. Treaty 6, established in 1876 between Canada and the Cree First Nations peoples of Central Alberta and Saskatchewan, contained significant clauses relating to future discussions of health provision:

> "In the event hereafter of the Indians ... being overtaken by any pestilence, or by a general famine, the Queen ... will grant to the Indians assistance of such character and to such extent as Her Chief Superintendent of Indian Affairs shall deem necessary and sufficient to relieve [them] from the calamity that shall have befallen them.... A medicine chest shall be kept at the house of each Indian Agent for the use and benefit of the Indians at the direction of such Agent"

Historians feel that similar health provisions were probably discussed during many other treaty negotiations but were not written down. Even though the Indian Act empowered the federal minister to make regulations to "prevent, mitigate and control the spread of diseases on reserves; to provide medical treatment and health services for Indians, to provide compulsory hospitalization and treatment for infectious diseases, and to provide for sanitary conditions...on reserves", federal departments maintained the stance that medical services were not a matter of Indian right, but rather of magnanimity (Young, 1988).

In the late 1800's and early 1900's, poverty, poor housing, and overcrowding increased the rate of infections. Access to many band communities was by boat, and the sole provision of medical services was the annual visit of the government Treaty party. The accompanying physician examined residents, performed minor surgery, pulled teeth, and later, with the advent of technology, performed vaccinations and X-rays for smallpox and tuberculosis.

In the mid-1900's, possible motivation for extending provision of health services to First Nations communities may have been more political than benevolent, including concerns of epidemics jeopardizing the health of white communities within proximity of First Nations communities, the provinces' inability to assume the financial responsibility for Aboriginal health, and the federal department attitude of "benevolent paternalism" linked to efforts to "civilize" the people. Many government agencies were involved in managing the health and welfare of the First Nations people (Leacock and Lurie, 1971; Young, 1988). Health services was part of the federal Indian Affairs Branch until 1945, when it was transferred to the federal Health Department (Young, 1988). Eventually a new directorate, called the Medical Services Branch (MSB), was established in 1962 to provide medical services to those groups outside provincial health jurisdiction. Services to First Nations communities was a major part of the MSB activity.

Since the mid 1900's, infectious disease rates have decreased, only to be replaced by increases in chronic, degenerative diseases such as diabetes, cancer, heart disease and cardiovascular disorders (Garro, 1995). Health continues to be a concern, as many Aboriginal communities cope with substandard living conditions and poor access to adequate water supplies and sewage disposal. Some communities have already undergone the process of transfer of health care, with Band-controlled health centres which hire their own community health nurses and workers. Other communities still use the Medical Services Branch to administer health care services, with community health nurses being federally hired and administered.

The final theme in this analysis is *education.* In the mid 1800's, missionaries began evangelizing the Central Canada tribes, building permanent church structures within the small villages and communities. White missionaries discouraged indigenous religious rites and culture. In the late 1800's the government of Canada encouraged the eradication of Aboriginal cultural and spiritual identity and supported the establishment of residential schools managed by the churches (Sessional Papers XXVII, 1904, as quoted in Lithman, 1984:45):

> "As a civilizing factor the advantage of the removal of the pupils from the regressive influence of home life is shared pretty equally by the industrial and boarding schools, although the latter are generally situated on or near reserves with a view to overcoming the strong objection manifested by the parents to the removal of their children to any great distance."

The civilizers in the churches and the government truly believed that "a wedge had to be driven not only physically betweeen parent and child but also culturally and spiritually", since "only in such a profound fashion could the separation from savagery and the re-orientation as civilized be assured" (Royal Commission on Aboriginal Peoples, 1996:341).

Aboriginal children resided in church-managed boarding schools for the entire year except for a few weeks in the summer. The residential schools resulted in the destruction and alienation of generations of children from their culture. Accounts of physical and sexual abuse, punishment for expressions of Aboriginal culture (such as speaking their own language), woeful neglect and malnutrition, epidemics of tuberculosis, mismanagement, underfunding, and inferior education made this a shameful period of Canadian history (Grauer, 1939; Royal Commission on Aboriginal Peoples, 1996:337, 353). But the greatest tragedy lay in the separation of young children from families. In the words of the Royal Commission on Aboriginal Peoples (1996:365):

> " 'To kill the Indian in the child', the department aimed at severing the artery of culture that ran between generations and was the profound connection between parent and child sustaining family and community. In the end, at the point of final assimilation, 'all the Indian there is in the race should be dead.' This was more than a rhetorical flourish as it took on a traumatic reality in the life of each child separated from parents and community and isolated in a world hostile to identity, traditional belief and language."

The result of such detrimental schooling was generations of First Nations people who had severe emotional problems, including anxiety, depression, and poor self-image. As quoted from a 1992 memorandum to the Deputy Minister from J. Cochrane (Royal Commission on Aboriginal Peoples 1996:379);

> "The survivors of the Indian residential school system have, in many cases, continued to have their lives shaped by the experiences in these schools. Persons who attend these schools continue to struggle with their identity after years of being taught to hate themselves and their culture. The residential school led to a disruption in the transference of parenting skills from one generation to the next. Without these skills, many survivors had had difficulty in raising their own children. In residential schools, they learned that adults often exert power and control through abuse. The lessons learned in childhood are often repeated in adulthood with the result that many survivors of the residential school system often inflict abuse on their own children. These children in turn use the same

tools on their children."

Calls for the closing of residential schools and the creation of day schools began in 1948, with the formal end of federal government partnership with the churches in 1969. By 1972, the federal government had given control of Aboriginal education to First Nations communities. All First Nations communities now have Band-control over the funding for education. Many First Nations people who were in the residential school system are presently involved in legal suits against the churches and the government.

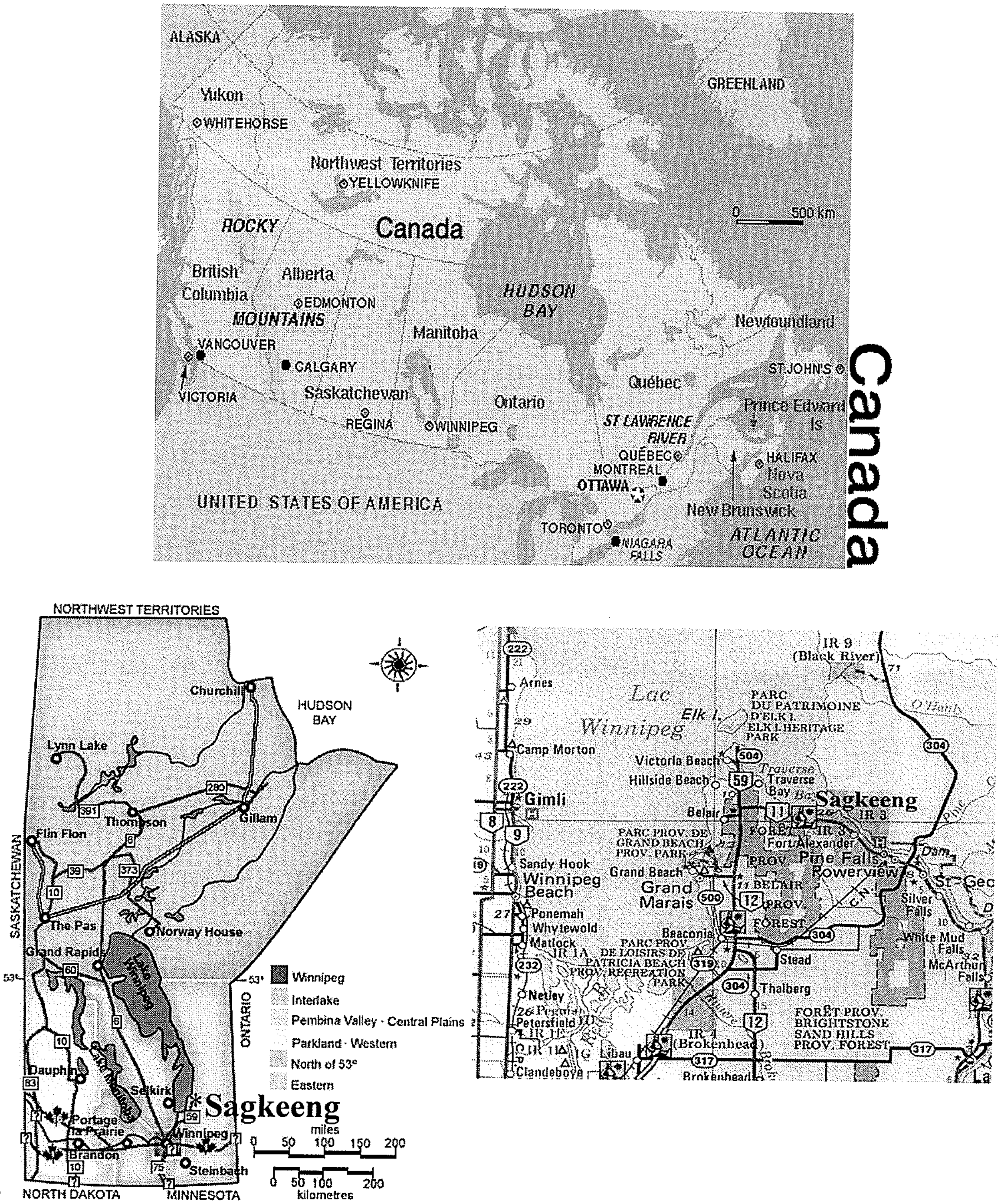
Issues of "Aboriginal rights" have been at the forefront of national political initiatives in the past decade. The entrenchment of Aboriginal rights into the Canadian Constitution Act of 1982, and a revision of the Indian Act in 1986, reflect the growing concern by the Canadian populace of the need to recognize the unique role of First Nations peoples within Canada. Manitoba is the "test province" for First Nations communities to begin the process of transferring monetary control to the community and away from federal departments.

1.4. A history of Sagkeeng First Nation (Fort Alexander)[4]

Sagkeeng is situated in central Canada within the province of Manitoba (see Figure 1.1.), at an historically critical land site at the mouth of the Winnipeg River as it flows into Lake Winnipeg. Sagkeeng is located at the geographical boundary of the

4 "Sagkeeng First Nation" is the way in which people of the community refer to their "reserve", although the legal name is still "Fort Alexander Reserve". According to Lalor (1993), Sagkeeng means "The Meeting Place" in the Cree/Ojibway language, and was the original First Nations name for the Traverse Bay area where the Winnipeg River meets Lake Winnipeg.

Figure 1.1. Map of Canada, Manitoba and Sagkeeng First Nation (FortAlexanderIR3), 1998[5]



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Maps are copied with permission from http://www.lonelyplanet.com and from http://www.travelmanitoba.com

Sub-Arctic, North-East Plains and Great Plains regions, so the flora is a mixture of deciduous and coniferous forests, lakes, swamps, bogs and prairie grasses. An abundance of resources were present in the pre-settlement period, including large game (caribou, moose, deer, bison), small game and fur-bearing animals (martin, fisher, lynx, wolf, bear, coyote, rabbit, otter, ink, muskrat, beaver), fish (sturgeon, white fish, jackfish), and waterfowl (ducks, geese). Foods such as wild rice, wild berries (blueberries, strawberries, raspberries, plums) and traditional herbal medicines were plentiful (Elias et al., 1997:9).

In the early 1700's, the territory was mainly occupied by Cree. However, smallpox epidemics obliterated the Aboriginal population of the area in 1737, and the Ojibwa (Salteaux) from Sault Ste. Marie migrated into the region. The people of Sagkeeng have a long history of European contact, somewhat different than that of other isolated hunting tribes of the region. They resided in large permanent villages, and collectively managed the abundant wild rice and fishing grounds. In contrast, the Northern Ojibwa lived in small scattered nomadic family groups, each with a family hunting territory (Lithman, 1982). Fur trade was vital to the tradelink between East and West along the canoe routes of the Winnipeg River. Sagkeeng's economic endeavours with early traders included the selling of local foods like wild rice, canoe building, hiring out as oarsmen, and toll collection from Europeans using the waterways (Lithman, 1984).

In 1871, with the signing and formalizing of Treaty 1, William Mann (KaKaKePenaise) became the first chief of the Fort Alexander Band, an Ojibwa community listing 485 members. The Fort Alexander reserve land consisted of land on both the north and south sides of the Winnipeg River and Traverse Bay. The late 1800's and early 1900's saw agriculture, fishing, hunting, wild rice production, berry picking, and lumbering (wage work in saw mills as well as cutting wood) as the primary economic activities (Lithman, 1984). The Ojibwa were known as skillful negotiators who were interested in using their territorial resource base wisely (Elias et al., 1997:13), and who were considered self-reliant and successful as a community (Lithman, 1984). But their regulatory control diminished with increased migration of settlers into the area. As early as 1878, there were written band complaints concerning white settlers cutting timber on reserve lands, and complaints regarding the land survey. Increasing domination by the federal Indian Affairs Branch and the local "Indian Agent" representative resulted in increased interference into the autonomy of local decision-making.

Reserve land was leased to the Manitoba Pulp and Paper Company in 1923, and a sale of land to the company was made by the Chief and Council in 1926. Following the Second World War, Sagkeeng residents were squeezed out of regular, long-term employment at the paper mill, and had to turn to various other pursuits, including work in the sugar beet fields and potato fields, berry picking, and temporary construction work (Lithman, 1984). Pine Falls is a town adjacent to Sagkeeng, originally built as the company town for the local pulp and paper mill. There has been a history of antagonism between Pine Falls and Sagkeeng. The issue of water quality downstream from the Pine Falls mill site is a major concern of Sagkeeng residents. A Sagkeeng father of young children made the following observation (Martens,1994);

> "We worried more when we were using bottles. [Why?] We were worried about germs, water. We always had to get water from other places, we couldn't drink this water here. You know this river's polluted so why

> would we want to give our child that, right? So we were getting water from springs." (lines 2561-2567)

In a research study by O'Neil et al. (1997), an elder discusses community concerns;

> Over the years, the white people have poisoned our water, the fish and other river animals we eat. They have caused a chain reaction of sorts. The rabbits are sick. The moose are getting sick too. Not only that, way over there, the Dryden Ontario Paper Company in dumping pollution into the English River. Pinawa dumps pollution into the Winnipeg River. Abitibi Price dumps into the Winnipeg River. The English River flows into the Winnipeg River system. In the end here, we get all that pollution. That is what we should also talk about. The water is very dangerous because you didn't know where the currents are anymore. One day they will be here, the next day somewhere else. The dams make the water rise and fall all the time. I repeat. The water is no good to drink. The rapids are not at work anymore. [They] killed the rapids with their dams. Our Creator did not put the rapids there for nothing. They kept the water fresh and clean. The rapids, our Creator put there, were blocked by the white man. Now our people do not have good water. (Elder 1. O'Neil et al., 1997:22)

Permanent employment for Sagkeeng residents in the past few decades was mostly related to transfer of money from federal government to the Band, and is related to upkeep, band administration, construction, social services, health and education (Lithman, 1984:29). But many residents are "underemployed", having part-time or seasonal jobs (Lithman, 1982). Despite lack of employment for Sagkeeng residents in the geographical area, the non-Aboriginal peoples residing and working in the region rely heavily on Sagkeeng people for economic viability, including the purchase of consumer goods, and the use of health care services and service industries.

The history of hospital facilities for Sagkeeng residents is part of the history of racial tension between Sagkeeng and Pine Falls. Up to the 1950's, there were segregated hospitals with one for the "white" population and one for the First Nations peoples of the area (Lithman, 1982:89). By necessity of facility expansion, the Indian Affairs Branch and the local "white" hospital board pooled resources to expand the "white" facility, while closing the "Indian" hospital. But even as recently as the 1970's, two distinct waiting rooms were used. Anecdotes of preferential treatment for whites and attempts to force First Nations patients into submission were common (Lithman, 1982:90).

Church-schools, both Anglican and Roman Catholic, were first set up as day-schools in the 1870's and 1880's (Elias et al., 1997:22; Lithman, 1984), to provide education for both Ojibway and Métis children. A residential school, run by the Roman Catholics with financial assistance from the Indian Affairs Branch, was built on the reserve in 1905, and soon expanded to accommodate increased enrollment. Children were removed from families from early years (age six) to their teen years, with infrequent family contact often limited to a few weeks in the summer. Male students worked on a farm close to the school, and female students were expected to do domestic tasks.

Local government of Sagkeeng became less colonialized in the 1960's, with increased funding for social assistance and housing placed into the hands of the elected chief and the Band Council. Chief and Council assumed responsibility for the townsite and the schools in 1973 (Lithman, 1984). Denominational schools were closed (Lithman, 1982), and band-controlled schools were built on both the north and south sides of the Winnipeg River. The 1970's saw a boon of building initiatives, including the Cultural Education Centre, the Anicinabe Community School, the Senior Citizens' Centre, and the Sagkeeng Al-Care Centre (a substance abuse treatment centre). Takeover of the Child and Family services program was begun by the Band Council in 1976.

1.5. A description of Sagkeeng First Nation community today

Sagkeeng, also known as Fort Alexander, is easily accessible by paved highway 120 km. from Winnipeg, which is a major urban centre of about 600,000 people and the capital of the province of Manitoba. Sagkeeng is divided by the Winnipeg River, with the only access being a bridge on the hydroelectric dam 16 km. east. Residents on the north shore "backtrack" in a roundabout route to cross over the Winnipeg River on their way to the south part of the community. See Figure 1.1. for a map of Sagkeeng (also marked as Fort Alexander, or IR3, meaning "Indian Reserve #3", on the map). The only alternate route is a winter ice road over the river, which is considered quite dangerous due to the unpredictable water levels of the river. In 1993, two-thirds of the people were living on the south side of the Winnipeg River, and of a total 400 homes, 222 were located on the south side.

Sagkeeng's "on-reserve" population (including university students temporarily away) was recorded as 3069 in 1993, 3048 in 1997, and 3114 in 1998.[6] The total population, including all registered treaty-status people *not* living on reserve, was 4667 in 1993, 5433 in 1997, and 5562 in 1998. Of the population living "on-reserve", over 18% are women of child-bearing age (ages 15 to 44 years), and 37% are children ages 0 to 14 years old (see Figure 1.2. showing the 1997 "on-reserve" population distribution).

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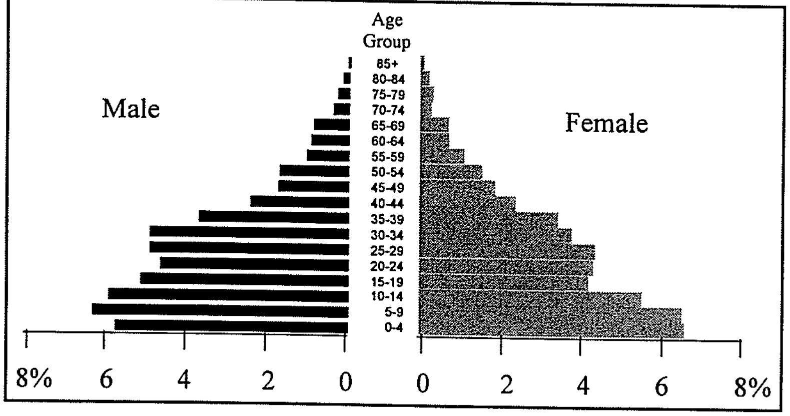
The population information was supplied by Rita Guimond, the Indian Registry Administrator in the Sagkeeng Band Office. The housing data was supplied by David Sinclair and Douglas Courchene, of the Housing Department of Sagkeeng Band Office, from a survey of the community in 1993.

Figure 1.2. Age-gender distribution of Sagkeeng First Nation "on-reserve" population, 1997 (n=3048)



In the Canadian census figures (Health and Welfare Canada Vital Statistics, 1988), there were 89 recorded in 1988, and 159 in 1995. But birth rates as recorded by census figures are often elevated in comparison with the number of community births, since births of Sagkeeng Treaty-status women not residing in the community are still attributed to Sagkeeng. Actual numbers of births to people residing in Sagkeeng are recorded in the Sagkeeng Health Centre files as 34, 43,54, 50, 47, and 55 for the years 1992 to 1997 inclusive (see Figure 1.3.).

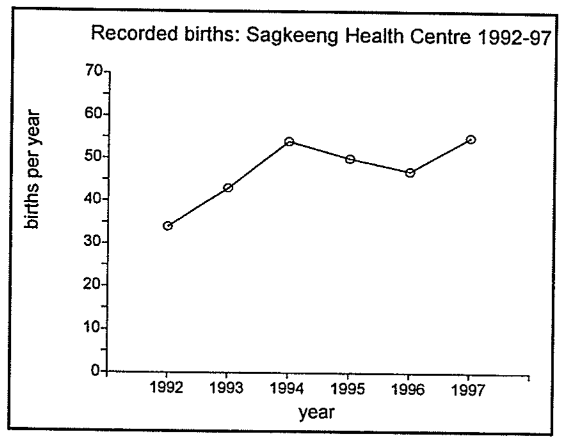


Figure 1.3. Sagkeeng First Nation births as indicated by the Health Centre records, 1992-1997 inclusive

The Fort Alexander (Sagkeeng) Health Centre is located in the townsite next to the Band Office on the south shore. The Health Centre is incorporated separately from the Band, with a separate Board of Directors[7] who administer money directly received from the federal Medical Services Branch (MSB). The Health Centre building contains administrative offices, a pharmacy, a physician's office, and offices for the community health nurses (CHNs), the community health representatives (CHRs), and the diabetes education coordinator. The CHNs are registered nurses whose job responsibilities include perinatal education, prenatal wellness clinics and postnatal well baby clinics. Prenatal teaching is done on an individual basis either at the health centre or at the client's home. Because of time restrictions, the prenatal teaching clientele has usually been limited to primiparas (first pregnancy).

Sagkeeng women go to physicians outside the community for maternity care, in the local towns of Pine Falls or Selkirk, or in Winnipeg. In my 1993-1994 survey, 69% (22/32) of the women gave birth in Winnipeg (mostly at Health Sciences Centre and St. Boniface Hospital), and of the 23 women interviewed in 1997 for the present research, 57% gave birth in Winnipeg. The local hospital, Pine Falls Health Complex, is the second most frequent choice for birthing, with 25% choosing Pine Falls in 1993-1994, and 30% in 1997. After being discharged from hospital, a woman normally receives a visit from the CHN as soon as the Health Centre has been notified of the birth through the Postpartum Referral Form[8].

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The current Health Centre Administrator is Gerald Courchene, who works as the chief executive officer directed by an appointed Board of Directors comprised of a Band Council representative, representatives from the community, and elders. At the present time (1998), there are no female elected Board members.

8

The provincial government department, Manitoba Health, developed the Postpartum Referral Form which is completed for all Manitoba women who deliver in Manitoba hospitals at 20 or more weeks gestation. This record accounts for more than 95% of all births within Manitoba. Upon maternal discharge from

Most students in Sagkeeng First Nation attend Band-controlled schools for their kindergarten to Grade 12 education. There are two elementary school sites (Kindergarten to Grade 4), one on each side of the river. Middle school (Grades 5 to 8) was located on the south shore, close to the Health Centre. But the building was condemned in the summer of 1996. Middle school students shared the high school facility on the north shore for the school year 1996-1997, and then moved into temporary huts along with the south-shore elementary students from November 1997 to the present. A new school is being built on the south shore, which is expected to open in the year 1999. Prior to 1994, the high school (Grades 9 to 12) was located on the south shore in temporary adjoining "huts" in the townsite. A new high school, built in the shape of an eagle, opened on the north shore in September 1994.

1.6. Comparing breastfeeding rates of Sagkeeng with provincial and national rates

Sagkeeng breastfeeding initiation and duration rates have been about 20% lower than regional Manitoba First Nation community rates and overall Canadian and provincial rates (see Figure 1.4.). Manitoba and Canadian overall breastfeeding initiation rates are reported as between 70% and 80% in the 1990s, with Manitoba South Region First Nations rates varying between 43% and 65%. Two recent Manitoba studies indicate even higher initiation rates, with an overall provincial initiation rate of 92% and a South Eastman Region rate of 90% (Breastfeeding Promotion Steering Committee of Manitoba,

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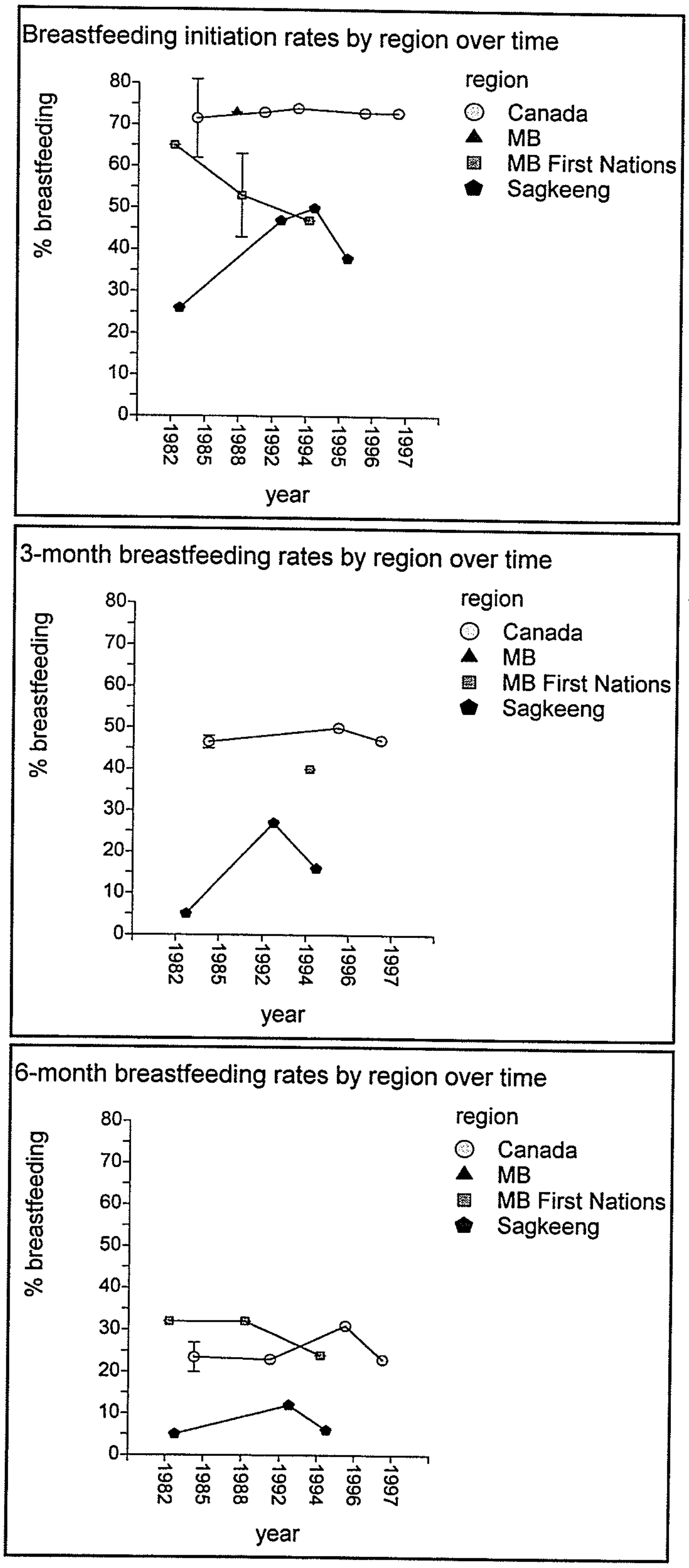
hospital, the form is sent to the public health nurse or community health nurse in the area of residence. It includes demographic and obstetric information, including the type of infant feeding upon discharge .

Figure 1.4. Breastfeeding rates (initial, 3- and 6-month) by regions from 1982 to 1995 (Canada, Manitoba, Manitoba First Nations, Sagkeeng)†



†The following references were used to generate the graphs in Figure 1.4.;

1982: Stewart (1985) for First Nations data

1985: Health Promotion Survey (1990) (cross-sectional national survey, asking about youngest child between 1980 and 1990)

1988: Manitoba Health, 1988 (Postpartum Referral Form) and Extension of Manitoba Health data (18 months from December 1987), personal correspondence with Dr. Cam Mustard;
Langner (1988) for First Nations data

1992: Canada Census, 1994 (cross-sectional study asking about youngest child born between 1989 and 1994), and Martens' 1997 research using chart audits in Sagkeeng

1994: National Database repeated in 1993-1994 (cross-sectional survey in Manitoba First Nations communities, but no data given for separate communities), and chart audit information for 1994 in Sagkeeng

1995: chart audit information for 1995 in Sagkeeng , and Levitt et al. (1995) for overall Canadian data (hospital administrators survey for Canadian maternity hospitals)

1996: data from National Longitudinal Study of Children and Youth, and National Population Health Study, Maclean (1998)

1998; South Eastman Health, 1997). In contrast, Sagkeeng had low initiation rates ranging from 26% to 50% in the two community-specific historical surveys (Stewart, 1995; current research by Martens). It is difficult to establish a trend for Sagkeeng, since the small survey numbers result in large confidence intervals of up to ±20%.

Duration rates for the overall Canadian population and for Manitoba First Nations Region are around 40% to 50% for three months, and 20% to 30% for six months. During rates reported in the South Eastman Regional Health survey (1997) reported 75% still breastfeeding at 3 months, and 31% at six months. In contrast, Sagkeeng had very low three- and six-month duration rates, half or less that of other reports (see Figure 1.4).

My Masters research in 1993-1994 included the community of Sagkeeng First Nation, as well as three other southern Manitoba First Nations communities. The Masters research was an attempt to look at the reasons behind the disparate breastfeeding rates, so that community-specific breastfeeding promotion strategies could be designed and implemented.

1.7. Breastfeeding promotion strategies for Sagkeeng: background and process

Sagkeeng was one of four First Nation communities (Sagkeeng, Long Plain, Hollow Water and Little Black River) which took part in my 1993-94 Masters research (Martens, 1994; Martens and Young, 1997; Martens, 1997). The low breastfeeding initiation and duration rates of Sagkeeng compared to Canadian, provincial, and other First Nations communities of the region indicated the need for breastfeeding promotion strategies to increase rates. The Masters research, which used a mixed-methodology approach of both qualitative in-person interviews and a quantitative prospective survey of women from third trimester of pregnancy to three months postpartum, was an important information source during community discussions to plan future breastfeeding promotion initiatives for Sagkeeng First Nation.

1.7.1. Qualitative data from my Masters research (1993-1994)

It is difficult to pinpoint one "cause" for Sagkeeng's decline in breastfeeding over the last century. But the residential school experience, accompanied by the severing of family and the loss of the culture of parenting, probably played a major role. During key informant interviews in 1993, comments were made about the effect of residential schools on women's perceptions of their bodies. The following quote was from a mother of six children:

> "The way I saw it, there wasn't very many people breastfeeding and all out here. And the way I look at it, too, is because of the residential school that. It seemed that they had to lose most of their traditional ways. Like the way to talk, to speak in English instead of their native language. [Was the residential school right in Pine Falls here?] No. Right across the river. Most of these kids here, at school we lost everything right off the bat. We weren't taught anything about breastfeeding." (1994: lines 1959-1967)

The second woman was a grandmother in her 40's, who had attended a residential school. Although she grew up in Sagkeeng, she was still separated from her family at age 5 to board at the local school, where she was punished for speaking Ojibwa or even for speaking to other members of her family residing in the school;

> "My age group most of them went to residential school. And I don't know if it [low breastfeeding rates] had anything to do with how we were taught

in school. Maybe it was the fact that you had to bear your breasts and it was considered a sin to show parts of your body and all that, you know. It was kind of awkward. Well, not awkward but ... you didn't feel right." (1994: lines 2903-2910)

There was evidence of a traditional sense of responsibility in a woman's "duty" to bring up her children "correctly". One father commented that;

> "Indian people think it's their responsibility, it's your responsibility [the children are your responsibility?]. Yah, your total responsibility. It's a big thing. To the girls around here ... if you slack off just a little bit. That they done something wrong." (1994: lines 2779-2784)

But alongside that idea was a view of the traditional way of life, and how the family unit operated with mutual input from the father as well as the mother;

> "Well there wasn't so much need to be away from each other all the time, right. The families used to always work there. These days you're always apart because you have to go work here, you have to go work there. You don't work as a family any more. [So you feel that the dad was usually around most of the time?] He'd go where there was hunting, most of the year he'd mostly be around, chipping in, fishing, whatever. ... I feel in the older days the wife was always there by the old man, like maybe not for bear hunting, but for rice picking, fishing, she'd be right there beside him. [with the children?] Yah. They'd all go. Rice picking, fishing, they'd all be together. But these days it's not like that any more. [It's hard, isn't it?] Like today, this is a romantic thing. I wish I could have lived some of that like with my wife where we're always together, we work together, instead of the way it is now. I come home, I'm just so beat after work. It very, it's mostly my wife that's with the kids all the time." (1994: lines 2837-2859)

A grandmother also spoke of how she learned about breastfeeding and child rearing, even though she bottle-fed her children due to the necessity of working outside the home;

> "[Where had you learned about the advantages of breastfeeding a baby?] From the older ladies in the community. It was natural for them to do. [your mother or your grandmother?] My mother, my aunties, and my dad's sisters. [so your own mother breastfed her babies?] Yup. She even breastfed her sister when my grandmother used to get her to babysit, she'd

be breastfeeding both of them." (1994: lines 2888-2897)

The "culture" of breastfeeding was evident in past generations, but in Sagkeeng the traditional knowledge was almost eradicated. In a 1997 survey by a Sagkeeng woman[9], where she spoke to twelve female elders about their experiences of childbirth, only two had breastfed their children. And these two women were of the oldest group interviewed, both over 80 and both very frail. So even though there are breastfeeding memories in the mid-40's "grandmothers" of today, there is very little actual experience with breastfeeding their own children. Because of this lack of community experience, women who breastfeed their babies are apt to be given misinformation and are prone to discouragement from their social peers or family. Here is a quote from a younger mother of the community;

> "I don't mind breastfeeding at all for the first months. People will try and say me wrong. [In what way? How do they try to discourage you?] If I say I can't do nothing, they say just give her a bottle and be done with it." ... It's weird. People look at you like you're weird. You can't really socialize 'cause people think it's dirty or something, or strange. [They don't want you to do that in public?] No. They think it's wrong. But I don't see no wrong in it. For the child you're doing that for. [Is that the people your age or the older people, too?] Well like when there's guys around, my boyfriend and his friend, they say what if my friends come over, are you going to show everyone your tit? [So he sort of gets embarrassed?] Uhuh. And he says look at all the things you eat, you're just giving her junk. It's healthier just to give her the bottle. But my mom says your body does everything for you; it purifies that milk before you give it to your baby." (1994: lines 1285-1289, 1306-1320)

The cultural norm of bottle feeding within Sagkeeng is reflected in this statement of

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9 Personal communication with Cynthia Fontaine, a resident of Sagkeeng First Nation

another young mother;

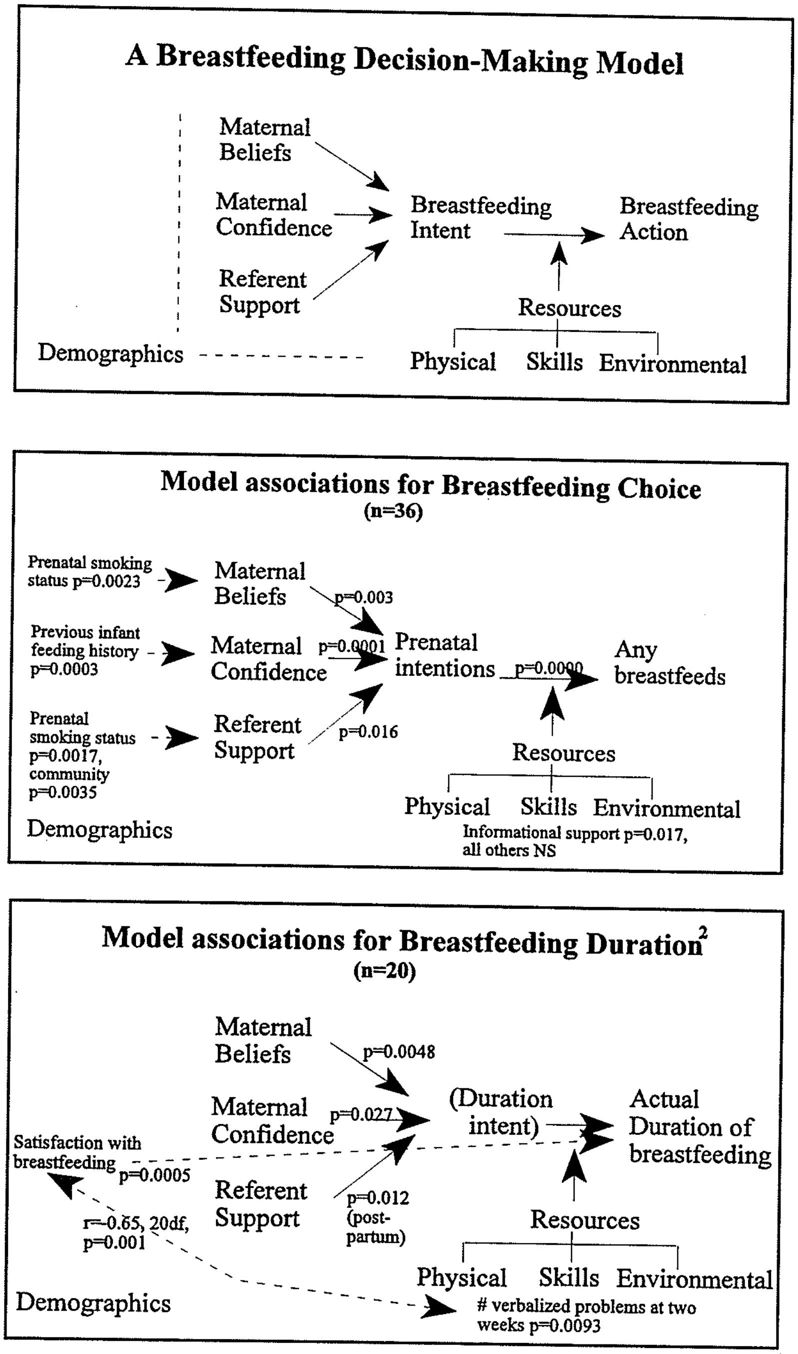
> "Actually I've never seen anyone on this reserve breastfeeding their babies. That's why I really don't have anything to say about it." (1994: lines 1687-1689)

1.7.2. The Breastfeeding Decision-Making Model

The Breastfeeding Decision-Making Model (see Figure 1.5) was tested for construct validity in my Masters research (Martens, 1994; Martens and Young,1997). Appendix 1 gives further details as to the study design, operationalized constructs, and statistical associations. The three constructs of "maternal beliefs" (knowledge about the benefits of breastfeeding), "maternal confidence" (a woman's confidence in her ability to breastfeed in different circumstances), and "referent support" (a measure of social support for breastfeeding) were all significantly associated with a woman's *intent* to breastfeed, which in turn was associated with the actual choice to *initiate* breastfeeding. All three constructs were also associated with *duration* of breastfeeding.

Incorporated into the model were other significantly associated constructs, such as a measure of resources (informational support, hospital policy), and a measure of the woman's "satisfaction with breastfeeding" and "number of breastfeeding problems" listed by the woman at two weeks postparum. Post-hoc analysis did demonstrate a two-fold risk of weaning by one month when women received gifts of pacifiers, formula, or both upon hospital discharge. Contrary toWHO recommendations (WHO, 1981; WHO, 1986), 78% of the breastfeeding women received these inappropriate gifts.

Figure 1.5. Breastfeeding Decision-Making Model[10]



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Note: this model was revised from Ajzen and Fishbein (1980), Liska (1984), Fieldhouse (1982), Martens (1994). In testing associations with *duration*, the constructs of the Breastfeeding Decision-Making Model were tested against *actual* rather than *intended* duration, due to only 9 women actually stating a specific time length for intended duration.

Demographic and lifestyle indicators which were associated with maternal beliefs, confidence and referent support included whether or not a woman had previously breastfed, and in which community the woman resided. "Previous breastfeeding experience" elevated the maternal confidence scores. The community's social support for breastfeeding (measured by the mean "referent support" score of the community) was significantly different for the four communities in the study. Low perceived social support for breastfeeding was also associated with low community breastfeeding rates.

1.7.3. Using the information for strategic planning in Sagkeeng

The Sagkeeng Health Centre and other community people began to discuss their own ideas about addressing the low breastfeeding rates, and the implications of the Masters research findings. Using the research findings, and listening to stories of the need for improvements in prenatal teaching resources, maternity care, and postnatal intervention, Sagkeeng community people discussed specific intervention strategies.

To address the lack of social support and lack of culturally-appropriate breastfeeding information prenatally and postnatally, the need for community resource material was discussed. One of the Sagkeeng Health Centre's CHN's was the primary provider of prenatal breastfeeding education, through individual teaching of the pregnant women either in the home or clinic during prenatal checkups. The nurse proposed the idea of a Sagkeeng-produced video and booklet which addressed prenatal care and breastfeeding issues. Many community people, including elders, men and women of child-bearing age, community leaders, the daycare centre children, and health centre personnel, became involved in the 1995 production of a prenatal education video which contained a breastfeeding component. An accompanying breastfeeding booklet was finished in 1996 through a cooperative venture with myself as the writer, and consultations with experts in nutrition and breastfeeding, Sagkeeng women including adolescents, local teachers and health personnel. The illustrator was a male Sagkeeng artist. This booklet specifically discussed the importance of breastfeeding on the health of the mother and infant, and gave information about the "how to's" of breastfeeding.

From the 1994 research, it was determined that a woman's confidence in her ability to breastfeed, her perceptions of breastfeeding "satisfaction", and the number of verbalized breastfeeding problems at week two postpartum, were all associated with the duration of breastfeeding. These may be intertwined issues of both individual teaching and social support for breastfeeding. The Sagkeeng Health Centre decided to pilot a "Peer Counsellor" program for postnatal breastfeeding women. The CHN had many other duties besides perinatal care, and was unable to give such directed care weekly or biweekly to postpartum women. One Sagkeeng woman, who was a mother experienced in breastfeeding her own children, underwent "peer counsellor training" to increase her skills in empathetic listening and in imparting basic breastfeeding information. The training of the first peer breastfeeding counsellor continued throughout 1996 and early 1997, as a collaborative effort of health centre personnel and a Winnipeg breastfeeding peer counsellor trainer. After completing her training, she was hired in April 1997 to begin a pilot Peer Counsellor program, funded for 7 months through my PhD research grants. The Peer Counsellor worked in association with the CHN of Sagkeeng Health

Centre, and also continued her contact with the Winnipeg Peer Counsellor Trainer when difficult situations arose which required more information. More potential peer counsellors continue to receive training, and the program is presently funded by the Sagkeeng Health Centre after receiving approval of the Board of Directors in April, 1998.

A breastfeeding teaching module to influence the breastfeeding beliefs and attitudes of adolescents in Sagkeeng was proposed by a school teacher and the peer counsellor-in-training. Knowing that the average age at first birth was 17 years, and the average educational level of mothers was Grade 10 (Martens, 1994), the optimal timing of breastfeeding education would be prior to pregnancy. People perceived as "least supportive" of breastfeeding were the male partners, male relatives, and female friends (Martens, 1997). So a breastfeeding instruction class was proposed for Sagkeeng Junior High School's Grade 7 and 8 Native Studies class. This was designed to educate all students about the benefits of breastfeeding, in an attempt to impact the future referent support within the community.

Concern was also expressed by Sagkeeng people about the breastfeeding policies and practices of the local maternity facility, Pine Falls Health Complex. Although many of the maternity nurses were highly supportive of breastfeeding, non-medically indicated supplementation of breastfed babies was reported as being commonly practised. In my Masters research, institutional breastfeeding policy and protocol was found to have a possible mediating effect on duration. The 1994 study also pointed out discrepancies in hospital breastfeeding policies/practices and WHO/UNICEF recommendations for maternity care. The health centre personnel, a Sagkeeng women who worked in the hospital as a nurse, and the hospital administrator all supported the concept of staff training regarding appropriate breastfeeding policies and practices for the local Pine Falls Health Complex. In conjunction with the nurse and administrator, we designed and implemented a training session for the nursing staff, which took place in June 1997.

My doctoral research became the evaluation of the community breastfeeding promotion programs suggested by Sagkeeng people - the peer counsellor program, the adolescent education program, and the hospital inservicing program.

1.8. Objectives of the program evaluation study

As part of the evaluation of the Sagkeeng breastfeeding promotion strategy, there were really three questions - was the "model" upon which the programs were designed (information derived from the Breastfeeding Decision-Making model and qualitative interviews) 'correct'? Were the initiatives derived from this model correctly deduced? And did these initiatives or programs actually 'work'? Because the Breastfeeding Decision-Making Model was first tested prospectively, the model was not assumed to be causal. In other words, the questions remained - would an increase in breastfeeding beliefs and confidence of prenatal clients result in an increase in breastfeeding initiation rates? And would the use of the video and booklet during the prenatal teaching actually increase the beliefs and confidence? And in the long-term, would Sagkeeng initiation rates increase? Similarly, would an increase in satisfaction with breastfeeding result in an increase in breastfeeding duration at the individual level? Would the Peer Counsellor program increase satisfaction levels of postpartum clients, with the long-term result of increased duration rates at the community level? Or would a school education program designed to increase adolescent knowledge about breastfeeding result in more positive beliefs and attitudes about breastfeeding, with the long-term results of increased community social support for breastfeeding and increased initiation and duration rates? Similarly, would a hospital educational intervention increase the breastfeeding supportiveness of staff and a change in hospital policy/practice? And would the policy/practice changes result in decreased supplementation rates of breastfed babies?

My research was designed to evaluate three of the formal elements of Sagkeeng's breastfeeding promotion strategy, and to record trends in breastfeeding from 1992 to 1997 to evaluate the overall community strategy. The objectives were to evaluate:

a. a community-based health program, designed to increase the satisfaction with and duration of breastfeeding through the peer breastfeeding counsellor program

b. a school-based program, designed to create positive breastfeeding beliefs and breastfeeding attitudes of adolescents

c. a hospital-based staff education program, designed to decrease supplementation rates of breastfed babies and to increase compliance with worldwide maternity facility standards for breastfeeding policies and practices[11]

d. the overall effectiveness of community breastfeeding promotion activities, through analysis of Sagkeeng breastfeeding rates from 1992 to 1997

11

Worldwide standards for breastfeeding policy and practice in maternity hospitals have been proposed by the World Health Organization and Unicef, in the WHO/UNICEF "Baby-Friendly Hospital Initiative"(BFHI) criteria, based on the "Ten Steps to Successful Breastfeeding" and the International Code of the Marketing of Breast Milk Substitutes (WHO, 1981; WHO, 1986; WHO, 1989; WHA, 1996)

Chapter 2: A Review of the Literature

In Chapter One, the context of Sagkeeng First Nation's breastfeeding promotion strategy was examined in terms of a history of First Nations peoples in Canada and Sagkeeng, and a historical overview of Sagkeeng's breastfeeding rates and community results of my Masters research. But why is a breastfeeding promotion strategy important to Sagkeeng? Why are the specific programs chosen by Sagkeeng beneficial from a health promotion model perspective and from an evidence-based review of the literature? The purpose of this chapter is to examine the relevant literature: breastfeeding and its effect on child health; the effectiveness of specific breastfeeding promotion programs; models of community health promotion; and politically embedded feminist perspectives.

2.1. Epidemiological research into associations between infant feeding and health

2.1.1. Breastfeeding and infant health

This section reviews epidemiological research on the associations of breastfeeding and infant health. The first part restricts the literature to the last decade and to developed countries - Canada, USA, Great Britain, Finland, Netherlands, New Zealand, and Australia. The second part discusses the literature pertinent to First Nations peoples of North America. Appendix 2 contains information about each study reviewed, including the place, sample size, treatment effect, and criticisms or comments.

The literature supports the protective effect of breastfeeding in reducing rates of respiratory illness (Wilson et al., 1998; Beaudry et al., 1995; Duncan et al., 1993; Wright et al., 1995; Nafstad et al., 1996; Howie et al., 1990; Cohen et al., 1995; Scariati et al., 1997). Only one study found no evidence of protection, but the sample size was small, drawn from an affluent Californian population with few respiratory illness episodes, and subject to volunteer bias (Dewey et al., 1995). Many of the studies have reported a dose-response relationship with an increase in the exclusivity[1] or duration of breastfeeding being associated with an increase in protection against disease. The risk of respiratory infections was about half for children exclusively breastfed compared to those exclusively formula fed for the first four to six months (Wilson et al., 1995; Duncan et al., 1993; Scariati et al., 1997). This relationship remained even in households where there was heavy cigarette smoking (Nafstad et al., 1996). Partial breastfeeding was associated with a smaller but significant decrease in the risk of respiratory infection (Howie et al., 1990), persistent up to the age of six years (Wright et al., 1995).

Breastfeeding is also associated with a reduction of morbidity due to gastrointestinal infection (diarrhoeal disease). Breastfed infants had about half the risk, compared to those fed solely breastmilk substitutes (Dewey et al.,1995; Beaudry et al., 1995; Howie et al., 1990), and a similar reduction of risk was found by Scariati et al. (1997) for exclusively breastfed babies (at least six months) compared to babies not receiving any breastmilk. In a Scottish study (Howie et al., 1990), the relative risk was one-quarter for babies breastfed fully or partially at least 13 weeks , compared to those

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1

Although formal definitions of breastfeeding (Labbok and Krasovec, 1990) identify "exclusive" breastfeeding as receiving no other liquid by mouth, the term 'exclusive' in the research includes both "exclusive" and "almost exclusive" (one or two swallows of other food per day, such as vitamin drops),or what Labbok and Krasovec would term, "fully breastfed".

not breastfed at all (4% versus 16%, $p<0.01$).

Reduction of infant mortality due to sudden infant death syndrome (SIDS) was associated with breastfeeding (Ford et al., 1993). Data also suggests a protective effect of breastfeeding in relation to childhood cancers, especially lymphoma (Davis et al., 1988), but evidence is limited. A contradictory finding (Shu et al., 1995) found a non-significant relationship between breastfeeding status and lymphoma despite odds ratios less than one, but this may be due to wide confidence intervals and small sample sizes. One follow-up study in Scotland (Wilson et al., 1998) found that no breastfeeding as an infant was associated at age 7 years with a small but significant increase (4 mm) of mean systolic blood pressure, noted by the authors as a possible precursor to future heart disease. Using a convenience sample of workers employed outside the home, one study found that women who breastfed their babies were less likely to be absent from work because of infant illness, and less likely to have long absences when they did miss work for infant illness, compared with women who did not breastfeed their infant during the first year (Cohen et al., 1995).

Exclusive breastfeeding for at least 3 months, or any breastfeeding for at least seven months, is associated with large protective effects (odds ratios of 0.4 to 0.5) against childhood Type I insulin-dependent diabetes mellitus, or "IDDM" (Virtanen et al., 1991). If a woman with gestational diabetes breastfeeds following the birth, there is evidence of a significant reduction (4.2% versus 9.4%, $p=0.01$) in subsequent onset of maternal diabetes mellitus compared to women who did not breastfeed (Kjos et al., 1993), even after adjustment for maternal age, BMI, and insulin use during pregnancy.

An area of great research interest in the last decade is the association of cognitive and neurological development with breastfeeding status. A small but persistent advantage in cognitive development has been reported in the literature, with at least four to five months of breastfeeding associated with advantages from one-quarter to one-half a standard deviation unadjusted (4 to 8 IQ points), and one-quarter of a standard deviation or less when adjusted (Fergusson et al., 1982, at 7 years; Morrow-Tlucak et al., 1988, at 2 years; Lucas et al., 1992, at 8 years; Niemela and Jarvenpaa, 1996, at 4 ½ years; Horwood and Fergusson, 1998, at 18 years; Lanting et al., 1994, at 9 years old). Although one-quarter to one-half a standard deviation increase in cognitive development scores does not appear to be a large effect, if the entire population score were to shift by one-quarter SD upward, this would translate into a 10% drop in the number of people scoring below the "average" of 100. Similarly, a shift of one-half SD would result in a 20% drop in the number of people scoring below 100.

A dose-response relationship of increased cognitive development with increased amount of breastmilk was also observed, (Morrow-Tlucak et al., 1988; Lucas et al., 1992). Many critics implicate confounders such as socioeconomic status, maternal education, and the act of breastfeeding rather than the breastmilk itself, in non-randomized trials. However, in the study of premature infants given breastmilk or artificial milk by nasogastric tube (Lucas et al., 1992), the statistically significant IQ advantage of 8.3 points ($p<0.0001$) up to 8 years later did not disappear when adjusted for socioeconomic status or maternal education, maternal choice to provide breastmilk (some who chose were not able to provide), gender of infant, days of ventilation, or subsequent breastfeeding on hospital discharge. One persistent explanatory variable was the total amount of breastmilk given to the infants by nasogastric tube in their early developmental stages. Biologically plausible mechanisms have been suggested relating to the presence of long-chain lipids which help in the development of the brain and retina, but this may also relate to healthier infants experiencing fewer infections. Two studies (Koopman-Esseboom et al., 1996; Huisman et al., 1995) also investigated cognitive effects of dioxin and poly-chlorinated biphenyl (PCB) contaminants passed through breastmilk. These studies concluded that there was "no harm", and possible benefit of breastfeeding compared with breastmilk substitute feedings.

All of the research cited up to this point have been in "developed" countries of the world. First Nations communities of North America have been considered neither "developing" nor "developed", but "Fourth World"[2] (O'Neil, 1986). A literature review of the past twenty years of research in First Nations communities of North America confirms the impact of breastfeeding on infant health (see Appendix 2 for summaries). Pima Tribe Navajo children of Arizona who breastfed exclusively for at least four months were less likely (adjusted OR=0.64) to experience an upper-respiratory tract illness in the first year of life (Forman et al., 1984a), and any breastfeeding was found protective against streptococcus pneumonia in an Alaskan Native population (Gessner et al., 1995).

2

The Fourth World refers to a structure of internal colonies in relation to a larger nation-state. The population involved are original inhabitants whose lands have been expropriated. The peoples have become subordinate to an immigrant population, both in a political and an economic sense. They inhabit marginal geographical regions, and their resources are exploited by the dominant group, often disregarding local consultations. The communities continue to be structured by colonial policies. According to O'Neil (1986), First Nations communities of Canada fit into the Fourth World paradigm.

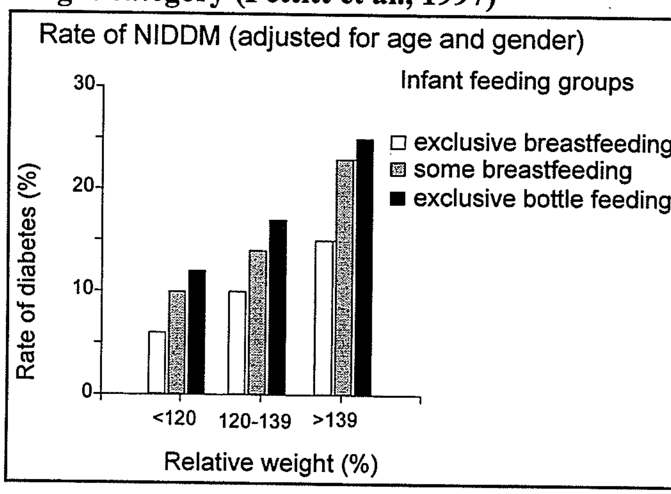
A dose-response relationship of breastfeeding with reduction in gastrointestinal illness was also noted in the literature, with children exclusively breastfed for at least four months having the lowest rates (adjusted OR=0.51, 95% CI 0.34 to0.77, adjusted for gender, socioeconomic status and birth cohort) when compared with children receiving no breastmilk (Forman et al., 1984b). In a northern Manitoba First Nations community setting (Ellestad-Sayed et al., 1979), accumulated pediatric illness diagnoses rates were reduced by breastfeeding (0.26 for breastfed children, 0.42 for non-breastfed children), as was the rate of hospital admissions in the first year (11% fully breastfed, 38% partially breastfed, 53% not breastfed).

One research study in the literature refers to a population-based intervention strategy to increase breastfeeding rates (Wright et al., 1998). Rates of sepsis (3.5% to 0.6%, p=0.00005), bronchitis (5.5% to 3.2%, p=0.02), pneumonia (11.9% to 9.0%, p=0.04) and gastroenteritis (41.6% to 36.3%, p=0.02) declined significantly on a population-basis, after the community intervention.

Research which demonstrates association between breastfeeding and reductions in Type II diabetes (also known as non-insulin dependent diabetes mellitus, or NIDDM) is of great importance to First Nations peoples, who experience elevated rates of Type II diabetes when compared with the non-native populations. In the province of Manitoba, the regional variation in age-standardized prevalence of diabetes among First Nations peoples for 1987 was 4% for males and 8% for females, compared with about 2.4% in the Canadian population as a whole (Young, 1994:157). Contrary to morbidity patterns of the non-Aboriginal pediatric population, NIDDM does occur in First Nations children, with a *minimum* prevalence estimate of 0.53 per 1000 for children less than 15 years old in Manitoba (Dean et al., 1992). This is comparable with the age-adjusted Pima Indian rate of 0.7 per 1000 for children under 15 years of age, in a Native American population which has the highest documented frequency of diabetes in the world.

A Pima Indian cohort of children (n=933) living on the Gila River Reservation of Arizona and born between 1950 and 1977 were originally enrolled in a retrospective study which began in 1978 (Forman et al., 1984a; Forman et al., 1984b). Seven hundred and forty-one (741) of the original cohort were also examined between the ages of 10 and 39 years old as part of a subsequent longitudinal study of diabetes (Pettitt et al., 1997). Accurate infant feeding data was recorded during the original study, and prior to any child developing NIDDM. Exclusive breastfeeding for 2 months was associated with an approximate halving of the percent of children being diagnosed with NIDDM up to the age of 40 years, at any given age grouping from 10 to 39 years, and at three different "relative body weight of normal" indices (OR=0.41, 95% CI 0.18 to 0.93, adjusted for age, gender, birth date, parental diabetes, birth weight). There was also evidence of a dose-response relationship, with some protection afforded by

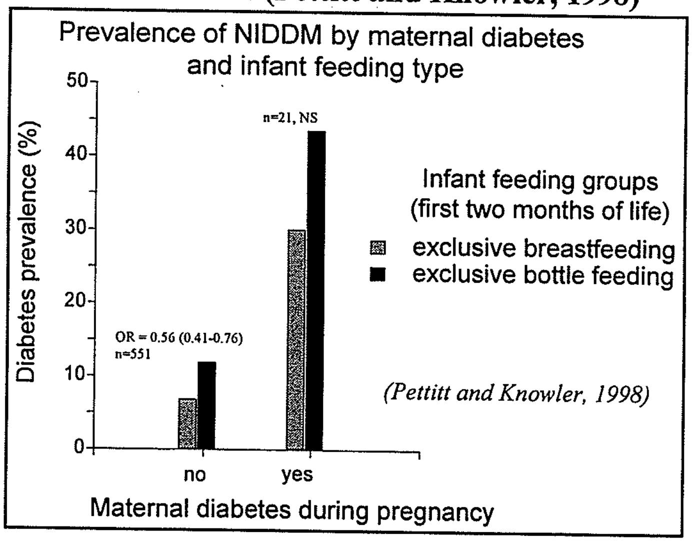
Figure 2.1. Rate of NIDDM (adjusted for age and gender) by infant feeding group and relative weight category (Pettitt et al., 1997)



partial breastfeeding for the first two months. For persons with the heaviest relative body weight index of >139%, 15% of those persons exclusively breastfed as babies were diagnosed with NIDDM, compared with 23% of partially breastfed, and 26% for those not breastfed (see Figure 2.1.). Critics of Pettitt et al.'s research (Simmons, 1997; Huang et al., 1997) cite possible confounding due to the demographic differences between families choosing to breastfeed and families choosing to bottle feed. They claim that families choosing to bottle feed may also be families who have experienced more stress or more acculturation, both being alternative risk factors for NIDDM.

One of the risk factors for NIDDM diabetes is being born to a diabetic mother (Knowler et al., 1990). The Pima cohort was also studied by classifying the diabetic status of the mother during the pregnancy of the child (Pettitt and Knowler, 1998). For both non-diabetic and diabetic mothers, subsequent breastfeeding of the child was associated with reduced risk of the child becoming diabetic by age 5 (non-diabetic: 7% breastfed child, 12% non-breastfed child; maternal diabetes: 30% breastfed child, 44% non-breastfed child). See Figure 2.2. graph.

Figure 2.2. Rate of NIDDM (adjusted for age and gender) by infant feeding group and maternal diabetes (Pettitt and Knowler, 1998)



In summary, health benefits of breastfeeding are evident in the research. The further evidence of population-based reductions in illness through breastfeeding promotion strategies (Wright et al., 1998) make community-based strategies an effective preventative health measure for First Nations children.

2.1.2. Criticisms of the association between breastfeeding and infant health

Many criticisms are leveled at claims of an association between breastfeeding and child health (Cunningham, 1989; Cunningham, 1988; Leventhal et al., 1989; Kramer, 1991). These include: a) issues of confounding; b) issues of defining "breastfeeding" within a study; and c) issues involving research design. Regarding the issue of *confounding*, critics point out that the health benefits of breastfeeding may be due to factors other than breastmilk. They suggest that health benefits of breastfeeding reported in "developing" countries are due to the lack of available clean water for formula, or lack of heating facilities to sterilize the containers, and not to the inherent health benefits of breastfeeding. In "developed" countries, critics claim that any difference in health status may be confounded with socioeconomic status, since higher socioeconomic strata of North America have higher breastfeeding rates and generally lower morbidity rates. They also point out that infants enrolled in daycare are not only less likely to be breastfed but are also more likely to be at greater risk of infection by exposure to other children.

Issues of *defining breastfeeding* relate to lack of clearly defined definitions of feeding categories, to recall bias and failure to collect prospective information. Standard international definitions for breastfeeding (Labbok and Krasovec, 1990; Armstrong, 1991), include "full" breastfeeding (exclusive or almost exclusive), "partial" breastfeeding (high, medium and low), and "token" breastfeeding (minimal). The problem is that it is difficult to attribute health benefits to breastfeeding when infants who are partially breastfed are grouped with either the "breastfed" or the "non-breastfed" cohort. For example, when partially breastfed infants are included in the "breastfed" cohort, the evidence of health benefits may be lessened. Similarly, if partially breastfed babies are included in the "bottle-fed" cohort, the evidence of health deficits of formula feeding may also be lessened. An understanding of the results of any study needs to include an examination of the classification of feeding mode. One solution is to subdivide the study group carefully into carefully defined feeding groups, but lack of power to detect differences would result from this partitioning if sample sizes are small.

Many studies also rely on maternal recall data for information about the duration of breastfeeding or the duration of "full" breastfeeding. But in recalling duration of breastfeeding (any breastfeeding until total weaning), bias does not seem to be as much of a problem as one might think. The validity and reliability of maternal recall of infant feeding patterns has been recorded in studies throughout the world. Huttly et al. (1990), in a cohort of Brazilian women, found that at least 70% of women classified breastfeeding duration by 3-month groupings accurately up to four years later. The shorter the duration, the more accurate was the recall. Bias did not occur in the recall of poorer, less educated mothers, but bias in the direction of reporting longer duration was noted in the wealthier, more educated women. Holland (1987) found that reports of breastfeeding duration by Malaysian mothers were free from systematic distortion, with error randomly distributed to over- and under-estimates. In a study of Bedouin Arab women, Launer et al. (1992), found that retrospective infant feeding data at 18 months postpartum could be used with confidence (to the week) when predicting feeding status of children. The data on duration of breastfeeding had a sensitivity of 1.0 and specificity of 0.91. In a study of 6-month recall by Michigan women, Quandt (1987) found that weaning recall was accurate, with group error not significantly different from zero, and individual data accurate to within ± 10 days for over 70%, and within ±1 month for 88% of the women. Recall of the frequency and length of each episode of feeding was less valid when compared to observational data (Piwoz et al., 1995, Vitzthum, 1994). Recall of the duration of "full" breastfeeding and the timing of supplements and solid foods being given to the breastfed baby was considered the least valid of breastfeeding information (Quandt, 1987; Launer et al., 1992). The definitions of "full" breastfeeding or "partial" breastfeeding imply a transition from full to partial in one direction chronologically, but the difficulty in recall may also relate to the fact that giving other foods to the infant may be a slow and sometimes erratic process over successive months. A woman may give her infant formula or solids during one week, and then cease to give these for several more weeks. Is that baby then classified as "partially" breastfed, having once received other foods, or can an infant go back and forth between being "fully" and "partially" breastfed? This creates difficulty in defining a "duration of full breastfeeding" in any research.

A third issue involves the *type of research design*. The observational study designs will still result in criticism from those who view the RCT as the only design to ensure causality. Many investigators criticize the claim of a link between breastfeeding and infant health because of the inability to perform randomized trials. The "gold standard" of research is considered to be the "randomized clinical trial" (RCT), where one group is allocated to receive the treatment while a second receives a placebo. Randomization is considered unethical in research on the health benefits of breastfeeding, so studies rely on prospective, retrospective or case-control designs. RCT's are considered to have strong "internal validity", which means the explanatory variable could be demonstrated to "cause" the outcome within the boundaries of the particular research setting. But the "downside" of RCT's is in the external validity of the results (Campbell and Stanley, 1963; Spector, 1981). Is there reactivity and changed outcomes because the people are being "studied", measured or tested? Is there a select group of people eligible for an RCT which would differ from the population in general? In other words, how generalizeable are the RCT results to a 'real world' setting?

In order to take these criticisms into account, the literature review on health benefits included studies of the last decade, and research populations in developed countries with presumably good access to sanitary living conditions, clean water, and easily-accessible cooking facilities. Despite the prospective nature of many of the studies, most studies incorporated carefully defined feeding groups, and multivariate techniques to control for confounders such as socioeconomic status or maternal education. And despite the difficulty in proving causal links between breastfeeding and health, persistent health benefits are evident. Many studies demonstrate dose-response relationships, indicating strong possibilities for causation. But there are other benefits of programs designed to promote breastfeeding. Breastfeeding is considered a "good thing" by the First Nations people, a return to traditional values and culture. Breastfeeding may be empowering to the women of the community. And breastfeeding programs may be instrumental in long-term reduction of Type II diabetes, and short-term reduction of many pediatric respiratory and gastrointestinal illnesses. Accepting the premise of "doing no harm" with the potential of "doing great good", the following sections describe programs with demonstrated effectiveness in increasing breastfeeding initiation and duration rates.

2.2. Literature review on perinatal support for breastfeeding

2.2.1. Prenatal breastfeeding education and its effects on initiation

Several studies in North America and Australia suggest the importance of prenatal breastfeeding education on initiation rates (see Appendix 3). The prenatal teaching from both health care professionals (Burkhalter and Marin, 1991; Brent et al., 1995; Rossiter, 1994; Sciacca et al., 1995) and from peer counsellors (Kistin et al., 1994; Long et al., 1995; Tuttle and Dewey, 1995) seem equally effective. The population of most studies was low-income (Brent et al., 1995; Sciacca et al., 1995; Kistin et al., 1994) or immigrant women (Rossiter, 1994; Tuttle and Dewey, 1995). In the low-income and immigrant populations, the study designs were all randomized trials with the exception of a quasi-experiment by Tuttle and Dewey (1995). Effects on initiation rate were mostly in the 21 to 29% range, with a low of 17% increase (Sciacca et al., 1995) to a high of 32% increase (Rossiter, 1994). The study finding the highest effect size also depended upon a convenience sample of prenatal attenders before randomization occurred.

Three studies involved First Nations women. The study by Long et al. (1995) in the USA used historical controls, reporting a 14% increase in initiation with prenatal education. The Canadian First Nations study by Glor (1987) also used historical controls, but found widely varying results from a 20% increase to a 20% decrease in initiation, depending upon the peer counsellor involved in the prenatal education One Navajo First Nations community in New Mexico, USA, experienced an overall increase of 9% (72% to 81%), and an increase of 5% for exclusive breastfeeding rates (4% versus 9%) after an intense community intervention strategy (Wright et al., 1998). This included community promotion in the form of radio, television, billboard and video information, distribution of t-shirts to breastfed babies through programs for low-income women and infants (WIC), a 3-day health care provider inservice on breastfeeding, and family education. The community strategy was found to be associated with an overall decrease in childhood morbidity, hypothesized to result from a population-based increase in breastfeeding rates.

2.2.2. Postpartum support for breastfeeding women and its effect on duration

The influence of health care provider and peer counsellor postpartum support on increased duration of breastfeeding up to six months is small (0 to14%) for middle-class women (Grossman et al., 1990; Lynch et al., 1986; Jones and West, 1985; Bloom et al., 1982). One exception was a study of British women in the late 1970s (Houston et al., 1981), visited biweekly by the same provider until weaning occurred. This study demonstrated a 20% to 25% increase in duration rates, but may be of limited generalizeability in the 1990s where more information is available to women. One Canadian randomized controlled trial (Gagnon et al., 1997) reported no significant difference in breastfeeding rates at one month for women on a program which included early hospital discharge (<36 hours) plus four postpartum visits of a health nurse at days 2, 3, 5 and 10, when compared with women receiving routine hospital discharge at 48-72 hours postpartum plus standard health nurse contact. Appendix 4 details each study.

However, both small and large effects have been demonstrated in randomized and quasi-experimental interventions in groups at risk, including low-income women, women in the United States WIC program, and women who decided late in pregnancy to breastfeed. The intervention of Brent et al. (1995) used health care provider support, and Kistin et al. (1994) used peer counsellors. Both demonstrated large (around 30%) increases in 2- and 3-months duration. The intervention effect (36% increase in four-month duration) of using a lactation consultant that was noted by Auerbach (1985) may have volunteer effect problems, since it was generalizeable only to those women who *requested* the services of a health care provider, and who were subsequently randomized to either receive or not receive the service. But Grossman et al. (1990) found small non-significant differences (-9 to 14%) when using a health care provider for telephone contact up to three weeks postpartum. The control group had higher maternal education and more prenatal class attenders, so treatment differences may have been minimized. Lynch et al. (1986) found no difference in breastfeeding duration for intensive lactation consultant follow-up, but a post-hoc analysis which included timing of the decision to breastfeed demonstrated a large increase (21%) in six-month duration for women who had only decided late in pregnancy. This may be relevant to the Sagkeeng population, where possibly one-third or more of the women in their third trimester of pregnancy were undecided as to their choice of infant feeding method (Martens, 1997). Saunders and Carroll (1988) found a small (9%) but non-significant increase in four-week duration for an intervention which included one visit by a WIC nutritionist and a postpartum group class. Several Toronto, Canada, peer counsellor programs have been described, but no formal evaluations have been reported to date (Barber, 1998).

In one of two reported intervention involving First Nations women, Long et al. (1995) used a quasi-experiment to detect a small (8-13%) increase in duration up to three months for a peer counsellor program in the United States. However, this was an artifact of increased initiation of 14%, so comparing rates of only those initiating breastfeeding, duration differences were non-significant (-6 to +7%) up to three months postpartum.

The difference between large and small effects do not seem dependent on the person being a peer counsellor or health professional. Besides differences in study design, differences may be affected by the degree of contact. Those exhibiting consistent, intensive individual contact (Kistin et al., 1994; Auerbach, 1985; Brent et al., 1995; Lynch et al., 1986) showed a greater effect size than those with limited contact (Saunders and Carroll, 1988; Grossman et al., 1990).

2.3. Literature review of adolescent educational programs on breastfeeding

Many researchers have developed measures for "breastfeeding knowledge" and "breastfeeding attitudes" of adolescents (see Appendix 5 for items). Some studies were restricted to females or pregnant females (Friel et al., 1989; Berger and Winter, 1980; Cusson, 1985; Joffe and Radius, 1987; Pascoe and Berger, 1985), but three studies included both male and female adolescents (Ellis, 1983; Gregg, 1989; Forrester et al., 1997). No surveys have been conducted with First Nations adolescents. Adolescents showed deficits in breastfeeding knowledge and negative breastfeeding attitudes (Berger and Winter, 1980; Ellis, 1983). But the majority, ranging from 62% in the USA (Pascoe and Berger, 1985) to 93% in Britain (Purtell, 1994) desired more information to be incorporated into the school curriculum (Gregg, 1989; Forrester et al., 1997; Berger and Winter, 1980) . In one study (Purtell, 1994), British female students indicated that they did not want school breastfeeding education to be from a teacher, but rather from a health care provider or a breastfeeding mother.

The percent of students identifying themselves as "breastfed children" ranged from a low of 17% in Newfoundland, Canada (Friel et al., 1989) to a high of 86-87% in Israel (Berger and Winter, 1980; Pascoe and Berger, 1985), with British students indicating 45% (Purtell, 1994), USA student around 30% (Forrester et al., 1997; Pascoe and Berger, 1985), and students in British Columbia, Canada at 43% (Ellis, 1983). The percent of adolescent female students intending to breastfeed a child ranged from 40% to 50% in most studies within Canada, USA and Britain (Pascoe and Berger, 1985; Cusson, 1985; Purtell, 1994), but higher percentages of around 70% were reported in Israel (Pascoe and Berger, 1985) and in USA college students and pregnant adolescents (Forrester et al., 1997; Lizarraga et al., 1992). Students with previous exposure to breastfeeding mothers, or who were breastfed themselves or had breastfed siblings, were more likely to intend to breastfeed their children (Pascoe, 1982; Cusson, 1985; Gregg, 1989; Maehr et al., 1993; Lizarraga et al., 1992). A female student had higher attitude scores if she had been breastfed as a child, or had been exposed to a greater number of breastfeeding women, (Cusson, 1985), and these attitude scores were correlated to breastfeeding knowledge scores.

Joffe and Radius (1987) noted the importance of accentuating the positive messages about breastfeeding, since positive attitudes were more predictive of intent to breastfeed than were perceived barriers. The greatest perceived barrier to breastfeeding for adolescents in Canada, USA and Britain was "embarrassment" (Friel et al., 1989; Ellis, 1983; Forrester et al., 1997; Gregg, 1989).

Most studies were cross-sectional, measuring predictors of positive attitudes and knowledge. Only one adolescent breastfeeding promotion intervention has been documented in the literature. This involved the effect of television advertisements (15 second, five times over a 40 day period) on the knowledge and attitudes of Newfoundland adolescent females (mean age = 16 yr). Friel et al. (1989) demonstrated a small but significant effect (3%) of increased positive attitudinal scores, but no effect in knowledge scores. The pretest was highly reactive and associated with increased post-test scores. Newfoundland has provincial breastfeeding initiation rates of about 50%, comparable to Sagkeeng First Nation but much lower than Canadian averages of around 80% (Martens, 1994; Levitt et al., 1995).

2.4. Literature review on hospital intervention strategies to affect breastfeeding policy and protocol

2.4.1. WHO/UNICEF breastfeeding initiatives

Worldwide breastfeeding promotion initiatives by the World Health Organization (WHO) and UNICEF have resulted in the Baby-Friendly Hospital Initiative (BFHI) (Marmet, 1993). Evaluation of a hospital's "baby-friendliness" focuses on compliance with the "Ten Steps to Successful Breastfeeding" (WHO, 1989) and the "International Code of the Marketing of Breast Milk Substitutes" (WHO, 1981), revised in 1986 (WHA, 1986) to include a ban on the acceptance of free or subsidized formula by maternity services. Appendix 7 includes summaries of the two documents.

The positive association of the adoption of each of the Ten Steps with increased breastfeeding initiation and duration rates have been well-documented throughout the world (see Saadeh and Akré, 1996; WHO, 1998). The Canadian Hospital Association adopted a policy on breastfeeding which supports the WHO/UNICEF initiatives (CHA 1994/5). Both a Canada-wide (Levitt et al., 1995) and a Manitoba provincial survey (Breastfeeding Promotion Steering Committee of Manitoba, 1998) have measured the compliance of Canadian and Manitoba maternity hospitals with BFHI criteria (see Appendix 8). The Canadian survey of administrators found that only 28 of 523 hospitals complied with at least seven of the "Ten Steps" (Dunlop, 1995). The Manitoba survey, which included administrators, nursing staff and women giving birth in a five-week period, found deficits in both policy and practice in most hospitals.

2.4.2. Hospital policy and practice interventions

The design of the research on effects of hospital policy interventions are weak, with two being quasi-experimental and six being pre-experimental, that is, having no comparison group (see Appendix 6). Two of the pre-experimental studies (Iker and Mogan, 1992; Bruce and Griffioen, 1995) showed no significant differences in supplementation rates or breastfeeding initiation rates after educational programs and policy changes. Small but non-significant (6-7%) differences in six-week duration may be evident, but with no control group, it is difficult to assess the importance of this effect in light of possible threats to internal validity. One pre-experimental design reported large (16-22%) decreases in routine supplementation (Valdes et al., 1995), but the information was based on self-reports of workshop attenders so the validity may be questionable. Two pre-experimental designs, one in the USA (Wright et al., 1996) and one in south-east Asia (Wilmoth and Elder, 1995) reported medium to large changes with implementation of BFHI criteria, with supplementation rates of breastfed babies decreasing by 19% and 28%, and timing of first breastfeeds decreasing by 2.6 hour and 6.8 hours respectively. However, the timing of first feeds was delayed compared to current practice in Canadian hospitals. One pre-experimental design in Norway (Nylander et al., 1991) compared frequency of breastfeeds and number of supplements given to breastfed babies on day two, both before and after an extensive educational staff intervention strategy. After the intervention, the mean frequency of breastfeeds on day two increased by 49% to 6.4 breastfeeds/24 hour, while the daily number of supplementary feeds decreased by 77% and total volume of supplementary feeds decreased by 88% (4.8 feeds before, 1.1 after; 188 ml/24 hour to 23 ml/24 hour). The six-month breastfeeding duration increased from 66% to 87% after the program. This design did not control for history, so observed changes may be due to historical factors other than the hospital educational strategy.

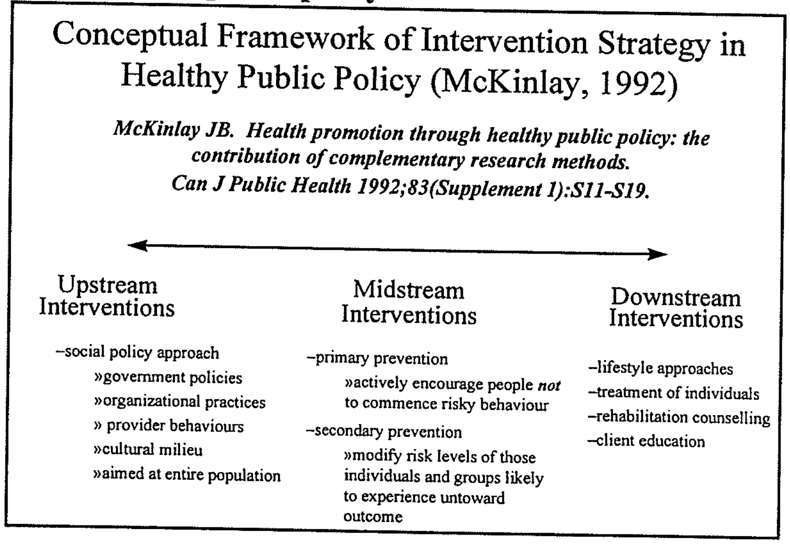
Both of the studies using quasi-experimental design reported positive change in breastfeeding policy and protocol. Winikoff et al. (1987) noted a breastfeeding incidence increase of 28% in the intervention site as compared to the control hospital, and a 13% increase in exclusive breastfeeding for at least 3/4 of the hospital feeds. This study evaluated a program of continual inservicing and policy changes over a period of three years, using interdisciplinary team approaches. Westphal et al. (1995) randomly selected one of paired hospitals to receive an intensive 133-hour training program for a team who were to implement change within their institutions. Three of the four hospitals showed increased compliance with BFHI criteria, when compared to their controls.

2.5. Theoretical models for community health intervention strategies

Sections 2.2, 2.3 and 2.4 described separate studies and separate programs, all designed to promote breastfeeding for adolescents, for prenatal clients, for maternity clients, and during the postpartum period. But these are "piecemeal" approaches, separate initiatives in isolation from each other.

In the discussions with various Sagkeeng people following my 1993-1994 Masters research, many ideas arose about ways to approach a "community-based" breastfeeding promotion strategy (see Chapter 1). Rather than considering each of these ideas as "piecemeal" or disjointed, one may consider each as a connected part within an overall encompassing theoretical framework for health promotion. Two frameworks are particularly relevant to Sagkeeng - the McKinlay framework, and the Medicine Wheel framework. These will be described separately.

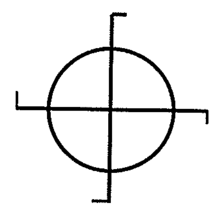
Figure 2.3. McKinlay (1992) framework for healthy public policy



The mutually necessary contributions of individual, community and institutional systems to the health of a population have been discussed by McKinlay (1992, 1993, 1994). He argues that even though personal risk factors are important, a disproportionate focus on individual voluntary risk behaviour modification is naive in the context of a social system which may encourage, reward or profit from risk behaviour adoption. McKinlay identifies three levels of intervention for health promotion strategies - "downstream", "midstream", and "upstream" (see Figure 2.3.). Downstream are the curative/personal lifestyle interventions, such as surgery, drugs and individual education. Midstream interventions incorporate a community-based strategy, using primary and secondary prevention. Upstream interventions investigate the macrostructure - wide scale organizational, provincial or federal sociopolitical changes. A community strategy for health promotion requires inclusion of all three levels of intervention *simultaneously.*

The emphasis on the need for downstream, midstream and upstream strategies in a health intervention is also compatible with First Nations models. In Volume 1 of the Report of the Royal Commission on Aboriginal Peoples (1996:646), the Medicine Wheel, associated mainly with the First Nations peoples of the Canadian plains regions, is used by community teachers to relate life truths.

> "The medicine wheel represents the circle that encompasses all life and all that is known or knowable, linked together in a whole with no beginning and no end. Human beings have their existence in this circle of life, along with other beings and the unseen forces that give breath and vitality to the inhabitants of the natural world. The lines intersecting at the centre of the circle signify order and balance. They help people examine experience by breaking down complex situations into constituent parts, while reminding them not to forget the whole."



Aboriginal paradigms define health in holistic, social terms (Feather et al., 1993) and the Medicine Wheel has been used to illustrate health promotion strategies (Bartlett, 1995). Health can be achieved by "examining the *spiritual, emotional, physical and intellectual* aspects of the *child, youth, adult and elder* as an *individual, member of a family, community and nation* within the context of the *cultural, social, economic and political* environment" (see Figure 2.4.). According to Bartlett (1995), health is an interaction of all sixteen elements, and health promotion programs must include strategies which address these elements. Current emphases of health educators, health evaluators, and health promotion strategists have also included a holistic framework similar to that of the

Medicine Wheel (Thompson, 1992; Hamilton and Bhatti, 1996[3]), with the inclusion of individual, family, community, institutional and national elements.

Figure 2.4. Aboriginal framework for holistic health (Bartlett, 1995)

Elements of the Medicine Wheel (Bartlett, 1995)			
EAST	**SOUTH**	**WEST**	**NORTH**
spiritual	***emotional***	***physical***	***mental***
child	***youth***	***adult***	***elder***
individual	***family***	***community***	***nation***
cultural	***social***	***economic***	***political***

In the Breastfeeding Decision-Making Model (see Chapter 1 discussion), the .predictors of breastfeeding initiation and duration included *individual, family, community* and *institutional* factors. Therefore, the Sagkeeng breastfeeding promotion programs chosen for evaluation represent the continuum for optimal effect: (1) a *downstream* intervention of *individual* prepartum education and postpartum breastfeeding peer counselling; (2) a *midstream* adolescent school-based intervention to affect knowledge, beliefs, and social support for breastfeeding at the *community* level; and (3) an *upstream* intervention to affect breastfeeding policy and practice in the local hospital *institution.* Simultaneous with these more "formal" programs , the overall Sagkeeng "culture" was experiencing more subtle influences at the *family* and *community* levels. The production of the community video and booklet

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This is mirrored by Health Canada's "Population Health Promotion Model" (Hamilton and Bhatti, 1996:7), with one of the cubic layers being "individual, family, community, sector/system, and society".

involved people, both males and females, from different age groups, different experiences, and different professions. Chapters 4 to 7 include results of each of the three formal evaluations and the less formal community trends analysis separately.

2.6. The politics of breastfeeding: feminist perspectives and a call to social action

In the last section, the literature on how to promote breastfeeding at the individual, family, community and institutional levels was placed in a framework of health promotion and holistic intervention strategies. But promotion of breastfeeding must also be placed in a political and global context.

In the late 1800's and early 1900's, women were encouraged to play the *scientific motherhood* role, where motherhood was elevated as the noblest profession for women. The era of 1920-1960 would best be described as "doctor should decide", with regulation, rule and authority for infant feeding placed in the laps, or rather the pens, of the medical profession (Apple, 1987). Feminist activists began to challenge previous concepts of motherhood. But the relationship of feminism to promotion of breastfeeding was fraught with difficulty. Feminists needed to reconcile the right of women to full participation in public life, and to economic independence (Reiger 1988). Early feminists of the 1970's equated pregnancy and childbirth as gross limitations on a woman's health and mobility, and stressed the need for reproductive control and access to child care. Feminists such as Germaine Greer, in the late 1970's, emphasized sexual differences from a woman-centred perspective. They stressed the involvement of men with childbirth and nurturing of the children, but often ignored the issue of lactation. This theme of "technology as provider of liberation" was used by the artificial baby milk industry as a marketing tool for their product (Van Esterik 1994a, 1989).

Feminist writers of the late 1980's and early 1990's began to include breastfeeding as an issue. Reiger (1988) saw lactation as associated with a decrease in female morbidity ("good for a woman") and a way to connect women worldwide in a way that "remakes the world". However, some feminists wanted to avoid privileging some (breastfeeding) mothers over others (non-breastfeeding). Thus certain universal processes such as menstruation and menopause were discussed by feminist literature, while others, like lactation, were avoided (Van Esterik 1994b). The feminist belief in personal control of life choices conflicts with health care providers' favouring of one feeding choice over another (Kearney, 1988). Infant feeding decisions may be construed as being dominated by predominantly male physicians, who arbitrarily legislate behaviour rather than promote individuality in feeding style.

In her discourse on breastfeeding and feminism, Van Esterik (1989:67) defines feminism as a theory that examines the causes of women's oppression, and actively seeks the elimination of gender subordination and all forms of social or economic oppression which is based on class, ethnicity or nation. The social feminists combine political economy with gender analysis, which encourages an examination of the way in which societal structure and institutions influences breastfeeding. Thus the creation of conditions "that make breastfeeding *possible, successful* and *valued* in a given society" (Van Esterik 1989:211) would be the outcome of a social feminist analysis of breastfeeding.

According to Van Esterik, breastfeeding issues are associated with poverty environments, empowerment issues, medicalization of infant feeding, and commoditization of infant food. A feminist approach would look at the consequences of replacing an adaptable, renewable resource like breastfeeding, with a non-renewable resource like bottle feeding. These issues often play out in broad political and economic contexts, like urbanization, colonization, industrialization, trade, migration, and capitalization of agriculture. *Empowerment* issues raise concerns about women's access to food in order to support lactation, flexible work to accommodate breastfeeding, and social support which influences infant feeding decisions. The *medicalization of infant feeding* brings forth concerns about the devaluation of women's knowledge, and the valuation of physician advice, hospital routines, and Western medical models. *Commoditization* of infant food results in "food delocalization", where food preferences may change to reflect non-cultural foods. The term "dietary colonialism" (McGee in Van Esterik 1989:163) refers to the "oppressed" emulating the oppressors' food behaviours. This could be subtle, through marketing to create higher value to foreign products. Or it could be a direct result of economic realities; women in developing countries are "liberated" by formula and bottles, so they can earn low wages in industries which do not grant maternity leaves, in order that the "oppressors" may have low cost consumer items. Is this really "liberation in a bottle", or oppression in a bottle?

Van Esterik (1989, 1994b) comments that breastfeeding empowers women and contributes to gender equality, thus it is an important feminist, human rights, and women's issue. Breastfeeding requires a rethinking of basic issues such as *division of* *labour* and the fit between our productive and reproductive lives. Conditions supportive of breastfeeding essentially reduce gender subordination. Breastfeeding requires *structural change to society* to improve the position and condition of women, to mandate equitable food distribution within the family, and to redefine work as compatible with mothering. Breastfeeding *gives control back to the woman*, away from the health care provider. Breastfeeding *makes a woman a producer*, challenging the idea of woman as consumer. Breastfeeding *challenges cultural assumptions* of breasts being the sexual property of men, and encourages women to fight for the right to breastfeed in public without censure. And finally, breastfeeding *encourages solidarity and cooperation among women* at the individual, community, national, and international level. As Van Esterik states (1994a), breastfeeding is politicization of the personal, for if breastfeeding is about empowerment and money, how could it not be political.

> "Telling breastfeeding stories and listening to breastfeeding stories helps us avoid politically correct breastfeeding. From women's stories, we learn that breastfeeding is about love, ecology, politics, power, women's knowledge and the wisdom of the body. It is about the personal messages and memories that contribute to who we are as people and the way we relate to others. But these stories, these memories are not always used to inform our knowledge of breastfeeding. Let us bring these stories into our understandings of breastfeeding to ensure that we place breastfeeding in both its broadest possible context, and its most personal context." (Van Esterik 1994b:73-74)

Van Esterik comments about the fears of inducing guilt in women who do not or cannot breastfeed. She states that guilt should be anger at patriarchal work environments, lack of skills of health care providers at helping women with problems, and lack of support in the community or nation. The goal is not to insist that every women breastfeed, but *to create* *conditions that enable women to breastfeed.* Conditions must be created "that make breastfeeding possible, successful and valued in a given society" (Van Esterik 1989:211). Breastfeeding is women's work (O'Gara, 1994), with real, tangible costs to the woman. Discussing breastfeeding issues should therefore be a feminist call to action and support of breastfeeding women throughout the world.

In Western culture, "public" and "private" are considered separate entities (Maher, 1992a, 1992b). The public domain includes *productive*, male, impersonal work, politics, and social relationships. The private includes *reproductive*, female, emotional, physical intimacy. In Western culture, great power and cultural value is placed on the "public" domain. Women crossing the boundary from private to public are therefore expected to adopt "public" stances. Reproductive work, including breastfeeding, is thus considered secondary, and breastfeeding at work or in public is a violation of Western cultural taboos. Simply providing women with time and place to breastfeed at work does not change the constraints to breastfeeding while working. Similarly, hospitals as institutions stress "productive" aspects, which often interfere with mother/child relationships, and with breastfeeding. Manipulation of breastfeeding by male domination includes physicians medicalizing infant feeding, male rules regarding the length and type of breastfeeding. Production models have produced breastfeeding "rules" - clocks, weighings, quantification of milk, testing of the quality of milk, and research aimed at finding an equivalent replacement for milk constituents. Breastfeeding blurs boundaries (Van Esterik 1994a), the dichotomies of "production versus reproduction", "public versus private", "work versus leisure", "self versus others", and "maternal versus sexual".

Breastfeeding can be transforming for some women, and terrifying for others who fear their loss of autonomy, or who have difficulty with the merging of dichotomous views.

To understand breastfeeding practices and patterns, one must truly explore political factors. Infant feeding issues can play out against a much deeper fabric of the political, economic, and gender context of First Nations communities. But one must be careful in constructing "feminist" thought in First Nations communities. Monture, a First Nations woman herself, observes that "we do not need to be feminists because we were born equal" (Monture 1993:334). Only after European governments forced European culture onto Aboriginal peoples, and enacted patriarchal legislation such as the Indian Act, did women lose the right to vote and to have a voice in politics. First Nations women prefer to define their own experience. Lack of education, employment, economic power, social status, and the remoteness of geography often makes First Nations women "invisible" to the feminist movement. In Aboriginal culture, the first responsibility of women is to the future generations, not necessarily to women of the world.

> "As a woman of the First Nations, I walk in front of seven generations to come. I have a responsibility to the little ones who are not yet here to see that there is a good place for them when they come. I hope you will take my hand and we can all walk to that good place together, in respect and as equals" (Monture 1993:340-341)

Despite cautions from Aboriginal women concerning feminist frameworks, the politics of gender and societal structures as well as the commitment to future generations of children makes the call for breastfeeding-supportive conditions relevant to First Nations communities.

2.7. Summary

Attempting to evaluate disjointed pieces of an overall community breastfeeding promotion strategy is similar to dissecting the proverbial elephant, or taking apart a wheel. Investigating the spokes gives the researcher a good description of various "pieces" of a wheel, but does not give the impression of how the pieces fit together to produce a useable, functioning and entire wheel. The whole is greater than the sum of its parts, and can only be understood as a system and not as separate pieces.

Attempting to evaluate pieces of the Sagkeeng breastfeeding promotion strategy is something akin to investigating the spokes for clues as to how the wheel functions. The results sections of this thesis (Chapters 4 to 6) essentially isolate the intervention strategies for the purpose of quantitative evaluation. But the reader must constantly keep in mind that these separate "pieces" or programs inevitably intersect and inter-relate, summing to something that is truly a whole community process which is greater than the sum of its programs - at both a health intervention level and a political social action level.

As much as possible, the interventions chosen for formal evaluation were as mutually exclusive as possible. The women involved in the evaluation of the pilot peer counsellor program, both as participants and non-participants, were not involved in the adolescent education program, nor did they have children of that age. Only one-quarter of the women in the peer counsellor program evaluation gave birth in Pine Falls Health Complex, the site of the hospital intervention strategy. Because of the study design, both participants and non-participants would have given birth in the hospital's post-intervention period of time. The ongoing "overlay" of community breastfeeding promotion strategies, including the video and the increased interest in prenatal breastfeeding education, was done in a non-experimental way and could have affected adolescents, pregnant women, families and health care providers in unmeasured ways. An attempt to collect community data over time, from 1992 to 1997, gave hints as to the community trends in initiation and duration rates of breastfeeding.

Only through the stories of people using the wheel can the researcher truly know how the spokes all fit together to function as a vital part of movement and life. Similarly, in evaluating the community effects of the breastfeeding promotion strategy of Sagkeeng, the stories of community people can enable the researcher to know how the programs "fit together". Key informant data is interspersed throughout the quantitative evaluation chapters. These personal insights help enrich and explain how the separate pieces function within the community strategy and enable a community to change or move forward. Through a mixed methodology of quantitative and qualitative data, an evaluation of the small community of Sagkeeng First Nation, despite small numbers and overlapping effects, was considered valuable and feasible.

The last chapter of this thesis is an attempt to bring the "spokes" of the individual interventions together, so that an overall community effect of change and forward motion can be seen. "Coming full circle" means just that - putting the pieces together in such a way as to enable a holistic view of Sagkeeng's community health promotion strategy, similar to the holistic approach of the McKinlay and Medicine Wheel frameworks.

Chapter 3: Research Design and Methodology Issues

3.1. Introduction

The evaluation of the community breastfeeding promotion strategy in Sagkeeng First Nation was comprised of multi-faceted evaluations of single programs and community trends. Specific research designs for each program evaluation will be discussed in the relevant chapters. But there are more general considerations, including the use of mixed methodology, concepts of evaluation research, and survey design. There are also statistical design issues, especially given a small community with small numbers.

3.2. Mixed methodology and triangulation

The term, "triangulation", was first used by Denzin (1978) and is borrowed from navigation strategy. This implies the corroboration of information by utilizing other methods and sources (Borman et al., 1986). Morse (1994) suggests that the use of multi-methods provides different "lenses" or perspectives on the research question, and may result in a more holistic view which can complement and enrich the data. The concept of triangulation is based on an assumption that different methods or data sources have inherently different biases, so the multi-method approach allows a researcher to validate similar findings, or to question differing findings (Creswell, 1994). Corroboration of data ensures that biases of the evaluator have been compensated by the convergence of independent methods and sources, or as Denzin (1978:28) states, "no single method ever adequately solves the problem of rival causal factors ... Because each method reveals different aspects of empirical reality, multiple methods of observations must be employed." Triangulation may not integrate a picture, but rather produce different pictures that could enhance the quality and credibility of findings (Patton, 1990).

Triangulation could mean mixing methods within the same "paradigm" of research, such as using two quantitative measures. For example, the evaluation of the Pine Falls Health Complex intervention strategy used a triangulated measure to investiage the supplementation of breastfed babies. One measure was taken from actual chart audits, and another from survey self-reports by the hospital nursing staff. Triangulation may also "mix the paradigms" of qualitative and quantitative research[1], such as in the evaluation of the peer counselling program in the Sagkeeng study. Findings from quantitative survey questions and a community chart audit were triangulated using data from qualitative semi-structured interviews.

Some researchers are hostile to the concept of "triangulating" across paradigms. Guba and Lincoln (1989) argue that the internal consistency and logic of differing paradigms makes it inadvisable to mix the differing inquiry modes. Others are doubtful but willing to withhold judgment:

> "Triangulation may signify a face-off between research paradigms. It remains to be seen if one paradigm will subsume the other, if one will be coopted or subordinated to the other (e.g. the use of qualitative methods only as 'preliminary explorations' or adjuncts to positivist designs), or if different research paradigms

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The "qualitative" research paradigm is sometimes referred to as the "naturalistic inquiry" paradigm. It is considered an inductive process, whereby the researcher builds concepts, hypotheses and theories from the qualitative interview data through thematic analysis. In contrast, the "quantitative" paradigm, sometimes referred to as the "positivistic" paradigm, is a deductive process. Theory and literature are used deductively, and the research hypotheses are tested through quantitative measures. (Creswell, 1994; Patton, 1990) can coexist, with findings from each informing the other". (Eakin and Maclean, 1992:S73)

Still others consider mixed paradigms as an advantage, with quantitative data giving a 'thin and wide' generalizeable approach, and qualitative data contributing to a 'rich and deep' interpretation of the data (Marshall and Rossman, 1989; Creswell, 1994; Patton, 1990).

Creswell suggests that it is advantageous to combine methods throughout different phases of the research process, suggesting one model of mixed methodology to be the "dominant-less dominant design". The researcher "presents the study within a single, dominant paradigm with one small component of the overall study drawn from the alternative paradigm" (Creswell, 1994:177). This would best reflect the framework of the Sagkeeng evaluation research, where the dominant design is deductive quantitative theory testing, with a less-dominant qualitative interview component to probe into the context, validity, and comprehension of the quantitative findings.

3.3. Evaluation research

Evaluation research began in the 1920s, in the fields of education and public health (Rossi and Freeman, 1993). Guba and Lincoln (1989) call this the "first generation of evaluation", characterized by *measurement*. The sign of a good evaluator was to be well-aware of the availability and usefulness of the myriad of measurement tools which were considered valid measures of constructs.

The second generation of evaluation, according to Guba and Lincoln (1989), began in the 1930s and evaluated programs through describing how well they measured up to certain stated objectives. The role of evaluator became the role of *describer*. After World War II, large scale programs were initiated in the areas of urban development, technical education and training, and preventive health. There was a need for "knowledge of results", the phrase used to describe the need for evaluating program outcomes. By the end of the 1950s and early 1960s, large scale program evaluation was common, with a corresponding increase in the literature of methodology and increased grant investments for such endeavours. Landmark publications on evaluation research included Campbell and Stanley's book, Experimental and Quasi-Experimental Designs for Research . This book detailed the authors' commitment to the experiment as being "the only way of establishing a cumulative tradition in which improvements can be introduced without the danger of a faddish discard of old wisdom in favor of inferior novelties" (Campbell and Stanley, 1963:2). A typology of pre-experimental (study of a single group), experimental (random assignment to control or intervention group), and quasi-experimental designs[2] were detailed, and possible threats to internal and external validity were described (see Appendix 9 for details on diagramming experiments and the different types of validity).

Third generation evaluation involved *judgment*, according to Guba and Lincoln

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According to Campbell and Stanley (1963:34), "there are many natural social settings in which the research person can introduce something like experimental design into his scheduling of data collection procedures (e.g., the *when* and *to whom* of measurement), even though he lacks the full control over the scheduling of experimental stimuli (the *when* and *to whom* of exposure and the ability to randomize exposures) which makes a true experiment possible. Collectively, such situations can be regarded as quasi-experimental designs."

(1989). Evaluators began to realize that objective-oriented description lacked the ability to point out the inadequacy of the objectives themselves. Therefore, a program may "stack up well" when measured in light of its objectives, but the objectives may be inadequate. Cronbach questioned objective-based evaluations, arguing for a contextual approach to evaluation (Greene, 1994). He also debated with Campbell over the importance of external validity and contextual meaningfulness (favoured by Cronbach) versus internal validity and causal claims (favoured by Campbell). By the late 1960s, Robert Stake and Michael Scriven were calling for the judgment aspect of evaluation; Stake for the evaluator to add judgment to description, and Scriven to examine the objectives themselves as possible problems, thereby producing "goal-free" evaluation (Greene, 1994). As Guba and Lincoln (1989:29) state, "Something not worth doing at all is certainly not worth doing well". But for many evaluators, the idea of 'judgment' implied political vulnerability, and was objectionable to those who viewwed science as 'value-free'.

The advent of the accessibility of computers and statistical programs produced enormous growth in evaluation research in the 1980s. However, a cynicism was evident with the realization that initiatives stemming from the evaluation were often stagnated by the policy makers, program planners, administration, and other stakeholders. Evaluation research was recognized as a political and managerial activity, which extended to eventual policy decision (Edwards et al., 1975). Program evaluation lived in a context of social policy, and therefore could never be politically neutral (Greene, 1994; Weiss, 1975). Certain elements of a program are not evaluated, evaluations are usually commissioned by the client instead of the recipient, and the evaluator gears findings to the client. Understanding the "policy space" or context of an evaluation became increasingly viewed as essential (Rossi and Freeman, 1993).

The climate of the 1990s brought with it a perception of scarce resources, choices made to allocate these scarce resources, and intense scrutiny of any program to which funding was designated. Contextual challenges to the meaningfulness of experimental logic for evaluation was a force for change in the form and function of program evaluation (Greene, 1994). There emerged a debate as to the objectivity, neutrality, and grand theory of evaluation research. Researchers such as Guba, Lincoln, House and Stake began utilizing interpretivist philosophies and incorporating qualitative methods to counter the positivistic approaches. Much of the debate was framed as "quantitative versus qualitative" paradigm debates. Qualitative approaches were originally thought untenable by practical program evaluators. But the Standards for Evaluation of Educational Programs, Projects, and Materials , written by the Joint Committee on Standards for Educational Evaluation, were updated in 1991 and encouraged the use of a variety of methods - qualitative and quantitative - the merit lying not in the form of inquiry, but in the relevance of the information obtained. Debate continued, however, with criticism that merely adding to the variety of methodologies did not change the basic premises of positivistic paradigm approaches (Greene, 1994).

Guba and Lincoln (1989) went further to develop their "fourth generation" evaluation, which included *responsive focusing plus a constructivist methodology*. They reacted to what was viewed as three fundamental flaws in program evaluation theory.

The first was a tendency toward managerialism, where the manager maintained a power-relationship with the evaluator and therefore was seldom blamed for program failure. The second was a failure to recognize value-pluralism. Although values were used in the third "judgment" stage, the question remained as to whose values would be used. The third was an over-commitment to the positivist paradigm of inquiry. According to Guba and Lincoln, this paradigm leads to removal of the context, overdependence on quantitative measures and "operationalized" variables, claims of truth being non-negotiable, claims of only one way of viewing the world, and claims of freedom from value and from any responsibility on part of the evaluator. The latter claim led to a proposal of the "constructivist" methodology, whereby theinquiry process would be carried out within the ontological and epistemological presupposition of the qualitative or naturalistic paradigm (Guba and Lincoln, 1989:11). Where the constructivist paradigm assumes relativist and subjectivity, the positivist paradigm assumes only one truth and a stance of objectivity.

In terms of program evaluation, Guba and Lincoln include stakeholders in an interaction that creates the construction, or the view, which becomes the product of the evaluation. The product is not a set of conclusions or recommendations or value judgments, but is an "agenda for negotiation of those claims, concerns and issues not resolved in the hermeneutic dialectic exchanges" (Guba and Lincoln, 1989:15). This satisfies the viewpoint that evaluation is social, political and value-oriented by nature, and purely positivist evaluation approach is considered flawed.

Although Guba and Lincoln disassociate themselves from critical theory paradigms, Greene (1994) believes that they have gone slightly beyond the strict naturalistic paradigm and added the component of *social action* to their constructivist paradigm. Constructivism requires that the evaluation be a catalyst for social action which emerges from the setting, rather than being prescribed by an evaluator. The evaluator in fourth generation evaluation becomes negotiator and social change catalys, in contrast to describer/consultant. Because of this social action role, Greene proposes the need for multi-methods, for quantitatively-based evaluations combined with the strictly qualitative methods preferred by Guba and Lincoln:

> "As participants in the social policy arena, program evaluators are increasingly being called upon to get involved, to be a part of the action, to become public scientists. With their acknowledgment of values, qualitative approaches can help evaluators illuminate alternative paths or courses of action. Such approaches can be molded to fit varied and emerging inquiry shapes, from technical reports to dramatic dialogue. And they can adaptively respond to varied and evolving inquiry functions, including shifting social action agendas. For these reasons, qualitative approaches are likely to continue to be a significant and useful alternative in the methodological repertoire of program evaluators. Yet, also for these reasons, qualitative evaluations as a genre are destined to remain within evaluation's responsive tradition - beautifully responsive but, in being so, unable to assume a more proactive role in the social policy sphere. And so, because the evaluator as public scientist must be proactive, must him- or herself become an active and accountable player in the policy arena, qualitative evaluations will not be enough" (Greene, 1994:541).

This reflects a pragmatic approach to evaluation, like the approach of Patton (1990). His "utilization-based" theory is described as follows:

> "Rather than believing that one must choose to align with one paradigm or the other, I advocate a paradigm of choices. A paradigm of choices rejects methodological orthodoxy in favour of *methodological appropriateness* as the primary criterion for judging methodological quality. This issue then becomes not whether one has uniformly adhered to prescribed canons of either logical-positivism or phenomenology but whether one has made sensible methods

> decisions given the purpose of the inquiry, the questions being investigated, and the resources available. The paradigm of choices recognizes that different methods are appropriate for different situations. Situational responsiveness means designing a study that is appropriate for a specific inquiry situation". (Patton, 1990:39)

So from the extreme viewpoints of Campbell and Stanley (1963) to Guba and Lincoln (1989, 1994), one is left with a dizzy feeling that evaluation theory is fluid and changeable. It remains troublesome to the student of evaluation research, who feels that health program research must be made generalizeable, yet responsive to all stakeholders. One can appreciate the pragmatism of Patton. In my own research, I have chosen to use the framework of Campbell and Stanley (1963) in choosing evaluation study designs. But the programs actually chosen for evaluation were decided upon through a community process, with community consultation and discussion at the end of the data collection. Cross-paradigm mixed methodology evaluation strategies were incorporated to elicit understanding and to include all stakeholder viewpoints. Yet within the pragmatism was a sense of political action, more in keeping with a feminist approach to research (see Chapter 2 on the politics of breastfeeding). My evaluation research was deeply political, a call to action in a community to increase women's empowerment to breastfeed their babies. The purpose of the research was to evaluate breastfeeding promotion programs with the intent to create conditions that make breastfeeding *possible, successful* and *valued* within a community (Van Esterik, 1989).

3.4. Survey design issues: reliability and validity

Within the quantitative positivist methods of my research, survey research was used extensively. Formal testing of the survey tools must ensure their validity and reliability. In the evaluations, previously tested tools from my Masters research were incorporated (Martens, 1994) - Breastfeeding Beliefs, Bottle Feeding Beliefs, Breastfeeding Confidence, and Referent Support tools (see Appendix 1). This section will detail the process used initially to establish reliability and validity.

Validity is defined as "the extent to which any measuring instrument measure what it is intended to measure" (Carmines and Zeller, 1979), and addresses the issues of systematic error, non-random error and bias. Types of validity include content validity, criterion-related validity, and construct validity (Rossi, Wright and Anderson, 1983). Each type will be discussed with reference to the survey tools from the Masters research.

Content validity assesses the extent to which all items appearing in the survey are relevant to the concept being measured. This is not a formal test or statistic, but is tested informally by asking "experts" to comment on the clarity and completeness of the questionnaire (McDowell and Newell, 1987). For the Masters survey tools, content validity was assessed in a three-step process; first, an extensive review of the literature for test items relating to the infant feeding decision-making process; second, qualitative interviews with Sagkeeng women, men, health care providers and educators which helped to validate the existing test items and identify further items needing inclusion; and third, comprehensive revisions through consultation with experts, including two community health nurses, one community health worker, three experts on Aboriginal health and women's health, one hospital-based Sagkeeng nurse, three First Nations mothers (two in their mid-teens and one in her early twenties), and one epidemiologist. This revised survey was then pretested by a First Nations interviewer with three mothers, where wording changes once again took place for the sake of cultural appropriateness and clarity.

Criterion-related validity is defined as "the correlation between a measure and some criterion variable of interest" (Rossi, Wright and Anderson, 1983). This may refer to a criterion which exists either in the present, called concurrent validity, or in the future, called predictive validity. No concurrent tools for "Breastfeeding Beliefs", "Bottle Feeding Beliefs", "Breastfeeding Confidence", or "Referent Support"were used. But predictive validity was evident in the fact that these measures correlated with a future outcome measure. As discussed in Chapter 1, the prenatally-measured variables correlated with intent to breastfeed, and with breastfeeding duration, according to the "Breastfeeding Decision-Making Model" (Martens and Young, 1997).

Construct validity establishes the variable as a "successful" quantification of a given idea, or concept, of interest. The idea of construct validity is central to the measure of abstract theoretical concepts. According to Carmines and Zeller (1979), construct validation requires three steps: first, a theoretical relationship between constructs must be specified; second, the correlations between the variables which measure these constructs must be examined; and third, the empirical evidence must be interpreted in terms of whether or not it clarifies the construct validity of the variable. In other words, do the measured variables which represent the constructs actually perform the way we would expect, according to a theory? In the Masters research, the "Breastfeeding Decision-Making Model" set up the constructs and their relationships. Construct validity was demonstrated, in that the relationships hypothesized were verified.

Reliability is the degree to which the variables are stable, consistent, or can be replicated (Spector, 1981). Reliability is affected by the fluctuations of random error. If an instrument is not reliable, then it cannot be valid. The more random error involved in the relationship, the more difficult it is for a significant correlation to be observed. According to Kerlinger (1986), reliability can be improved by writing items unambiguously, adding more items of equivalent kind, giving clear instruction, and administering the instrument in a standard way. Three types of reliability which are often assessed include inter-rater reliability, intra-rater reliability (also known as test-retest reliability), and internal consistency .

Inter-rater reliability determines whether different raters, or interviewers, using the same method and respondent, would obtain the same survey results. According to Bergner (1987), good training, instruction and supervision of interviewers is crucial to obtaining the minimum correlation of 0.8 between interviewers. The Masters research included three different interviewers, who demonstrated at least 96% inter-rater reliability during training sessions. In the current research, the only interviewer was myself. I used the same technique of asking the questions, including giving the interviewee a copy of the survey tool so that she could follow along as I asked the questions verbally.

Intra-rater or test-retest reliability determines whether the results obtained on repeated tests of the same client would remain stable in an interval of time, assuming no other change affected the results. This was not formally done in the Masters research, except during the actual survey where one of the tools measured prenatally, the "Referent Support" tool, was repeated two weeks after birth. A paired t-test indicated no significant difference between the two measures ($t=0.36$, 34 df, $p=0.40$, NS), and a significant correlation between the two results ($r=0.6$, 33 df, $p=0.0004$), despite the fact that the birth of a child and the initiation of breastfeeding or botte feeding occurred between the test periods. In the present research, revised tools used in the hospital and school evaluations were formally tested for intra-rater reliability, results being included in relevant chapters.

Internal consistency refers to the fact that a variable representing a construct needs to be homogeneous, that is, it taps into different aspects of the same attribute. Too high correlations within the items comprising the variable may indicate redundancy, whereas too low correlations may indicate different constructs being measured within the same scale (Streiner and Norman, 1989). Cronbach's alpha is a reliability test which measures internal consistency (Hintze, 1997). Carmines (1990) stipulates that a value of at least 0.8 should be achieved for widely used survey tools, but Leedy (1997:35) assumes that a score over 0.7 is acceptable. For "Breastfeeding Beliefs", "Bottle Feeding Beliefs", "Breastfeeding Confidence", and "Referent Support" variables, Cronbach's alpha were considered acceptable at 0.85, 0.83, 0.92 and 0.83 respectively in my Masters research.

3.5. Statistical design issues

In Chapter 2, a multi-level approach to influencing health behaviours has been proposed using McKinlay's model for healthy public policy (McKinlay, 1992). Witout simultaneous programs which address “downstream, midstream and upstream” concerns - issues at the individual, family, community, institutional, and government levels - the intervention strategy may be ineffective. So it is crucial to evaluate promotion strategies at all levels.

But a researcher faces statistical problems with small sample sizes when doing an evaluation within a small First Nations community such as Sagkeeng. In statistics, adequate sample sizes are required to detect significant differences and avoid Type II error (the error of not finding a difference even though a difference truly exists). One way to avoid this problem is to collect data within one community over a long period of time to increase sample size. But this has the disadvantage of losing short-term effects of health intervention strategies, since the programs may be evolving through time. A second possible solution to the statistical dilemma is to include several communities in a study. But it is evident that different communities, even those in geographical proximity, may have very different social and cultural support for health behaviours. For example, the community of Hollow Water First Nation is about a one-hour drive north of Sagkeeng. But my previous research (Martens, 1994:168) and the Canada-wide First Nations survey (Stewart, 1985), indicated that Hollow Water had higher social support for breastfeeding when compared to Sagkeeng, higher initiation rates (70% versus 56%) and higher six-month duration rates (29% versus 5%), comparable to the rates of the overall Canadian population (see Chapter 1). So grouping together communities to increase sample size creates the problem of “generalizing” over very different settings with very different breastfeeding rates, policies, program, and strategies for promotion.

In order to maintain the validity of working within one unique community during a reasonable time frame of program intervention, quantitative measures of program effectiveness must maximize "power" of the small sample size, that is, the possibility of detecting a difference if it truly exists. The following subsections will review ways in which to increase the power of small sample size evaluations, and will include information on specific statistical testing and sample size determinations for the proposed program evaluations.

3.5.1. Literature review of the statistics of small sample sizes

To overcome the lack of power in small samples size evaluations, careful choices in statistical tests and research design must be made. Reducing between-subject error terms through the use of matching before random assignment, blocking, inclusion of covariate measures, and doing repeated measures of the same person all help to increase the power of the analysis (Cook and Campbell, 1979:49). One-tailed hypothesis testing[3] should be considered where feasible and ethical (Schneider and Darcy, 1984), with the provision that conclusions of "no effect" need to be examined for potential harmful

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Two-tailed testing, most commonly used, evaluates the possibility that the 'a priori' general alternative hypothesis is true (treatment groups "differ"). One-tailed testing evaluates the possibility that an 'a priori' specific or directional alternative hypothesis is true (one treatment is superior to another). Although the overall 5% risk of Type I error is identical for one- or two-tailed testing, the one-tailed test puts the error completely in one tail of the normal statistic distribution. Hence, the critical value used to reject the null hypothesis ("no difference between treatment groups") is a smaller value and the alternative hypothesis will more likely be concluded. This results in less Type II error for one-tailed testing, with the same level of Type I error. The decision to test "one-tailed" or "two-tailed" must be made before the experiment, and must include the consideration of 'at least do no harm'. Despite the assumption that the difference between treatments could only possibly go in one direction, appropriate reporting of harmful effects if the treatment effects do go in the opposite direction must be included. (Hassard, 1991; Norman and Streiner, 1994) effects.

Some researchers have suggested a re-evaluation of the traditional 0.05 significance level of Type I error (wrongly concluding a difference between treatment groups). The 5% error level has historically been considered a useable cutoff point in a way that prevents harm to patients, while maintaining reasonable expectations of finding useful new interventions and generalizeable results (Hassard, 1991:168; Schneider and Darcy, 1984:577). But some researchers have proposed alternative significance levels of 0.1, 0.2 or more for evaluation involving public policy decisions whose outcomes are not related to life-and-death issues (Morrison and Henkel, 1970; Skipper, 1967; Labovitz, 1968; Orme and Combs-Orme, 1986; Schneider and Darcy, 1984; Hepler, 1992; Kirk, 1982). At the traditional statistically significant level of 5%, the researcher would be confident in the statistical result of "program effectiveness" 95% of the time, or 19 times out of 20. If a different critical value of Type I error were used, such as 0.10, then the researcher would conclude "effectiveness of the program" with a level of certainty of the results being 90%, or 18 times out of 20. Most policy-makers would probably be quite comfortable with a 90%, or even an 80%, level of certainty that their money was well-spent, especially in public health situations where the worst-case scenario would most likely be no harm to individuals other than to the taxpayer's pocketbook.

Evaluators can also estimate the power of the test being able to detect a politically or practically significant effect given the small sample size, or the costs and benefits of Types I and II error (Schneider and Darcy, 1984; Cook and Campbell, 1979:41; Hepler, 1994). The existence of several small sample interventions with patterns of statistically insignificant but similar directional treatment effects, or of trends in a single evaluation that may be non-significant only because of lack of power, may point to the feasibility of further, large-scale evaluations (Stuckert, 1976; Hepler, 1992).

3.5.2. General statistical considerations

Most of the statistical tests in my research used the traditional 5% probability of Type I error as the criterion to conclude differences, except in the Peer Counsellor program evaluation in Chapter 4 where sample sizes were very small. In all of the analyses, data was screened prior to analysis for outliers, and for necessary transformations. Any data that did not conform to test assumptions of normality was analyzed using appropriate non-parametric techniques. In cases of small sample sizes, exact permutational p-value tests were used in situations violating required numbers (Mehta and Patel, 1992; Mehta and Patel, 1993). For comparison of initiation and duration rates using multivariate techniques, a minimum of 5 to 10 persons were required per explanatory variable in the model (Tabachnick and Fidell, 1989:129; Norman and Streiner, 1994:127).

Many of the outcome measures of this research included "latent variables", that is, composite variables which are the summation of several single test items (Breastfeeding Beliefs is one example of this). All of the latent variables in this research were summations of ordinal Likert scales. Ordinal data is generally analyzed using non-parametric tests. However, latent variable outcomes can be analyzed using parametric tests, such as t-tests and analysis of variance tests, as long as there are *at least ten summed* *items* (Norman and Streiner, 1994:211), and if other test assumptions, such as equality of group variances and normality of the data, are also satisfied.

Further subsection testing of any tool used a Bonferroni correction factor which stiffens the criteria for accepting a statistical difference by 0.05/n, where n is the number of statistical tests performed. If each item of a 25-item latent variable were analysed for significant differences, then the level of significance required to conclude a difference by item would be 0.05/25, or $p \leq 0.002$. In situations where the level of Type I error was increased to 0.1 due to sample size problems, the confidence interval of the estimates were cited as 90% confidence limits, and the Bonferroni correction factor criteria for single item testing was 0.10/n.

Both the school intervention and the hospital intervention were evaluated using a "repeated measure", that is, the participants completed survey tools which were repeated over time and linked to their earlier result. The statistical test used in this analysis is called a "split unit analysis of variance" (split-unit anova). Basic assumptions of anova include independence of results, normal distribution of data and homogeneity of variance. But with "split unit" anova, there is a likely correlation between measures of the same person. So an assumption of "compound symmetry" (Munro and Page, 1993) or multi-sample sphericity (Girden, 1992) must also be met. This assumption has two parts: first, the correlations between the repeated measures (in the case of the school intervention: pretest, post-test, retention test) should be about the same; secondly, the variances of the repeated measures should also be similar. Because these assumptions are usually breeched by repeated measures data, a multivariate approach is commonly used to check the results obtained from a split-unit anova (Munro and Page, 1993: 157-172; Girden, 1992:64). The multivariate, or "manova" analysis, takes inter-correlation into account. Through a multivariate approach, it uses predictors of all variables simultaneously. Manova uses complete data for the repeated measures, so the analysis excludes persons who only have partial data. Another type of general linear modelling, called the "unstructured mixed model" approach, can also be used. This approach uses the data itself to generate correlations between a person's repeated measures, and has the added advantage of using both complete and incomplete repeated measure data sets.

During the course of the analysis, it was discovered that my statistical package NCSS 97(Hintze, 1997) was able to handle repeated measures data that was complete (no missing values), but would not give valid results if there were missing values. Thus the school intervention data was analyzed using split-unit anova with NCSS 97 with a filter for complete data, and also using SAS for the complete and incomplete data, and for multivariate checks (manova) and unstructured GLM mixed modelling to take into account possible breeches of the assumptions of compound symmetry.

One of the assumptions of split-unit anova is a "balanced" design, that is, equal or proportional gender representation by group and over time. According to Norman and Streiner (1994:80), if there is less than 15% discrepancy the problem is usually ignored. One test of balance is a chi-square test where $p \geq 0.05$ implies a balanced experiment.

3.5.3. Clinically significant differences and sample size determinations

In my previous research investigating the constructs of the Breastfeeding Decision-Making Model (see Chapter 1), predictors of the decision to initiate breastfeeding and to continue to breastfeed included such latent variable measures as "Breastfeeding Beliefs", "Breastfeeding Confidence", and "Referent Scores". Measures used to evaluate the effectiveness of the peer counselling pilot program, the school educational intervention, and the hospital staff inservicing included similar outcomes.

Table 3.1. includes mean values and standard deviations for the "Breastfeeding Beliefs", "Breastfeeding Confidence", and "Referent" tools as derived from the 1994 research (Martens and Young, 1997). In the current research, I assumed that a "clinically significant" increase in beliefs or attitudes would be the difference between prepartum women who eventually chose to bottle feed or to breastfeed. The aim of several of the interventions was to increase the scores by at least this amount. The difference in Breastfeeding Belief scores between women who initiated breastfeeding and those who did not, as well as between short-term (less than 30 days) and long-term (more than 30 days) breastfeeders, was about one standard deviation (SD) unit, for a "true treatment effect" of one. Similarly, the difference in Referent scores was about three-quarters SD between initiators/non-initiators and between short/long-term breastfeeders. The difference in Breastfeeding Confidence scores between initiators/non-initiators was over one SD (1.3), but only about half SD between short/long-term breastfeeders.

Table 3.1. Comparison of Mean Scores of Breastfeeding Beliefs, Confidence and Referent by duration of breastfeeding and overall means: Four Communities and Sagkeeng First Nation (Martens and Young, 1997)

Tool	Mean and (SD)			T-test: p-value for difference between those initiating breastfeed-ing and those not	mean value for women who breastfed 1 to 30 days (n=12)	mean value for women who breastfed more than 30 days (n=10)
	women not initiating breast-feeding n=14	women initiating breast-feeding n=22	overall n=36			
Four First Nation Communities (n=36)						
Breastfeeding Beliefs	35.7 (6.1)	40.9 (5.4)	38.9 (6.2)	p=0.01	38.1	44.2
Breastfeeding Confidence	38.7 (11.3)	54.9 (12.1)	48.4 (14.1)	p=0.0004	51.4	59.5
Referent	3.0 (4.6)	6.5 (4.0)	5.2 (4.5)	p=0.02	5.1	8.2
Sagkeeng women only (n=20)						
Breastfeeding Beliefs			37.5 (3.6)			
Breastfeeding Confidence			47.8 (12.9)			
Referent			3.68 (3.0)			

Knowing the "clinically significant" differences which are hypothesized for an intervention strategy, and knowing the study design (either repeated measures or comparison of separate groups), one can calculate the sample size required to detect a difference of this magnitude. See Table 3.2. for a chart of various sample sizes required to detect different effect sizes, assuming either unpaired or paired (repeated measures) normally distributed data and comparisons of group means. Each intervention sample size will be given in the corresponding chapter for that particular evaluation.

Table 3.2. Sample Size for Different Effect Sizes, assuming 80% power

Intervention design and analysis	Using Type I p of 0.05				Using Type I p of 0.10				Comments
	Effect Sizes				*Effect Sizes*				
	1	*0.8*	*0.5*	*0.25*	*1*	*0.8*	*0.5*	*0.3*	
Repeated measures (split-unit) anova [Hospital Staff and Sagkeeng School program]	8	15	28	110	consideration for small sample sizes where the level of Type I error is increased to 10%				Glantz (1997) for repeated measures anova
NOTE: the "n" is the sample size in one hospital, or one group	7	11	25	99					Hassard (1991) paired t-test calculations
Multi-way anova [Hospital chart audits and Peer counselling program]	13	22	50	197	9	16	36	144	Hassard (1991) for independent t-test sample size calculations
NOTE: the "n" is the sample size before, or the sample size after the intervention					consideration for small sample sizes where the level of Type I error is increased to 10%				

3.6. Ethical considerations

The research proposal was reviewed by the Human Ethics Committee of the Faculty of Medicine, University of Manitoba. Permission for the research was also obtained from the Sagkeeng Band Council, Sagkeeng Health Centre Board of Directors, Sagkeeng Junior High School Principal, Sagkeeng First Nations Education Authority, Pine Falls Health Complex Board of Directors, Arborg and Districts Health Centre Board of Directors, and each individual involved in the research. Each client was given the choice of participation, of whether or not to answer any question, and whether or not to continue in the study (see consent forms, in Appendix 10, 11, 12). During in-person interviews, if any breastfeeding questions or problems arose, the client was referred to the appropriate resource persons.

At the completion of the data collection, all confidential lists and interview forms were kept secure in the research team's office. All audio tapes were erased after transcription. In published data, no names or identifiers of individuals were used. The institutions and participants received summary documents of the study in which they participated, but no access to individual results was given to any council or participant.

3.7. Summary

Despite the difficulties of evaluating multi-faceted program intervention strategies in small communities, the task still lay before an evaluator. An evaluator really has two choices. Either the evaluator can refuse to evaluate such a "messy" intervention, choosing to evaluate only large trials with rigorous internal validity controls. Or a researcher can accept the "messiness" of a real community-based evaluation, and attempt to use creative and cross-paradigm approaches to ensure as much methodological and statistical rigour as possible. I chose to evaluate a small community-based multi-faceted program intervention, aware of the potential for future criticism as to the lack of "statistical power", but also aware of the potential for a small community to be able to determine the effectiveness of its own community-based promotion activities.

Chapter 4: Sagkeeng First Nation Peer Counsellor Intervention Strategy

4.1. Introduction

This chapter discusses the evaluation of Sagkeeng First Nation Health Centre's Peer Counsellor[1] pilot program in 1997. Program effectiveness measures included changes in the duration of breastfeeding, satisfaction with breastfeeding, the number of breastfeeding problems encountered postpartum, and measures of women's beliefs, confidence and social support for breastfeeding. The data was collected during face-to-face interviews using both quantitative survey tools and qualitative semi-structured interviews. Women giving birth between November 1996 and December 1997, and selected key informants (community health nurse, Peer Counsellor, and Peer Counsellor trainer) were included in the study.

4.2. Hypotheses to be tested

Comparing women included in the PC pilot program with those not included:

- the overall duration of breastfeeding will be longer
- the postpartum "Breastfeeding Beliefs", "Breastfeeding Confidence", "Referent Support", and "Breastfeeding Success" scores[2] will be higher,

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1

Throughout this thesis, the abbreviation, "PC", will be used to designate "Peer Counsellor"

2

The constructs of the Breastfeeding Decision-Making Model (Martens and Young, 1997) include Breastfeeding Beliefs, Breastfeeding Confidence, and Referent Support. See Chapter 1 for a description of the model. The construct, "Breastfeeding Success" was based on a modification and revision of the Maternal Breastfeeding Evaluation Scale, or MBFES, by Leff (1994), and used with permission of Leff.

and the "Bottle feeding Belief" scores will be lower

- the satisfaction with breastfeeding will be higher, and the number of verbalized breastfeeding problems will be lower
- in the qualitative interviews, the PC will be identified as an important resource person by breastfeeding mothers

4.3. The Peer Counsellor Program: background and description

In the Sagkeeng Health Centre, one of the two community health nurses (CHN) takes on the task of providing perinatal education. The CHN hired during 1992-1997 used individual teaching for perinatal education, due to lack of acceptance of group teaching. According to the CHN, "The girls tend to stick to themselves, and not want to share in a group." The Sagkeeng video/booklet, So You Want a Healthy Baby, was used in the prenatal instruction once they became available in 1995 and 1996 respectively. The booklet, which focuses mainly on the "how to's" of breastfeeding, was also given out to breastfeeding women during postnatal visits. In the words of the CHN;

> "I use the video for mostly the new first-time mothers although others have watched it. We've had positive reactions from the moms and the booklet has been a great resource for myself and as a teaching tool for the moms when I do the prenatal ... I'll take it post if I know they are breastfeeding." (lines 5221-36)

The CHN of Sagkeeng was aware that postpartum support for breastfeeding women could affect the duration of breastfeeding, but she had many other duties. A review of the literature on postpartum support indicated that a peer counsellor was at least as effective as a health professional in increasing breastfeeding duration (see Chapter 2). Sagkeeng Health Centre was receptive to the idea of using the peer counsellor model, both for the cultural appropriateness of peer models and for cost-effectiveness. As noted by the CHN, reflecting about the PC program;

> "I don't have the time to spend basically talking to them about {breastfeeding}. I can give them a general rundown, but it was nice to have someone that you knew could spend the time, that would make the phone calls if she needed the help, that the mother felt she could call at home. Whereas I'm just at work certain hours and doing other things." (lines 5299-5305)

An experienced breastfeeding peer counsellor from Winnipeg was interested in developing a training program for Sagkeeng. She suggested to the CHN that a candidate for the program should be a Sagkeeng woman from the same or similar background as the clients, having had an enjoyable breastfeeding experience for at least three months and demonstrating an ability to help others respectfully and empathetically. The CHN helped identify three women for the first training sessions. Here is how the CHN described her choice of one of those women;

> "I guess she was in the first video and was so 'hep' on breastfeeding and traditional and such a neat person and wasn't afraid to express her opinion and was just so positive for breastfeeding." (lines 5244-5249)

The PC trainer developed a formal training manual, called Peers Work (Romphf, 1998). The writing of the training manual was a fluid, ongoing process with constant revisions and updates as the PC Trainer becomes more experienced in the training process and the program. As the PC trainer described the process:

> "... the first thing we had to do was that we had to emphasize, rather than

> the structure of the breast ... the advantages of breastfeeding. And then from there we went to the barriers." (lines 4440-4467)

Peers Work contains outlines and objectives for the PC program and for the training sessions (see Table 4.1.). The focus of training for the PC was on identifying barriers to breastfeeding, recognizing danger signals requiring referral to a health professional, and through communication skills and good information, increasing a woman's self-confidence in her ability to breastfeed. The emphasis was on the normal course of breastfeeding and on counselling techniques to assist a woman in making her own decisions. In the words of the PC Trainer:

> "{the PC} was like every new mother who wants to help, and thinking that if she could just have all the information in the world she could solve any problem there is. This is not the way breastfeeding counsellors help people. Sometimes there's no way you can know enough, and the mother has to work out her own problem. And {the PC} realizes that. She's really good about realizing that each mom has to figure it out herself and she's going to give her encouragement and she's going to give her bits of information. But in the end, it's {the mother's} problem, it's her baby, you know." (lines 4371-4382)

Prior to the PC pilot project, four women underwent training with the PC trainer. One woman "graduated" from the training course in March 1997, and began the formal work with the Health Centre in April 1997, with her first clients in Many 1997. The program consisted of scheduled telephone calls made by the PC, or home visits if the woman had no telephone, to those mothers identified by the CHN as eligible for the PC program. Women who were affiliated with Sagkeeng First Nation were identified by the receipt of

Table 4.1. Objectives and outline of the Sagkeeng Peer Counsellor program, from Peers Work (Romphf, 1998)

Goals of Sagkeeng PC Program	1.	To increase the numbers of mothers in Sagkeeng who start breastfeeding and to increase the amount of time babies are breastfed
	2.	To increase the knowledge in Sagkeeng of how breastfeeding meets both the nutritional and emotional needs of babies.
	3.	To increase the support for breastfeeding in Sagkeeng through education aimed at partners, parents, grandparents, elders and the community
	4.	To reduce infant sickness and promote good health through breastfeeding
	5.	To support good parenting practices in Sagkeeng
	6.	To support mother-baby relationships in Sagkeeng
	7.	To provide a long-term community-based network of breastfeeding support
Objectives of Sagkeeng PC Program	1.	To encourage mothers in Sagkeeng to a. Breastfeed their babies with no supplements b. Introduce solid foods around the middle of the first year c. Continue breastfeeding to three months (ideally throughout the first year)
	2.	To train local mothers with breastfeeding experience to help other mothers learn about breastfeeding their babies, and to support mothers throughout their breastfeeding relationships.
	3.	To work with other health-related agencies who share the above goals.
	4.	To set up ongoing support programs in Sagkeeng for breastfeeding mothers
	5.	To set up an ongoing support network (newsletters, workshops, etc.) for thePCs
Outline of PC Training Manual	1.	Introduction to the chapters in the Peers Work program
	2.	Advantages of breastfeeding
	3.	Barriers to breastfeeding - strategies for encouragement
	4.	Helping mothers to breastfeed - communication
	5.	Preparing mothers to breastfeed
	6.	Getting breastfeeding off to a good start (techniques)
	7.	Common concerns of mothers
	8.	Special breastfeeding situations
	9.	Life as a family and adjusting to baby's changing needs
	10.	What's next
Objectives of the PC training program	This peer counsellor handbook was written as a guide to enhance the abilities of those women who are interested in promoting breastfeeding. The training provided will help the counsellors go beyond their own experience and give mothers, in a normal breastfeeding situation, help and suggestions based on current research and knowledge. To reach that goal, users of the handbook will: *Know about the advantages of breastfeeding *Identify the reasons that attract women in their community to breastfeed *Develop strategies for encouraging women to breastfeed *Identify the most common factors that discourage women from breastfeeding *Develop strategies for helping women overcome these barriers *Enhance their communication abilities *Know how to get breastfeeding off to a good start *Know about the common concerns of mothers *Learn about special breastfeeding situations *Have the opportunity to network with other organizations if they wish	

their Postpartum Referral Form[3] by the Sagkeeng Health Centre. This form indicated whether or not breastfeeding had been initiated in the maternity hospital, and the information was verified by the CHN upon her first visit to the mother within a week or less from hospital discharge. Once the CHN verified that breastfeeding had been initiated, she informed the woman that she would be receiving a call from the PC as part of Sagkeeng Health Centre's postpartum education.

The program was designed so that *the PC initiated calls* to the clients, since research indicates that only a small proportion (12-16%) of postpartum women will initiate a call for help even though they may have received a referral telephone number (Lee, 1997)[4]. The original PC program designated optimal points of contact by the PC, either by telephone or visit once a week for the first month, and once every two weeks for months two and three (at weeks 1, 2, 3, 4, 6, 8, 10, and 12 postpartum). The coverage was not fully realized for any of the clients - no client received all 8 contacts. Reasons

3

The Manitoba Health provincial "Postpartum Referral Form" is used province-wide by all hospitals and records information on mothers and infants at the time of discharge from hospital. This includes the type of infant feeding at discharge. A copy is sent to the public health nurse or community health nurse of the client's service area. Occasionally, a form is sent to the community but the client is residing elsewhere.

4

This was reinforced during the qualitative interviews of two non-clients of the PC program. One mother, who had experienced problems with engorgement, sore breasts and nipples, and leaking, was asked about Sagkeeng resources for women who had problems. Her reply was, "I really don't know. I've never really asked for any help from the community." (lines 3565-66). The other woman had given birth before the onset of the formal PC program. She had experienced many problems with breastfeeding, including problems with the baby latching on, worries about her milk supply, and cracked nipples. Despite the awareness of the existence of a Sagkeeng woman whom she could have contacted for suggestions, she commented, "The woman who came and seen me told me about {the PC} and that she helps women with breastfeeding, and I probably would have called her if I had any problems" (lines 3401-3403) for non-contact included: unavailability of the client; the PC not making the telephone calls; clients weaning and not wishing to receive any more calls; and clients moving away from the Sagkeeng area after receiving initial calls. The mean number of calls per client was 2.9 (SD 1.9), with a median of 3 calls (range 0 to 7). This included all PC program clients (n=18), not just those who were included in the in-person interviews. For those clients who were interviewed (n=13), the mean was 3.5 (SD 1.8), with a median of 4 (range 1 to 7). The greater number of calls to women included in the interviews was mostly influenced by the fact that those women who moved away from the community only received the initial calls while residing in Sagkeeng. But at the time of interviews for this research (4 to 7 months postpartum), they were no longer residing in Sagkeeng and therefore were not included in the interview sample.

The purpose of the PC contacts was to provide encouragement, support and basic breastfeeding information up to the first three months postpartum. The aim was to increase the confidence and satisfaction with breastfeeding, and to assist with problems or questions through information suitable to the breastfeeding mothers' individual needs. This was in addition to the routine postpartum support and visit by the CHN, and any medical concerns were referred to the CHN.

During the PC pilot program, the work of the PC was supervised mainly by the PC trainer, who made weekly calls to the PC to check on the progress of her work and to give further information if needed. The PC was expected to keep a detailed log of the information from the telephone calls, and these log sheets were given to the CHN as part of the medical records of the health centre file. The PC describes the content of her telephone calls in these quotes:

> "I'll write down the questions before I make the phone calls, think about what these women are going through right now, at the moment. And one of the few questions I always ask is 'Did you have a good birth experience?'. And if they say 'yah' or 'I don't know', then we'll talk about the birth and from there I can find out if they had the epidural or something like that, the babies were sleepy, if they latched on, if they didn't latch on. Because a few moms say that 'oh well, I tried to breastfeed but the baby didn't want me'. And so when I explain to them, well if you had these things while you were in labour, it affects the nursing. And so 'oh, okay', so they think 'okay, well it's not me then' and they get a little bit of confidence right there." (lines 5612-5628)

> "I'll ask how are you and baby enjoying breastfeeding, and they have to answer that question. You know, they have to think about it. And so they go 'Uh, it's okay' and then they'll go into detail. 'Oh, he's, he's not sucking right' or 'My nipples are sore', or "I don't think he's getting enough'. ... Oh, if I just say, "Are you breastfeeding', you know they'll say yes or no. But I think asking questions like that, they have to go into detail and answer your question thoroughly." (lines 5711-5737)

The fear of a negative reaction to these "imposed" telephone calls was not realized. From the perspective of the CHN, mothers expressed appreciation concerning the PC program:

> "[Were there any {women} who were not positive?] ... It was all positive. They were very happy to have someone that they could call and some of them did call her with problems ..." (lines 5272-5282)

4.4. Evaluation of the PC program: design and methods

4.4.1. Research design

The evaluation of the PC pilot program was a "separate sample pretest - post-test design" (Campbell and Stanley, 1963), with the sample for the pretest being women who did not receive the program, and the sample for the post-test being women who did receive it. Women giving birth from November 1, 1996 to December 31, 1997, and who had initiating breastfeeding, were eligible for inclusion. The following is a diagram of the research design, with "R" meaning "randomly assigned", "O" meaning a pre- or post-test measure, and "X" meaning the intervention which was being evaluated.

(Not included in PC program)	R	O		
(Included in PC program)	R		X	O

Although women were not actually randomly assigned to receive or not receive the program, their inclusion depended only upon the date of birth of their child and therefore could be considered a "random" event. Women giving birth before the onset of the PC pilot program comprised most of the non-client group. But isolated events during April to December 1997 resulted in some being "missed" by the program due to circumstances beyond their control or the control of the Health Centre personnel. They were also included in the non-client group.

The intervention, "X", was the PC pilot program, described in detail in the preceding section. Pretest and post-test measures ("O") included both quantitative and qualitative measures, administered during face-to-face interviews with the women at four to seven months postpartum. Between 4 and 7 months after the birth, the women were contacted by the CHN or the CHR (community health resource worker) for permission to participate in the research. The mothers were unaware of the evaluation during their participation in the PC program, since they were only contacted for interviews at least one month after they received the last formal PC contact. If a woman agreed to the interview, then the Health Centre allowed me to contact her directly and request additional written consent. Most of the interviews (20/22) took place in the woman's home.

The interviews were tape-recorded. The semi-structured qualitative section of the interview was completed first (see Table 4.2.). The questions were given in a consistent manner and in the same order, but if a woman mentioned other issues, I would encourage this additional information. Following this, the quantitative survey tools were given (see Tables 4.3. and 4.4.), including measures of Satisfaction with Breastfeeding, Number of Verbalized Breastfeeding Problems, Breastfeeding Confidence, Breastfeeding Beliefs, Bottle Feeding Beliefs, Referent Support, and Breastfeeding Success. See Appendix 10 for a complete copy of the interview tools.

4.4.2. Statistical design

Because of Sagkeeng's small annual birth rate of about 50, and the low (around 50%) hospital discharge rates of breastfeeding (see Chapter 1), it was difficult to set up a statistical analysis of program effect. A realistic estimate of the number of women eligible for the study was 25, but some would decline participation. So a "pilot study" approach used a Type I error of 0.10 rather than the traditional 0.05 (see Chapter 3 for details of this approach). For the PC program evaluation, using a t-test to compare the two groups, and a one-tailed analysis with alpha of 0.1 and 80% power, a true treatment effect of 1 would be detected as significant with measures from 18 persons, 9 non-clients and 9 PC clients (see Chapter 3 for charts used in this calculation).

The quantitative data from the PC program evaluation was analysed using independent t-tests (or non-parametric Mann Whitney U test), and proportional hazards regression modelling, comparing outcomes of clients and non-clients. Further subsection testing of any summed measure used a Bonferroni correction factor, of 0.10/n, in keeping with the allowable Type I error of the pilot study.

4.4.3. Instrumentation

Both qualitative and quantitative tools were used in a mixed-method approach to evaluating the effectiveness of the PC program. The qualitative questions were designed to incorporate behaviour and experience, opinion and value, feeling, knowledge, sensory, and demographic information, according to the recommendations of Patton (1990: 292-293). Only one of the qualitative questions related directly to the PC program, but this was not considered the focus of the interview. Separate qualitative questions (no quantitative tools) were designed for the interviews with the PC, the PC Trainer, and the Community Health Nurse. See Table 4.2. for the list of qualitative questions for mothers, the CHN, the PC and the PC trainer. This is a "minimum" list, that is, the questions gave structure to the interviews, but other questions were asked according to issues arising during discussion.

All but one of the quantitative tools used to evaluate the PC program have been developed and tested with Sagkeeng First Nations antenatal and postpartum women (Martens, 1994; Martens and Young, 1997). Of the tools used previously, "Breastfeeding Beliefs", "Bottle Feeding Beliefs", "Breastfeeding Confidence", "Referent Support", "number of verbalized problems", and "satisfaction with breastfeeding" tools demonstrated validity and reliability for initiation and duration of breastfeeding (see Chapter 3). See Table 4.3. for a summary of the tools.

Table 4.2. Qualitative interview questions

MOTHERS

1. In which hospital did you give birth?
2. In what ways did the hospital staff help you with breastfeeding?
3. How did you feel in the hospital? - anxious, relaxed, happy, afraid, confident??
4. Was your baby given supplements during the hospital stay? If so, what kind and how often? What was your opinion about your baby being given supplements?
5. When you got home, if I had been following you around for a typical day in the early weeks, what would I have seen you doing?
6. What is your opinion about the importance of breastfeeding to women, babies and families?
7. Describe the information about breastfeeding that helped you?
8. How did different people help you with breastfeeding?
9. (Only for those women after the peer counselling program has begun) How did you feel during and after the peer counsellor phone calls?
10. In this community, what resources are available to women when they need help with breastfeeding?
11. What kind of community resources would you put into place if you wanted to help other breastfeeding mothers?

PEER COUNSELLOR

1. How did you feel when you had to make a telephone call to a woman?
2. In your opinion, did your calls help women?
3. What type of responses would you get from women?
4. If I were sitting beside you while you were making a telephone call, what would I have seen and heard you doing?
5. How would you change the program or your preparation for the task?

COMMUNITY HEALTH NURSE

1. In your opinion, in what ways do you think that the peer counsellor telephone calls affected your clients?
2. Describe any feedback you got from the mothers about the phone calls?
3. Is the liaison between the PC, the PC Trainer and yourself adequate? How could this be changed? What things worked well?
4. What would you like to see happen in the future with programs for the breastfeeding mothers of Sagkeeng?

PEER COUNSELLOR TRAINER

1. Tell me about the process of writing the PC Training Manual and the training of Peer Counsellors - how did you start, did you envision it, how has it gone?
2. Have you found that the PC program has affected the persons involved? In what ways?
3. How did you and the PC feel about the PC initiating the calls to people postpartum?
4. Is the liaison between the PC, the PC Trainer and the CHN adequate? How could this be changed? What things worked well?
5. What would you like to see happen in the future with programs for the breastfeeding mothers of Sagkeeng?

Table 4.3. Quantitative survey tools, and individual items, used in the research

Breastfeeding Beliefs or Bottle Feeding* Beliefs Score	Breastfeeding Confidence Score	Referent Support Score	Satisfaction, Number of Verbalized Problems
Rated on 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), summed for composite score. Possible range: 10 to 50 (*interchange the word "bottle feeding" for breastfeeding)	Rated on a 5-point Likert scale (1 = very unsure, 5 = very sure), summed for composite score. Possible range: 17 to 85	Referent score = product of A and B for each referent, summed, and divided by the number of referents for which the woman gave answers. ($\sum$ (A*B) / n) Possible Range: -21 to +21	*Satisfaction score - rated on a 5-point Likert scale, only one question. Possible range: 1 to 5 *Number of problems: a number from 0 and up
1. Breastfeeding [bottle feeding] would make you and your baby develop close feelings 2. Breastfeeding is the most natural way to feed your baby 3. Breastfeeding would be convenient 4. Breastfeeding would provide the best food for the baby 5. Breastfeeding would save time 6. Breastfeeding would make you feel good about yourself 7. Breastfeeding would help you regain your figure 8. Breastfed babies are healthier 9. Breastfeeding would allow you to go places and do things outside the home easily 10. Breastfeeding would not cost very much money	Would you feel confident about a woman breastfeeding ... 1. During the hospital stay? 2. During the first week at home? 3. For six weeks after the birth? 4. If baby is born by a Caesarian Section? 5. If baby is premature and has to stay in the hospital? 6. If her breasts hurt? 7. If the baby has a hard time learning how to breastfeed? 8. If she is in a public place? 9. If she or her baby get sick? 10. If her baby seems fussy a lot of the time? 11. If she goes back to school or work? 12. If she smokes? 13. If she drinks alcohol? 14. If she eats a lot of snack foods? 15. If there are other women in the room? 16. If there are men in the room? 17. If she has diabetes?	A. infant feeding preferences of referents: rated on a 7-point Likert scale (-3 = definitely bottlefeed, 0 = neutral, +3 = definitely breastfeed) B. compliance with referents (do you go along with the wishes of these people?) rated on a 7-point Likert scale (1 = never, 7 = always). Male partner Your own mother Your own father Your mother-in-law Your sister(s) Your brother(s) Close friends Your doctor The health nurse People at work/school *The Peer Counsellor (if applicable) *The hospital nurse (*added referents to the 1994 survey tool for the 1997 research)	1. How satisfied are (were) you with breastfeeding? 1. Very unsatisfied 2. Unsatisfied 3. Neither unsatisfied nor satisfied 4. Satisfied 5. Very satisfied How many problems have you had with breastfeeding? _ List them.

The one measure not included in my Masters research was "Breastfeeding Success" (see Table 4.4. and Appendix 10). "Breastfeeding Success" was operationalized using a revision of the Maternal Breastfeeding Evaluation Scale, (Leff et al., 1994). This tool was originally tested for content validity through qualitative reviews, key expert evaluation, and pretesting. The population with whom this was used represented a mainly white, married, well-educated, middle to upper socioeconomic stratum of women from northern New England, whose median duration of breastfeeding was over 6 months. For the Maternal Breastfeeding Evaluation Scale (MBFES), Leff reported Cronbach's alpha as 0.93, and test-retest correlation as 0.93. Correlation with "overall satisfaction with breastfeeding" was 0.83, but correlation with "duration of breastfeeding" was 0.48. So this tool was considered useful in identifying a different domain of "successful breastfeeding' than the traditional measure of duration.

The population for which the Maternal Breastfeeding Evaluation Scale (MBFES) was used differed substantially from the First Nations population. Therefore the tool was assessed for content validity using experts from Sagkeeng, including the PC, the PC trainer, an adolescent primiparous breastfeeding woman, and a breastfeeding multiparous woman in her 20s. Some of the statements were revised, since they were considered unacceptable, offensive or difficult for the women to understand (see Table 4.4. for the revised statements). For example, the statement "Breastfeeding was like a high of sorts" was considered unacceptable due to its connotations to a drug culture image. The statement, "Breastfeeding makes me feel like a cow" was considered offensive, and there were concerns that this negative image may be detrimental to future breastfeeding images.

Table 4.4. "Breastfeeding Success" quantitative survey tool test items, with noted revisions to the MBFES (Leff, 1994)

1.	With breastfeeding I felt a sense of calm. **(Original MBFES: *With breastfeeding I felt a sense of inner contentment.*)**
2.	Breastfeeding was a special time with my baby.
3.	My baby wasn't interested in breastfeeding. ***(difficult for people to answer)***
4.	My baby loved to nurse.
5.	It was hard being my baby's main source of food.
6.	I felt extremely close to my baby when I breastfed.
7.	My baby was an eager breastfeeder.
8.	Breastfeeding was physically draining.
9.	It was important to me to be able to nurse.
10.	While breastfeeding my baby's growth was good. **(Original MBFES: *While breastfeeding my baby's growth was excellent.*)**
11.	My baby and I worked together to make breastfeeding go smoothly.
12.	Breastfeeding allowed me to be more tuned in to my baby. **(Original MBFES: *Breastfeeding was a very nurturing, maternal experience.*)**
13.	While breastfeeding, I felt self-conscious about my body.
14.	With breastfeeding, I felt too tied down all the time.
15.	While breastfeeding, I worried about my baby gaining enough weight.
16.	Breastfeeding was soothing when my baby was upset or crying.
17.	When I was breastfeeding, I felt really good about life. **(Original MBFES: *Breastfeeding was like a high of sorts.*)**
18.	The fact that I could produce the food to feed my own baby was very satisfying.
19.	In the beginning, my baby had trouble breastfeeding.
20.	Breastfeeding made me feel like a good mother.
21.	I really enjoyed nursing.
22.	While breastfeeding, I was anxious to have my body back.
23.	Breastfeeding made me feel more confident as a mother.
24.	My baby gained weight really well with breastmilk.
25.	Breastfeeding made my baby feel more secure.
26.	I could easily fit my baby's breastfeeding with my other activities.
27.	Breastfeeding made me feel over-touched.
28.	My baby did not relax while nursing. ***(difficult for people to answer)***
29.	Breastfeeding was emotionally draining.
30.	Breastfeeding felt wonderful to me.

Breastfeeding Success score was the summation of 30 items, each rated on a 5-point Likert scale (1=strongly disagree; 2=disagree; 3=neither disagree nor agree, neutral; 4=agree; 5=strongly agree). Possible range: 30 to 150.

The statement, "With breastfeeding, I felt a sense of inner contentment" was considered inappropriate form the community's religious perspective.

All statements in the MBFES were rated using a Likert scale of 5 points, "strongly disagree", "disagree", "neutral", "agree", and "strongly agree". The entire tool, including the statements which were altered by the experts, is recorded in Table 4.4. During the actual in-person interviews, I found the two negatively worded statements to be extremely difficult for people to answer. These two statements were: "3. My baby wasn't interested in breastfeeding"; and "28. My baby did not relax while nursing". I had to explain them carefully with emphasis on the "not", and often the woman needed to think about the statements in the positive, and then reverse her answer. I felt that the answers were unreliable and possibly biased, because I needed to clarify and emphasize them.

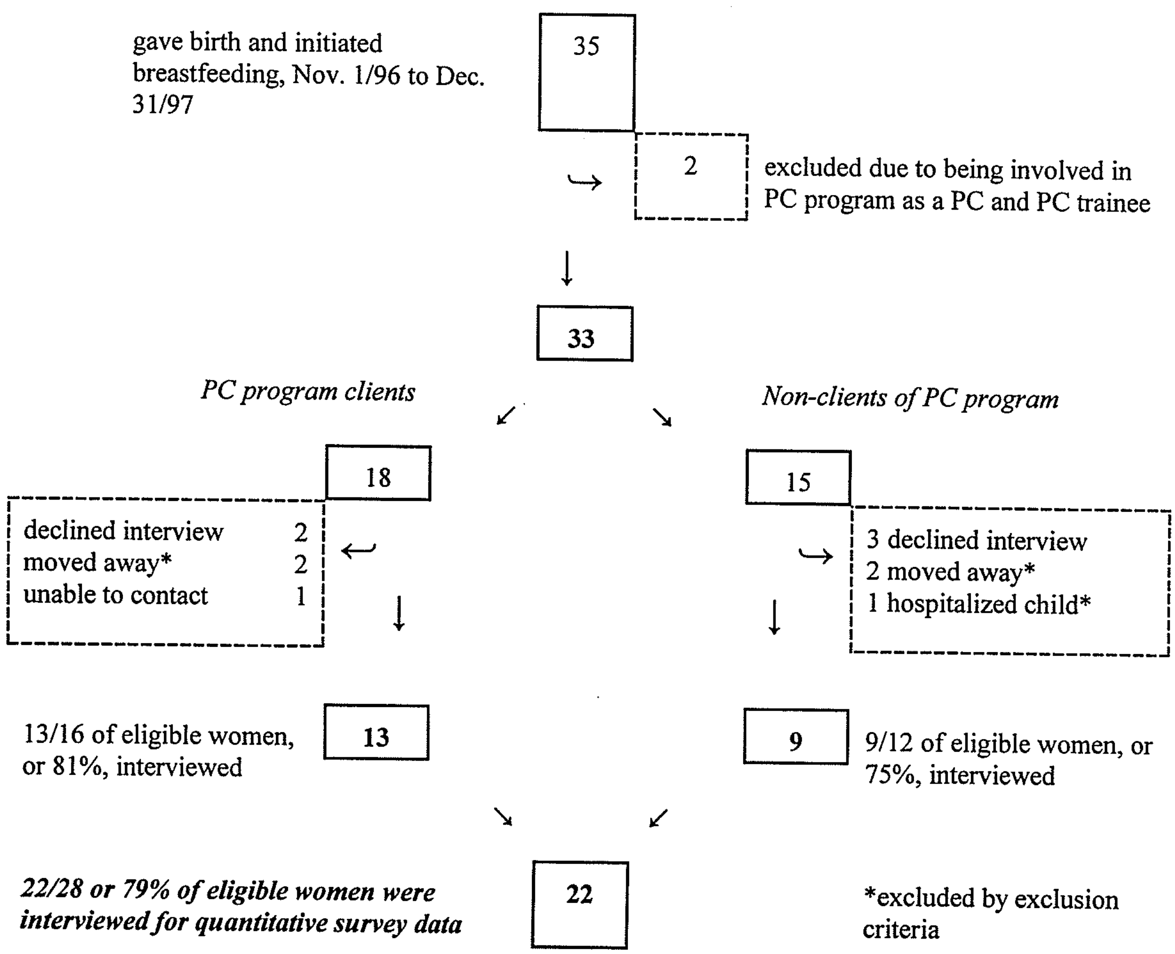
4.4.4. Population and sample considerations

The target population included all women affiliated with Sagkeeng First Nation and residing in or near Sagkeeng, who gave birth to a live infant, the baby being alive for at least 4 months thereafter and in the care of the mother at home, and who initiated breastfeeding. The sample (n=35) included Sagkeeng women who gave birth between November 1,1996 and December 31,1997 and initiated breastfeeding. But 2 were involved in the PC training program[5]. Of the remaining 33, 22 were interviewed (13 clients, 9 non-clients), 5 declined, 4 had moved to Winnipeg before the research at 4-7

[5] One was the PC herself, another was a PC trainee who did not complete the training session. The extensive PC training could have influenced beliefs/attitudes of these women, so they were different from non-clients. But they had not received the scheduled telephone calls, so they were not "PC clients".

months postpartum, 1 was unable to be contacted, and 1 woman had a hospitalized child. Taking into account eligibility criteria, the overall response rate was 22/28 or **79%**; 81% for clients, and 75% for non-clients (see Figure 4.1.). *Non-clients* (n=9) included women giving birth prior to the PC program (n=5), and women "missed" during the program (n=4) due to: health centre closure in August (n=1); PC unavailable in November due to family illness (n=1); Postpartum Referral Form sent to wrong community (n=1); and missed postnatal visit due to retirement of the CHN in December (n=1).

Figure 4.1. Response rate of PC program evaluation: quantitative survey



4.5. Results of the PC Pilot Program quantitative evaluation

4.5.1. Demographic comparisons of PC program clients and non-clients

There were no statistically significant differences between the PC clients and the non-clients as to maternal age, infant birth weight, or percentage of primiparous women (see Table 4.5). Interviews took place when the infants were between 3.5 and 8 months old, with a mean age of 5.4 months. The infants in the PC client interviews were slightly younger (means 4.9 versus 5.9 months, p=0.07), but the age range was similar.

Table 4.5. Comparison demographics of peer counsellor program participants and non-participants (n=22)

Demographic indicator	Program participants (n=13) Mean (SD) {Range}	Program non-participants (n=9) Mean (SD) {Range}	Statistical test (two-sample t-test unless otherwise indicated)
Maternal age	22.8 (4.6) years {16 to 34}	24.3 (6.4) years {13 to 32}	p=0.53
Infant birth weight	3566 (725) grams {2015 to 4568}	3436 (448) grams {2752 to 4256}	p=0.63
Infant age at interview	4.9 (1.1) months {3.5 to 7}	5.9 (1.4) months {3.5 to 8}	p=0.07
Parity	76.9% multiparous 23.1% primiparous	77.8% multiparous 22.2% primiparous	Fisher's Exact Test p=1.0

4.5.2. Effect of the PC program on "satisfaction with breastfeeding"

The research supported the hypothesis that PC clients were more satisfied with breastfeeding than non-clients. Clients' median response was "very satisfied" (n=12, median of 5, range 2 to 5) and non-client median response was "satisfied" (n=9, median of 4, range 3 to 5), with this difference reaching significance for the pilot project critical value of $p \leq 0.10$ (Mann-Whitney U test, one-tailed, p=0.07). See Figure 4.2. for a box plot of the results[6]. One response was missing for this question, since the client had difficulty understanding the word "satisfied".

"Satisfaction with breastfeeding" was also related to duration of breastfeeding when all data was combined, including program clients and non-clients (see Figure 4.3 and Equation 4.1.). The data was dichotomized into "satisfied" (a ranking of either 4 or 5), and "unsatisfied" (a ranking of 1, 2 or 3) similar to my Masters research (Martens and Young, 1997). Women "unsatisfied" with breastfeeding were 12.6 times more likely to wean (95% CI 2.1 to76.9, p=0.004) compared to women who were "satisfied".

Equation 4.1.	*$\ln \alpha = -2.53(satlevel)$* where α is the relative hazard of weaning Satlevel=1 for "satisfied" (4 or 5) and 0 for "unsatisfied" (1, 2, and 3) SE = 0.89 $\chi^2 = 8.5$, 1 df, p=0.004 *Model not controlled for other explanatory variables, and only used data from in-person interviews (n=22)*

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According to Hintze (1997:443-444), a box plot is made up of a rectangle, the top and bottom of which are the 25th and 75th percentiles. The length of the box is thus the IQR, or "interquartile range", and represents the middle 50% of the data. A line in the box, usually through the middle of the box, represents the median at the 50th percentile. Adjacent values are displayed as T-shaped lines extending from the ends of the box. The upper adjacent value is the largest observation that is ≤ to the 75th percentile plus 1.5 times IQR. The lower adjacent value is the smallest observation that is ≥the 25th percentile minus 1.5 times IQR. Values outside the upper and lower adjacent values are called outside values. Values under 3 IQRs from the adjacent values are called mild outliers, and those outside 3 IQRs are called severe outliers. Severe outliers are considered unusual.

Figure 4.2. Satisfaction with breastfeeding by inclusion in PC program

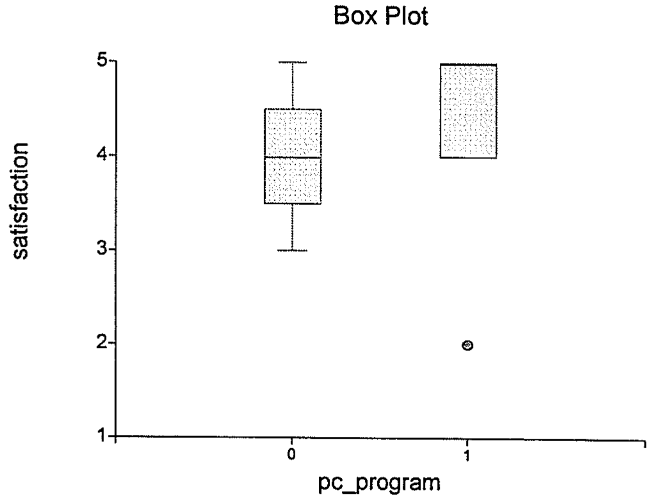
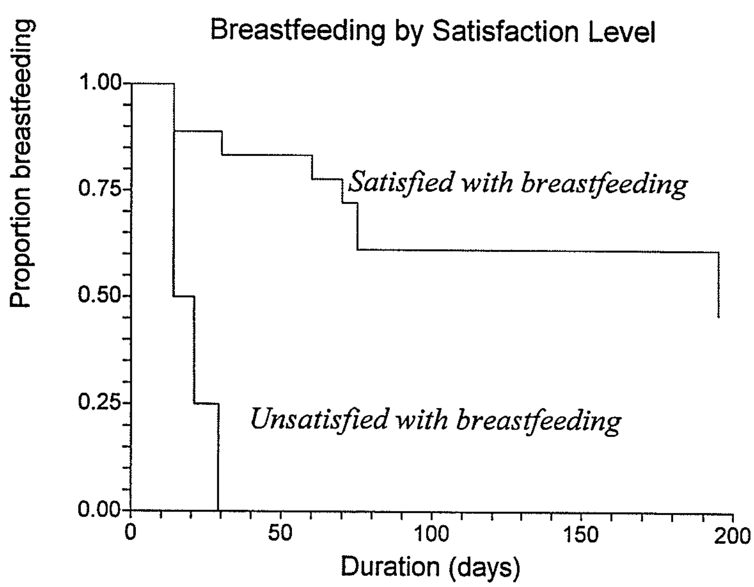


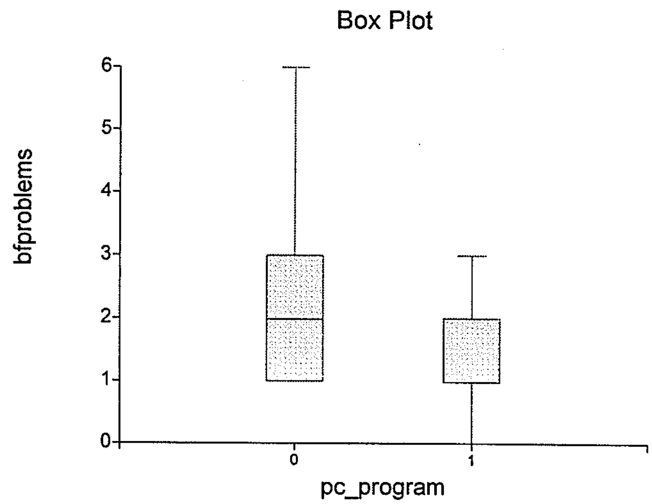
Figure 4.3. Kaplan-Meier Survival Curves by Satisfaction Level ("unsatisfied" included very unsatisfied, unsatisfied, or neutral; "satisfied" included satisfied, very satisfied), n=21



4.5.3. Effect of the PC program on "number of verbalized breastfeeding problems"

The "number of verbalized breastfeeding problems" is a numerical count of problems reported by the woman when asked "how many problems with breastfeeding have you had?" Program clients reported a median of 1 problem (range 0 to 3), and non-clients reported a median of 2 problems (range 1 to 6). Program inclusion was statistically associated with fewer reported breastfeeding problems (Mann Whitney U test, p=0.044). See Figure 4.4. for a box plot of the results. Of the 13 clients, over half (n=7) reported 0 or 1 problem. Of the 9 non-clients, one-third (n=3) reported only 1 problem, with none reporting 0 problems.

Figure 4.4. Number of reported breastfeeding problems by PC program participation

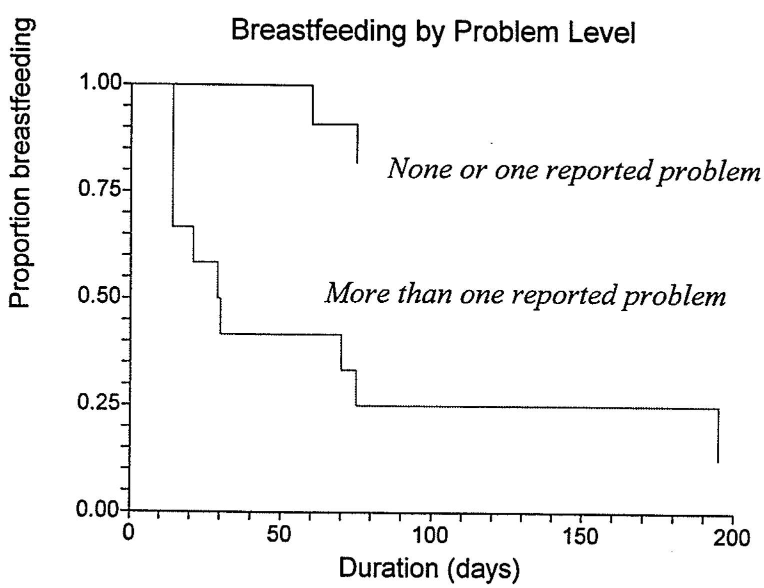


All data (including clients and non-clients) were categorized by the level of "number of verbalized problems", with "few problems" being either 0 or 1, and "many problems" being more than 1, similar to the dichotomous split in previous research (Martens and Young, 1997). The duration of breastfeeding was associated significantly with the level of problems (see Equation 4.2). Those women who reported "many" problems" were 7.6 times more likely to wean (95% CI 1.6 to36.0, p=0.002).

Equation 4.2.		*ln α = +2.024 (problevel)* where α is the relative hazard of weaning Problevel = 1 if woman reports 2 or more problems, 0 if less than 2 problems SE = 0.78 χ^2 = 9.3, 1 df, p=0.002 *Model not controlled for other explanatory variables, and only used data from in-person interviews (n=22)*

The three most frequently mentioned problems were: soreness of breasts or nipples (mentioned by 12 women); perceptions of not enough milk (9 women); and problems with the baby "latching on" (6 women). Other problems were mentioned only once or twice, including: feeling tied down by breastfeeding; not knowing how to express and store milk; inverted nipples; lack of time for herself or her other children; embarrassment about public breastfeeding; and not feeling comfortable with breastfeeding.

Figure 4.5. Kaplan-Meier Survival Curves by Number of Reported Problem Levels (0 or 1 problem versus more than one), n=22



4.5.4. Effect of the PC program on Breastfeeding Beliefs, Bottle Feeding Beliefs, Breastfeeding Confidence, Referent Support, and Breastfeeding Success

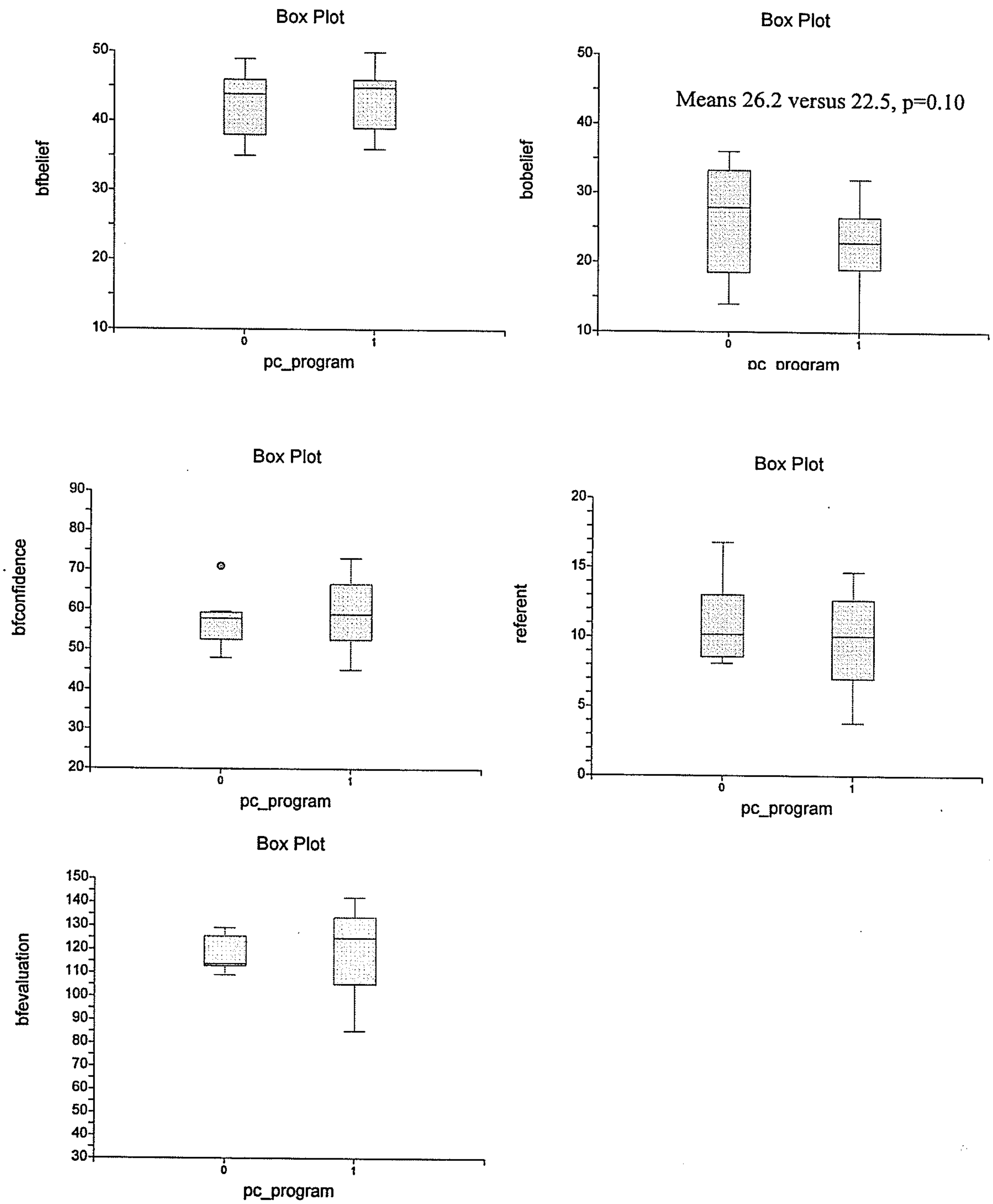
The results of additional constructs of the Breastfeeding Decision-Making Model (Martens and Young, 1997), and on "Breastfeeding Success" (revision of MBFES by Leff, 1994) have been summarized in Table 4.6. and Figure 4.6.. Despite trends in the direction of the hypotheses, there was no evidence of difference between program clients and non-clients except in "Bottle Feeding Beliefs". PC clients had lower mean Bottle Feeding Belief scores when compared to non-clients (22.5 versus 26.2, p=0.10).

Table 4.6. Comparison of beliefs, confidence, referent and success scores by peer counsellor program inclusion (n=22)

Construct (possible range of results, minimum to maximum)	Peer counsellor program clients; n=13 Mean (SD)	Peer counsellor program non-clients; n=9 Mean (SD)	Statistical test (one-tailed, two-sample t-test unless otherwise indicated)
Breastfeeding Beliefs (range 10 to 50)	43.4 (4.1)	42.7 (4.8)	p=0.35
Bottle Feeding Beliefs (range 10 to 50)	22.5 (5.7)	26.2 (7.7)	p=0.10*
Breastfeeding Confidence (range 17 to 85)	58.9 (9.3)	57.3 (6.5)	p=0.33
Referent Support (range -21 to 21)	10.7 (4.6)	11.0 (2.9)	p=0.58
Breastfeeding Success (MBFES: Leff, 1994) (range 30 to 150)	119.5 (16.8) Median 125 Range 85 to 142	117.9 (7.3) Median 114 Range 109-129	(unequal variances) Mann-Whitney U test: p=0.33

* pilot project critical value for rejecting the null hypothesis is 0.10, so this is statistically significant

Figure 4.6. **Box plots of effect of PC program on Breastfeeding Beliefs (bfbelief), Bottle Feeding Beliefs (bobelief), Breastfeeding Confidence (bfconfidence), Referent Support (referent), and Breastfeeding Success (bfevaluation) scores** *(0=non-clients; 1=PC clients)*



4.5.5. Effect of the PC program on items of the latent (composite) variables

In the quantitative survey tools, several tools were a summation of individual items. These included the following tools, along with their corresponding number of individual items: Breastfeeding Beliefs (10), Bottle Feeding Beliefs (10), Breastfeeding Confidence (17), Referent Support (maximum 12 for each of "referent feeding preferences" and of "compliance with referents"), and Breastfeeding Success (30). Using a Bonferroni correction factor, each item was tested for differences between PC clients and non-clients. Only one individual test item was close to significance - "How sure [confident] are you that a woman could breastfeed if the woman goes back to school or work?" This was an item in the Breastfeeding Confidence scale. The median result was higher (median 4 or "sure") for PC clients compared to non-clients (median 2 or "unsure"; Mann Whitney U test, p=0.01) but this was not considered significant due to the Bonferroni correction factor criterion of $p \leq 0.006$. Of the clients, 62% (8/13) said they were "sure" or "very sure" that a woman could breastfeed if she would go back to school or work, compared to 33% (3/9) of non-clients.

4.5.6. Effects of the PC program on the duration of breastfeeding

Overall duration rates (duration of "any" breastfeeding):

The breastfeeding duration of those women interviewed (n=22; 13 PC clients, 9 non-clients) were compared by PC program inclusion. Program participants were more likely to continue to breastfeed when compared to non-participants (Log Rank, $\chi^2 = 3.14$, 1 df, p=0.076; Cox-Mantel test statistic -3.07, p=0.002), indicating supporting evidence for the proposed hypothesis. Figure 4.7 shows the Kaplan-Meier survival curves by program inclusion: about 80% of the PC clients were still breastfeeding at 1 and 2 months, compared to about 40% of the non-clients. By three months postpartum, about 70% of the PC clients, and only 20% of the non-clients, were still breastfeeding.

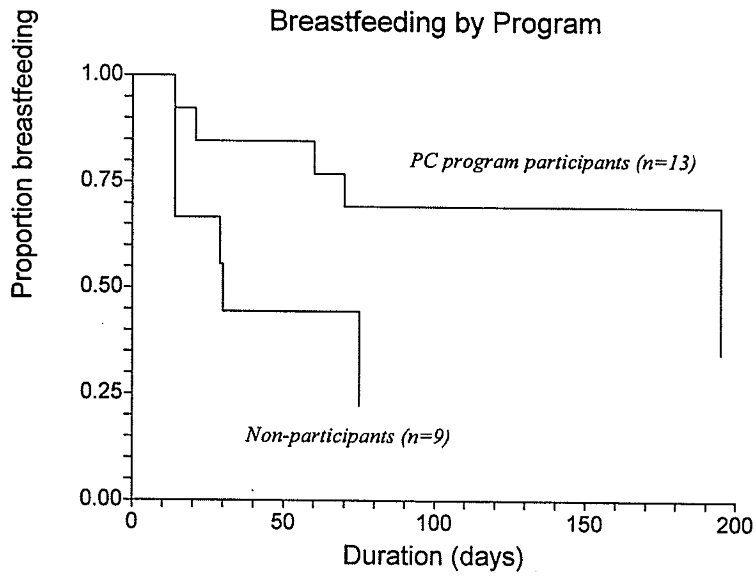
A Cox's Proportional Hazards regression modelling, using PC program inclusion as the independent variable, was significant at the p=0.09 level (see Equation 4.3.).

Equation 4.3.	$\ln \alpha = -0.9908\ PC$ where α is the relative hazard of weaning PC=1 for Peer Counsellor pilot program clients, 0 if not SE = 0.589 $\chi^2 = 2.87$, 1 df, p=0.09 *Model not controlled for other explanatory variables, and only used data from in-person interviews*

Using Equation 4.3., the relative hazard of weaning for PC clients compared to non-clients was 0.37 (90% CI 0.14 to 0.98) at any given point. This means that the relative risk of weaning for non-clients was 2.7, more than double that of the PC program clients.

Because of such small numbers for non-clients (n=9), this modelling was not adjusted for parity or birth weight. In Chapter 7 a more complete analysis is presented, which linked PC program participation to community data (including breastfeeding duration data for those women not interviewed in person), and which adjusted for birth weight and parity.

Figure 4.7. Kaplan-Meier Survival Curves for interviewees only, by Peer Counsellor Program Inclusion, n=22



Duration of "full" breastfeeding:

Although the information on duration of "any breastfeeding" was easy for women to recall, the duration of "full" breastfeeding[7] (exclusive or almost exclusive) was more difficult. The validity and reliability of this information was questionable, especially since women were interviewed at an average of 5 months and many had only vague recollections of when other foods or liquids were introduced. This not only reflected problems with recall, but also problems with trying to impose a definition on a process

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"Full breastfeeding" includes both "exclusive" (no other liquid or solid given to the infant) and "almost exclusive" (vitamins, minerals, water, juice, or ritualistic feeds given not more than once per day, not more than one to two swallows). If any food is given (either liquid or solid) in greater quantities, then breastfeeding is said to be "partial". This is in accordance with the Interagency Group for Action on Breastfeeding (IGAB), a group comprised of staff from WHO, UNICEF, SIDA and USAID (Armstrong, 1991) and to Labbok & Krasovec (1990).

that may not be "linear"in nature. For example, women would describe how they had given their infants formula for a period of time up to several days or weeks, then did not do this, then started again. Which is the point in time where a researcher could state definitively that supplementation had "officially" begun - the first point, or the second? According to my previous research (Martens, 1994), at least 50% of the women were supplementing their infants at any given point in the first three months of breastfeeding, but this was not necessarily the same 50% over time. Problems in validity and reliability of recall for the duration of "full" breastfeeding have been reported in the literature (see Chapter 2). So at the research proposal stage, no detailed question was included in the research in order to collect retrospective data on dates of first supplementation.

4.5.7. Summarizing the quantitative findings on the effect of the PC program

Being a client of the PC program was associated with a longer duration of breastfeeding, higher satisfaction with breastfeeding, fewer reported breastfeeding problems, and lower "Bottle Feeding Belief" scores as compared with non-clients. These findings supported the research hypotheses. A PC client was only about one-third as likely to wean as a non-client (RR=0.37, 90% CI 0.14 to 0.97). A PC client also reported being "very satisfied" with breastfeeding in comparison with the "satisfied" rating of non-clients (median 5 vs. 4, p=0.07), and reported fewer breastfeeding problems (median 1 vs. 2, p=0.044). PC clients had lower Bottle Feeding Belief scores (22.5 vs. 26.2, p=0.10, true treatment effect of 0.55), indicating bottle feeding was less positively perceived when compared to non-clients.

Although there were no statistically significant differences in the variables of "Breastfeeding Beliefs", "Breastfeeding Confidence", "Referent Support", and "Breastfeeding Success" scores between clients of the PC program and non-clients, the evidence of change in the direction hypothesized by the Breastfeeding Decision-Making Model for "Breastfeeding Beliefs" and "Breastfeeding Confidence" leads to a possible verification rather than a rejection of the model. Small sample sizes, and true treatment effects less than hypothesized, could have led to a lack of power to detect a difference.

4.6. Qualitative results of the PC program evaluation

The qualitative data was used to triangulate the quantitative findings, and to give context or meaning to the limited view from survey tools. It was also used to evaluate the effectiveness of the PC program in providing a community-based resource for breastfeeding women. This section will first report on how the key quantitative findings were corroborated or challenged by the qualitative interview data, and will then include information on resources identified by PC clients and non-clients.

4.6.1. Comparison of quantitative findings and qualitative findings

In previous research (Martens and Young, 1997), "satisfaction with breastfeeding" was a significant predictor of duration. The more satisfied the woman was at the two-week postpartum interview, the more likely she was to continue breastfeeding. Satisfaction was also correlated with the "number of verbalized problems" ($r= -0.65$, 20 df, $p=0.01$). In the present research, being a PC client was associated with greater satisfaction with breastfeeding and fewer reported problems, so this may give insight into why the PC program resulted in longer breastfeeding duration. The qualitative interviews indicated that PC clients had greater access to information, more satisfaction with their breastfeeding experience because of this access, and less problems due to timely answers to their concerns. As some of the PC clients reported:

> "If I was worried about something I'd phone {the PC}. Whenever I needed something I'd phone her ... Yah, when I thought I didn't have milk, and I asked her..." (lines 1356-1360)
>
> "Well, {the PC} helped me with the questions that I didn't know about, eh? Sometimes I just felt like quitting, stopping, but I just keep on." (lines 1495-1500)
>
> "Actually this {PC} that helped me more out of all the people that I've known. She helped me a lot just by talking to her over the phone, you know. Just any questions that I had, she'd try her best to answer them, or give me information on, you know, situations or anything. So that was very helpful." (lines 4220-4226)

In contrast, non-clients referred to the need for a good source of information:

> "I had no support, no information. I didn't have anything, and I tried to do it on my own." (lines 233-234)
>
> "I didn't really know anything about {breastfeeding}... I just needed to talk to somebody about it because I just wasn't sure if my baby was getting enough vitamins and whatever he needed. I was afraid of it, like I was afraid he wasn't getting enough to eat. And then I gave him water, I started to give him water. And he liked the water." (lines 741-748)

Although the PC clients, on average, reported one less problem with breasteeding, both groups identified the problems in three major areas: soreness, insufficient milk, and latching on. Here are some of the comments by women describing problems:

> "Well my nipples were sore, and I felt like I was starving him."(line 2584)

"A month or a month and a half he was about, I started supplementing him with a bottle because it didn't seem like he was getting enough. And sometimes it seemed like there wasn't anything ... The baby was getting frustrated, too, when he was eating. So then I'd give him a bottle and then he would sleep." (lines 722-735)

"When I started, I got cracked nipples ... That's how mine were - they were just hurting. [So what did you do about that?] I just took the pain. Baby is more important." (lines 1264, 1269-1272)

"I just had one problem that started in the hospital. She didn't latch on right, really right. And I got cracked nipples. That was really painful. [So what did you do about that?] I just let them air out, and my granny told me to put tea bags on them." (lines 1629-1634)

"But this {baby}, I didn't get sore till that ninth week when I got cold. And I couldn't understand why I was just in pain. And at the same time while I was in pain, he was - it seemed - he wasn't getting enough, always crying at the same time, always spitting up and whatever. And I talked to my granny about it, and I talked to my boyfriend's mom, and they both told me the same thing - that I got cold and that's why my back was sore and my chest was sore. And I said 'but why would my baby be spitting up?' And then my boyfriend's mom told me, she said, 'that's why I always told you to keep warm.' She said 'when you get too cold, your milk goes like water. And that's why the baby doesn't want it, and that's why you got sore', she said. And sure enough, after I quit with the soreness on my nipples and all that, I still fed him for a whole week trying to reach that tenth week. So I did. So I put him on the bottle after that tenth week. I noticed that he wasn't spitting up any more, and he was satisfied." (lines 3264-3290)

PC clients had less positive Bottle Feeding Beliefs compared to non-clients, and this was also validated in the qualitative interviews. Women commented that they often received help and support from their own mothers or mother-in-laws, yet these people and other family members were more knowledgeable about bottle feeding than breastfeeding. The PC was seen as providing information, so that PC clients could go counter to the community norm of bottle feeding:

> "Like {the PC} gives you more confidence with breastfeeding when you have someone to talk to, and especially for these younger mothers... Like there's a lot of women that I know who don't even try it. They just give their baby bottles without giving it a chance to try breastfeeding." (PC client, lines 2281-86)

> "Actually all the people I know have bottle fed babies. So it's like, everybody's like, 'you breastfeed???'. They just thought I'm the kind of girl that wouldn't be breastfeeding... they're surprised that I breastfeed ..." (PC client, lines 2404-8)

> "I find that {my family}lean most towards feeding with the bottle. And like with my mom, I think it's because she seen how tired I was all the time. Sometimes I'd get really so tired and emotional. I'd feel like now is the time to put him on the bottle, but yet I wouldn't." (PC client, lines 3131-36)

So the association of PC program inclusion with less positive bottle feeding beliefs may indicate that those in contact with the PC were able to obtain information and support to counteract the cultural acceptance of bottle feeding as a norm and as a positive behaviour.

The quantitative data did not support the hypotheses of increased Breastfeeding Beliefs, Breastfeeding Confidence, or Breastfeeding Success. As to beliefs about breastfeeding, both PC clients and non-clients gave many advantages of breastfeeding, and why it was important. These included four themes; *bonding* (closeness) between mother and baby, *healthiness* of the baby (few illnesses, breastmilk being the best food, and good growth), *ease and convenience* (including time saved), and *less costly* compared to bottle feeding. All four themes were reported by both the clients and the non-clients, verifying the finding of no differences between groups. Exact quotes from the two groups will illustrate the four themes:

Bonding

> "{Breastfeeding} just makes me feel really connected to him. ... {Bottle feeding} just made me feel, really, like I was on the other side of the room ..." (lines 140, 147-8, non-client)
> "I think it's really important to breastfeed so they'll be more attached to their babies." (lines 2927-9, PC client)

Healthiness

> "I think every mother should breastfeed for as long as they can because it's healthier for the baby ... he's hardly ever been sick." (lines 756-62, non-client)
> "I think that breastfeeding is very healthy for the baby. I know that my friends have bottle fed and I noticed the major differences..." (lines 4208-10, PC client)

Ease and convenience

> "{Breastfeeding is} easier than the bottle, 'cause the bottle, you have to stay up there and hold him and the breast you can just sleep with the baby latched on." (lines 1207-10, non-client)
> "{Breastfeeding's} not so hard as feeding bottled babies, and it's comfortable." (lines 2725-6, PC client)

Less costly

> "I knew that what I was gonna do {breastfeed} was gonna help me money-wise." (lines 505-6, non-client)
> "Well I think that it's good to breastfeed ... because it's expensive to buy formula." (lines 1314-6, PC client)

But contrary to the quantitative findings of no difference in Breastfeeding Confidence scores, there were indications that inclusion in the PC program was linked to increased confidence in a woman's ability to breastfeed her baby. The knowledge that they could telephone the PC gave them a "way out" of their worries, fears, and lack of confidence. Over half (5/9) of the non-clients spoke of being fearful, afraid, worried or unconfident, like in the comment of one woman:

> "I thought, 'Is she gaining weight?' I was always worried about her." (line 2028)

Only one non-client, a self-assured woman, talked about being confident:

> "I accessed my own resource people and I got my own information and my own material to make myself aware. And with that I felt confident ..." (lines379-81)

In contrast, 7 of the 13 PC clients spoke about confidence (or lack of confidence), and 6 of these directly related the visits or telephone calls of the PC to building up their confidence in their ability to breastfeed. Some of the client comments included:

> "Like it gives you more confidence with breastfeeding when you have someone {like the PC} to talk to, and especially for these younger mothers." (lines 2281-2283)

> "{The PC} helped me a lot. She kept phoning me every week, to see how I was doing ... I felt more confident about breastfeeding" (lines 2957-62)

> "... if I was worried about something, I'd phone {the PC}." (line 1357)

This theme of the PC "giving confidence" was reinforced by the PC trainer. A woman was chosen to receive training because she was "somebody who had confidence in the breastfeeding process". And the PC trainer described the PC as being "just very good at giving mothers confidence, which is a real problem in Sagkeeng." So, contradictory to the quantitative finding of no difference in Breastfeeding Confidence between non-clients and clients, the qualitative information gives more insight. Both groups felt unconfident at times, but PC clients related that the PC helped them to overcome their uncertainties and gave them a feeling of confidence.

There were indications that both groups of women (PC clients and non-clients) were aware that some relatives/friends were highly supportive, and others were non-supportive. This could verify the finding of no group differences in Referent Support scores, contrary to the hypothesis. One PC client observed that her family "lean most towards feeding with the bottle" (line 3132), and another client stated that "all the people I know have bottle fed babies" (line 2404). But another PC client said that it was her aunt that showed her how to breastfeed, that she "had the support of my granny and my friends" (line 1598). Similarly, a non-client was thinking out loud when she said "Did I have friends I could talk to {about breastfeeding}? No, no." (line 3415). But another non-client reported that her own mother had breastfed all her children, and "my mom showed me how to take the engorgement away" (line 3546). Social support for breastfeeding varied more by individual family and friends rather than inclusion in the PC program.

4.6.2. Resources available to the breastfeeding women of Sagkeeng

In order to evaluate the effectiveness of the PC in providing a resource for Sagkeeng breastfeeding mothers, the following questions were asked specifically about the current community breastfeeding resources, in this order:

- Describe the information about breastfeeding that helped you.
- How did different people help you with breastfeeding?
- (Only for those woman who received the PC pilot program) How did you feel during and after the peer counsellor phone calls?
- In this community, what resources are available to women when they need help with breastfeeding?

Of the 13 PC clients interviewed, 10 of the 13 spontaneously identified the PC as a person helping them with breastfeeding, and the other three discussed the help they had received from the PC when prompted by the question relating to the scheduled telephone calls. In contrast, of the 9 non-PC clients interviewed, only one spontaneously referred to the PC as a resource person when asked the second question, and this was due to the fact that she was a personal friend.

In the non-client group, the "people resources" which were identified included: family members (own mother, grandmother, family member); friends (including other breastfeeding women and the PC who happened to be a friend); "no help available"; and health professionals such as the CHN and doctor. Other resources identified by the non-client group included: pamphlets; videos at the hospital and in the community. The group had mixed feelings about the usefulness of pamphlets, with the majority (5 out of 9) finding printed materials and videos helpful, but the rest either not remembering them or not having read them:

> "Um, I was pregnant with my first and they gave me some videos to watch about breastfeeding. There was a meeting - a group of girls got together and talked about breastfeeding." (lines 1078-1080)

> "I had all these pamphlets and all that from the hospital and all these stuff that they kept on giving me. [Was any of that particularly helpful?] I don't know. I didn't even bother with it." (lines 1229-1239)

In the PC client group, the "people resources" identified by the women included: the PC; family members (grandmother, aunts, sister, cousin, own mother or mother-in-law with the comment that the mothers knew more about bottle feeding); friends (and husband's friends); community health nurse; and hospital nurse. Other resources identified by the PC client group included: magazines (including coupons for formula); videos (in hospital and community); pamphlets. Only 5 of the 13 people in this group identified pamphlets spontaneously as a resource, with 3 finding them helpful and 2 not bothering to read them.

> "There's pamphlets and books that they gave me from the Health Centre...I found them useful." (lines 1734-1740)

> "I didn't really read anything about breastfeeding. Just my aunties kept telling me to breastfeeding because it's healthier for baby." (lines 1588-1592)

Only one woman in the entire sample mentioned receiving pamphlets from a commercial baby food (formula) company. This woman also mentioned problems with breastfeeding:

> "I got some breastfeeding things in the mail... From magazines .. From formula companies... They sent me all kinds of formula. ...{The PC} phoned me, yah, but things weren't working out ... well my milk supply already went away. " (lines 1898-1927)

In the PC client group, comments about the PC were very favourable. Her information was considered useful, she was able to answer questions about breastfeeding, and women appreciated the regular telephone calls initiated by her. People found the PC easy to talk to, and appreciated having someone to talk to who knew about breastfeeding, and she instilled confidence in the women by being able to answer questions: She was able to relate to women and their breastfeeding questions:

> "{the PC's} very helpful ... She's very friendly. She tells her own stories - I can relate to them." (lines 3023-5)

One of the clients appreciated the help given to her, but had made a personal choice to wean, as indicated by the comment:

> "It didn't feel right for me but I know a lot of girls do it. [Do you think that the um Health Centre people could have helped you in any way that they

didn't?] Mm, not really, it was my choice." (lines 2609-13)

Only one client expressed mixed feelings about the PC contacts, saying that the PC gave her encouragement during some contacts but did not understand her during other contacts:

> "... when I was really discouraged I would phone {the PC} and she helped me. She helped me quite a bit but other times I felt like she really didn't understand what I was talking about or going through or something. It was either that, or I just at the same time just felt so down that I didn't really want to listen to anybody ... I found that because she gave me her phone number I was free to call her when I had a problem ... and of course when I called her she was always willing to help me out." (lines 3160-82)

So of the 13 PC clients interviewed, 12 of them identified the PC as being a very valuable community resource for breastfeeding women, and only 1 person had mixed feelings about being contacted. Participation in the PC program was also associated with being able to identify the PC as a community resource during the qualitative interviews.

4.7. Discussion

4.7.1. The effect of the PC program: strengths and limitations of the results

Results of the PC pilot program evaluation need to be viewed with caution. The major limitation is sample size. Only 22 Sagkeeng women were interviewed for the quantitative research, and only 9 of these were classified as "non PC" clients. This small sample size would invite criticism regarding its a) lack of power, and b) generalizeability. Despite the criticism of lack of power, statistically significant differences were detected in terms of breastfeeding duration, levels of satisfaction, reported problems, and "Bottle Feeding Beliefs". Changes in the Breastfeeding Belief and Breastfeeding Confidence scores were only about 0.25 of a standard deviation, but the sample size would only be able to detect a true treatment effect of about 0.75 or more standard deviations.

Concerning the criticism as to generalizeability, the present study did confirm previous findings. In my Masters research (Martens and Young, 1997), "satisfaction" was a significant predictor of duration. The more satisfied the woman at her two-week postpartum interview, the more likely she was to continue breastfeeding. Those women "unsatisfied" with breastfeeding were 12.4 times (95% CI 2.9 to 52.6, p=0.0005) more likely to wean at any given time compared with women who were "satisfied" with breastfeeding. This was verified in the current research, with a relative hazard of weaning of 12.6 (95% CI 2.1 to 76.9, p=0.004). The additional finding of "satisfaction" being associated with PC program inclusion strengthens the argument for a causal relationship of PC program inclusion with greater breastfeeding duration, being mediated by greater satisfaction with breastfeeding.

A correlation of "satisfaction" with "number of verbalized problems" was also noted in the previous 1994 research (Martens and Young, 1997). The more satisfied, the less problems were verbalized by women at the two-week postpartum interview (r= -0.65, 20 df, p=0.001). This was similar to the Spearman's correlation coefficient in the present research (r= -0.68, 20 df, p=0.0005). In the Masters research, those women having more than 1 problem were 6.2 times (95% CI 1.5 to 26.1, p=0.009) more likely to wean compared to women reporting zero or one problem. This was also verified in the current research, with a relatived hazard of weaning of 7.6 (1.6 to 36.0, p=0.002). The additional finding that PC program clients reported a median of 1 problem, compared to non-clients' median of 2 problems, points out an important *clinically significant difference*. PC program participation was associated with a reduction in reported problems to the point of substantially reducing the risk of weaning. Once again, this could strengthen the causal relationship between the PC program and a longer duration of breastfeeding, through the mediation of reduced reported number of problems.

Despite the fact that the Masters research data on "satisfaction" and "number of verbalized problems" was collected at a two-week postpartum interview, and the current research asked the question retrospectively at four to eight months postpartum, these two variables maintained their predictive ability for breastfeeding duration. This could possibly translate into an easily administered weaning risk indicator for public health personnel to use in telephone contacts or in-person visits. A similar indicator was alluded to in the interview with the Peer Counsellor. During her first telephone call to new clients, she would ask how they were "enjoying" breastfeeding. She found that this question gave more information than if she asked closed-ended questions such as ,"are you breastfeeding?", or "how are things going?". This "enjoyment" question used by the PC could possibly be in the same domain as "satisfaction, and seemed to encourage women to detail their problems with breastfeeding:

> "I'll ask 'how are you and baby enjoying breastfeeding?' and they have to answer that question. You know they have to think about it and so they go 'Uh it's OK' and then they'll go into detail. 'Oh, he's, he's not sucking right' or 'My nipples are sore' or 'I don't think he's getting enough'... if I just say 'are you breastfeeding', you know they'll say 'yes' or 'no', but I think asking questions like that they have to go into detail and answer your question thoroughly. And you can just keep asking different questions different ways."

A further criticism involves the study design, a separate sample pretest - post-test design. Campbell and Stanley (1963) identify "history", "instrumentation" and "selection" as possible sources of internal invalidity in this design. Selection was probably not a threat to internal validity, due to the random nature of eligibility by time of birth rather than by selection of the researcher or health centre personnel. "History", in other words, something else besides the intervention which could have changed people's outcome measure, may be a possible limitation. Due to the fact that other breastfeeding initiatives were ongoing within the community, including the prenatal education by the community health nurse, the hospital staff education, and the adolescent school education, the sample of women during the PC pilot project time may have been influenced more by community effects. But the fact that 4 of the 9 "non-clients" actually gave birth during the PC pilot project time period strengthens the argument that the intervention, and not "history", was the reason for the noted change. "Instrumentation", that is, differences in the interviewer's administration of the instrument tool from beginning to end, can also be reasonably excluded due to the fact that the interviews for both non-clients and PC clients were interspersed throughout 1997 in no particular order.

Non-blinding could be considered a potential threat to the internal validity of the research. The interviewer (myself) was not blind to the categorization of the woman being interviewed. I may have biased the interview in favour of the hypothesis through being aware of the classification of the interviewee. One argument against this bias would be the standardized testing tool, which was essentially read word-for-word to each interviewee without variation. Even the qualitative interviews followed a semi-structured format of questions, each asked in the same order and using the same words.

The health care providers, that is, the CHN and the PC, were also "unblinded" and aware of the ongoing research. This could have influenced the behaviour of the CHN, since she may have varied her prenatal or postnatal instruction for those whom she realized were also receiving PC contacts. Prenatal instruction was similar for all women in the research and was usually only given to first-time pregnant women. It was also instituted before the PC program was underway and before the final details of the research were completed. During the PC program, the CHN made a point of trying not to interfere with the program, other than to give the PC the names of the clients after the first postpartum visit. Similarly, the PC herself was aware that the program was being evaluated, but was not given the details as to the form of evaluation that this would entail.

One concern of any pilot project is overcompensation for the sake of "proving" a program. In this situation, the PC was aware of the importance of the pilot program's demonstrated "success" so that future funding would be available. This may have resulted in problems with external validity, or the ability to generalize these findings to other times and places. The effect size may be exaggerated because of the emphasis on evaluation during the pilot phase, or the special talents of the PC involved in the pilot program phase. In other words, another trained PC may not demonstrate the same capability of empathetic listening and information-giving skills. Because of the extensive training of the PCs, it is hoped that future PCs would also be of similar skill level.

One of the greatest strengths of the research was the verification of quantitative findings through qualitative data obtained during in-person interviews. Because of the weaker study design, the non-blinding of the interviewer and health centre personnel, and the small sample sizes, it was considered important to include triangulation of data through qualitative thematic analysis. The quantitative findings of longer breastfeeding duration, increased satisfaction with breastfeeding, and decreased number of verbalized problems for PC clients when compared with non-clients was verified through the many quotes of women who spoke of the valuable input and support from the PC during her telephone calls or home visits.

4.7.2. Comparison of findings to the literature reports

In the current research, very large increases in duration at 1, 2 and 6 months were associated with PC program inclusion. PC clients who were interviewed had duration rates 30% to 50% higher at intervals throughout the first six months compared to non-clients. This was comparable to the largest effects noted in the literature, and most similar to those reported for low-income WIC urban women in the USA (Brent et al., 1995; Kistin et al., 1994), and Auerbach (1985) with WIC clients who requested services. The effect size must be tempered by the fact that the results reported in this chapter were based *only* on those women who were interviewed (n=22 out of 35 women giving birth). Chapter 7 will discuss a population-based approach, and the data in Chapter 7 includes breastfeeding rates for *all* Sagkeeng women who gave birth and initiated breastfeeding. Those results were analyzed by PC client status, using historical data from 1992 to 1997, and adjusting for parity and birth weight. Thus the Chapter 7 results would presumably give a more unbiased treatment effect size.

4.8. Summary and policy recommendations

Using a "pilot project" statistical critical value of $p=0.10$ for conclusion of a difference, inclusion in the PC pilot program was associated with a decreased risk of weaning (RR=0.37, 90% CI 0.14 to 0.97, $p=0.09$), increased satisfaction with breastfeeding (median 5 versus 4, $p=0.07$), decreased number of verbalized breastfeeding problems (median 1 versus 2, $p=0.044$), and less positive Bottle Feeding Belief scores (22.5 versus 26.2, $p=0.10$). Qualitative interviews verified the importance of the Peer Counsellor's role in postpartum support, and the need for a knowledgeable breastfeeding woman to be available as a community resource for other breastfeeding women.

Recommendations:

- that the Peer Counsellor program become a funded program of the Sagkeeng First Nations Health Centre, with future program evaluation strategies
- that the CHN and PC work in close co-operation with the PC trainer, to provide training and support to ensure at least 2 hired PC's at any given time
- that the PC's primary role be to initiate telephone calls or visits to all postpartum breastfeeding women at regular intervals, optimally at one-week intervals in the first month, and two-week intervals for the next two months. That secondary roles be considered to include prenatal instruction and postnatal mothers' groups
- that a PC is available by telephone at any time during the week, and that the installation of a telephone in the house of each PC be funded
- that the booklet and video, So You Want a Healthy Baby, be formally evaluated

Chapter 5: Sagkeeng School Intervention Strategy

5.1. Introduction

This chapter describes the effect of a breastfeeding education session for adolescents attending Sagkeeng First Nation Junior High School in May and June 1997. A pretest - post-test control group design was used to evaluate the effectiveness of the session in terms of changes in breastfeeding beliefs and attitudes.

Because the infant feeding choice of a mother with her first child sets the path for choices with subsequent children (Martens, 1994), it is important to focus on early decision-making when considering education about the importance of breastfeeding. Therefore, a one-class (50 minute) educational intervention on the topic of breastfeeding was given to Sagkeeng students in Grades 7 and 8. Infant feeding choices are affected by social support, so promoting breastfeeding as the cultural norm needs to include changing the attitudes of young people.

5.2. Hypotheses

In Sagkeeng Junior High School Grade 7 and 8 students,

- the Breastfeeding Belief post-test scores will increase after the intervention, compared to a control group
- the Breastfeeding Attitude post-test scores will increase after the intervention, compared to a control group
- the Bottle Feeding Belief post-test scores will decrease after the

intervention, compared to a control group

- The control and intervention groups will have equivalent scores on the Breastfeeding Beliefs, Bottle Feeding Beliefs and Breastfeeding Attitude retention tests ten days later, since they will both have received the intervention before the retention test

5.3. Sagkeeng School Breastfeeding Education intervention: background and description

The principal of the junior high school is a First Nations woman, and many of the staff are community residents as well. The junior high classes provide classroom instruction to group classes of about 20 students, using curriculum guidelines from the province of Manitoba. Sagkeeng First Nations Grades 7 and 8 students have been attending school in various locations during the 1990's. The south shore school was declared "condemned" in 1996, so students were relocated to the Sagkeeng Anicinabe High School on the north shore of the community for the September 1996 to June1997 school year. The school facility was shared, with Grades 5 to 8 attending school in the mornings, and Grades 9 to 12 in the afternoons. It was during this time (May and June 1997) that the research intervention occurred. In the following school year, 1997-1998, the construction of a new junior high school was begun on the south shore. Meanwhile, temporary "huts", also on the south shore, were built to house the kindergarten to Grade 8 students, and school officially opened again November 1997.

In my previous research, the average age at first birth in Sagkeeng was found to be

17 years old (Martens, 1994), and the average educational level of mothers was Grade 10. Male relatives, sisters, and friends were viewed by the pre- and postpartum women as being the least supportive of breastfeeding. So the age of first-time parents, and the lack of social support for breastfeeding, indicated the need for adolescent education to promote breastfeeding. During the production of the Sagkeeng video and booklet, So You Want a Healthy Baby, in 1994-1995, three teachers, a school principal, and some students of the high school and junior high school were involved in the filming of the video, and in the artwork and editing of the booklet. Interest was expressed at including the topic of breastfeeding in the curriculum. A Junior High School teacher, who is also a father of three breastfed children and husband of the first Sagkeeng Peer Counsellor (see Chapter 4), began planning life education topics for his Native Studies course, including a session on breastfeeding. I proposed doing a formal evaluation of the session, since this was an essential part of the continuum of the overall community breastfeeding strategy - "midstream" in McKinlay's model (see Chapter 2).

The teaching module for Grades 7 and 8 students was decided upon in consultation with the teacher, the Peer Counsellor, the Peer Counsellor trainer, the community health nurse, the principal of the school, and myself. It was designed to address deficits in knowledge and to increase breastfeeding confidence, two predictors of the intent to breastfeed (Martens, 1994). Students wrote pretests the day before the session, and were assigned randomly to either the "intervention" or the "control" group. The morning of the session, students who were absent the day before reported to the office, wrote a pretest, and then were assigned to a group in order of appearance.

The breastfeeding education session was designed to be 50 minutes long. The speaker first showed the Sagkeeng video, which includes information about prenatal care and discussion about the benefits of breastfeeding by elders, mothers and fathers of the community. Students each received a copy of the Sagkeeng booklet, So You Want a Healthy Baby. The first page of the booklet discusses the benefits of breastfeeding. The male students were rather reticent to show interest in the topic, but during the session they avidly read the booklet and enjoyed identifying the sketches of community people. After the video, the Peer Counsellor referred to the booklet to discuss the advantages of breastfeeding. Then she "told her story" of how she felt about breastfeeding, including benefits to the mother, father and baby. She also discussed some of the perceived barriers to breastfeeding as noted in previous research (Martens, 1994), including: "you can breastfeed if you return to school/work"; "you can breastfeed if you eat junk food"; "you can breastfeed with other people around or in public"; and "you can breastfeed even if you smoke". She gave ideas about how to breastfeed in these situations. She also spoke about the importance of supporting friends, relatives and partners in their choice to breastfeed their babies, and how this could help the community of Sagkeeng. Then she ended with a question period. See Table 5.1. for the objectives and outline of the class.

The "control" group attended a simultaneous session given by a Sagkeeng Band leader on a politically salient issue. Hydroelectric and industrial use of Winnipeg River was causing great concern. Sagkeeng residents were concerned about river bank erosion, fluctuating river levels and quality of river water. In the second class, the control group received the breastfeeding education session.

Table 5.1. Objectives and outline of the Sagkeeng Junior High School breastfeeding class

Objectives The participant will be able to: 1. State at least five benefits of breastfeeding to the mother and her baby (develop close feelings, natural, convenient, best food, saves time, regain figure, healthy baby, minimal cost, enjoyment) 2. Identify at least two barriers to breastfeeding, and state how these can be overcome (example: returning to school, wanting to smoke, wanting to eat junk food, being embarrassed about breastfeeding, wanting to go out) 3. State the importance of adolescents, both male and female, supporting women (their friends, sisters, partners) in breastfeeding their babies
Outline 1. All Grade 7 and 8 students take the pre-test the day before, to allow for randomization of the students. The pretest only includes the beliefs section and demographics. 2. Watch the video (includes the elders talking about breastfeeding) 3. Why breastfeeding is a "good thing" in terms of benefits to mother and baby, using the Sagkeeng breastfeeding booklet and personal story of the peer counsellor 4. Some of the difficulties/barriers (returning to school etc.), and how mothers can continue to breastfeed 5. The importance of breastfeeding in the traditions of First Nations people 6. Take the post-test (includes the demographics, beliefs and attitudes sections) **Note: the post-test is given to the intervention group at the end of their class on breastfeeding, but is given to the control group at the start of their class on breastfeeding (after they have had the control session)** 7. Take the retention test 10 days later (same as post-test), to measure retention of information for both groups

Because the same format was maintained for both groups' breastfeeding education sessions, there were only subtle differences between the two. First, the Peer Counsellor said that she was more nervous during the first session, and read more from her notes instead of talking directly to the students. Secondly, the students in the intervention group received the session first class (8:00-8:50 am) of the morning, and the control group received it during second class (9:00-9:50 am). So the time of day may have affected the learning. Thirdly, the Peer Counsellor's four-month old breastfeeding baby was "baby-sat" by the school secretary during the first session. But during the second session, the baby was hungry, so the Peer Counsellor breastfed her baby while speaking to the class. So the control group's breastfeeding education session included role-modelling!

Students attended sessions and wrote the tests as part of their school curriculum. But a letter had been sent home prior to the sessions, requesting parental/guardian permission for the results to be included in the research. Originally I planned to mail the consent forms, but no postal addresses were available for the students. Permission to use the test results was only obtained directly from a portion of the students. The parent/guardian then received a telephone call from school personnel requesting verbal consent or refusal. This proved to be a difficult task, taking several months of work. Many of the telephones were no longer in service, and the school did not necessarily have up-to-date records on telephone numbers. Because the telephone calls occurred over the summer time, some families were not available, some had moved away, and some children were no longer residing with the parent or guardian. The school was also closed until November 1997, due to construction. Because of cost constraints and time constraints, there was an emphasis placed on obtaining permission for those with "complete" test results (pre-, post-test, and retention test) and those with almost complete results (pre- and post-test). Students with different combinations of test results were not further contacted for permission.

5.4. Evaluation of the Sagkeeng School breastfeeding education session: design and methods

5.4.1. The research design

Breastfeeding Beliefs, Bottle Feeding Beliefs, and Breastfeeding Attitudes of adolescents were measured using a pretest - post-test control group design for the beliefs, and a post-test only control group design for the attitudes. The pretest occurred the day before the sessions, on May 27, 1997. The post-test occurred on May 28, 1997, at the end of the first session (intervention and control group), before the students received the alternate session. In order to evaluate the long-term effects, a second post-test, called the "retention test", was repeated 10 days after the educational sessions, on June 7, 1997. So the "intervention" group received a pretest the day before the class, took part in the breastfeeding class, did the post-test, and then attended the "control" session in the second period of the day. Ten days later, they took a "retention test" which was identical to the post-test. Meanwhile, the "control" group received a pretest the day before the class, attended the control session first class of the morning, did the post-test, and then attended the intervention session during the second period. Ten days later, they also wrote the retention test. This is diagrammed as follows;

	May 27/97	May 28/97			June 7/98
R	O_1	X	$O_{1,2}$	C	$O_{1,2}$
R	O_1	C	$O_{1,2}$	X	$O_{1,2}$

where O_1 is the pretest with "beliefs" tools, and $O_{1,2}$ is the post-test and retention test including both the "beliefs" tools and the "attitude" tool

Students were matched by pretest scores, grade, and gender, and subsequently randomized to X or C (Campbell and Stanley, 1963). This type of "blocking" assured greater equivalence of the groups prior to intervention. Because of the possibility of reactivity in attitudinal testing (Campbell and Stanley, 1963:18; Friel et al., 1989), it was considered advisable to use a post-test-only design for the Breastfeeding Attitude tool.

5.4.2. Statistical design

The adolescent breastfeeding educational intervention involved a pretest, post-test and retention test which could be linked by identifiers. The analysis therefore used repeated measures (split unit) analysis of variance, with the outcomes of "Breastfeeding Beliefs", "Bottle Feeding Beliefs" or "Breastfeeding Attitude", and the explanatory variables of group (intervention or control), time (pretest, post-test, retention test), gender, and the interactions of group by time, gender by time, and group by gender by time. Statistical analysis indicated a balanced design for pretest - post-test comparisons ($\chi^2 = 0.025$, 1 df, p=0.87, NS) and for pretest, post-test and retention test comparisons ($\chi^2 = 0.0$, 1 df, p=1.0, NS). Assumptions of normality and equality of variance were not breeched by the data set. To detect a true treatment effect of 0.75, assuming two-tailed testing, Type I error probability of 0.05, and 80% power, 15 persons per group for a total of 30 (Glantz, 1997) or 11 per group for a total of 22 (Norman and Streiner, 1994; Hassard, 1991) were the minimum requirement. For a true treatment effect of 0.50, 25 persons per group would be required, for a total of 50. See Chapter 3 for the tables used to calculate sample sizes, and for other general statistical considerations.

5.4.3. Instrumentation

Breastfeeding Beliefs, Bottle Feeding Beliefs and Breastfeeding Attitudes tools were revisions of previously tested Breastfeeding Beliefs, Bottle Feeding Beliefs, and Breastfeeding Confidence tools (Martens, 1994; Martens and Young, 1997). The original tools were assessed for content validity and predictive validity for breastfeeding decisions of First Nations women in their third trimester of pregnancy (see Chapter 3).

I revised the original tools to include measures of additional constructs recorded in the literature on adolescent breastfeeding knowledge and attitudes (see Appendix 5). See Table 5.2. and Appendix 11 for the revised tools. To test the three revised tools for content validity and for test-retest reliability, the survey was administered to Grade 7 students attending Kleefeld School, in rural southern Manitoba. Students were asked to critique any questions that they did not understand. The word, "curriculum", was difficult for some students to understand, so a definition was given in the final version. Table 5.3. includes the test-retest reliability analyses. "Breastfeeding Belief" and "Bottle Feeding Belief" scores were reliable over a one-week period. However, the correlation coefficient of 0.63 for the Bottle Feeding Belief score may be considered unacceptably low by usual criteria of 0.70 or greater (Henerson et al., 1987:154). Because of these concerns, an analysis of the actual intervention data was performed post-hoc using students' results who were in the "control" group (n=27) and who wrote a pretest, and a post-test one day later, prior to receiving the breastfeeding session. The Pearson's correlation coefficient was 0.78 (p=0.000002), which was in the acceptable range for reliability.

Table 5.2. Quantitative survey tools, and individual items, used in the school research

Breastfeeding Beliefs or Bottle Feeding* Beliefs Score	Breastfeeding Attitude Score	Other questions
Rated on 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), summed for composite score. Possible range: 12 to 60 (*interchange the word "bottle feeding" for breastfeeding)	Rated on a 5-point Likert scale (1 =strongly disagree, 5 = strongly agree), summed for composite score. Possible range: 12 to 60	
1. Breastfeeding [bottle feeding] would make you and your baby develop close feelings 2. Breastfeeding is the most natural way to feed your baby 3. Breastfeeding would be convenient 4. Breastfeeding would provide the best food for the baby 5. Breastfeeding would save time 6. Breastfeeding would make you feel good about yourself 7. Breastfeeding would help you regain your figure 8. Breastfed babies are healthier 9. Breastfeeding would allow you to go places and do things outside the home easily 10. Breastfeeding would not cost very much money 11. Breastfeeding allows a mother to get more sleep 12. Babies enjoy breastfeeding	Circle the number which best tells how you feel about the sentence: 1. Breastfeeding is a good thing for mothers 2. Breastfeeding is a good thing for babies 3. Breastfeeding the baby is a good thing for the male partner 4. It's okay for women to breastfeed if there are other women in the room 5. It's okay for women to breastfeed if there are men in the room 6. It's okay for women to breastfeed in a public place 7. Women should be encouraged to breastfeed their babies 8. I would encourage my friends to breastfeed their babies 9. I would be comfortable (not embarrassed) if I saw a woman breastfeeding her baby 10. Our school should encourage teen mothers to breastfeed 11. Breastfeeding is fashionable 12. Breastfeeding information should be included in the school curriculum* *curriculum means what you study and learn about in school	Have you ever seen a woman breastfeeding a baby? (Yes or no) Were you breastfed as a baby? (Yes, No, or I don't know) How would you want your own children to be fed? (Breastfed, bottlefed, mix of breastfed and bottlefed, I don't know)

Table 5.3. Reliability study of the student surveys (one week test-retest)†

Instrument (range of possible scores, a summation of 5-point Likert scale questions)	Pretest mean (SD) n=41	Post-test mean (SD) n=36	Difference of pre- and post-test: Two-tailed paired T-test (n=36)	Correlation coefficient of pre- and post-test results (n=36)
Breastfeeding Belief Score (12 to 60)	41.0 (6.1)	40.6 (5.4)	p=0.32, NS (non-parametric Wilcoxon)	r=0.89 p<0.000001
Bottle Feeding Belief Score (12 to 60)	34.0 (5.9) median 34	33.9 (4.9) median 33.5	p=0.61, NS	r=0.63 p=0.00004
Breastfeeding Attitude Score (12 to 60)	38.5 (7.4)	41.3 (7.0)	p=0.0008* with a mean difference of 1.9	r=0.89 p<0.000001

† parametric tests unless otherwise indicated

Even though the "Breastfeeding Attitude" pilot tests were highly correlated (r=0.89, p<0.000001), the paired t-test indicated a significant mean increase of 1.9 over the one-week period (p=0.0008). This verified reactivity to an attitudinal test as indicated in the literature (Campbell and Stanley, 1963:18) and in the adolescent breastfeeding education evaluation by Friel et al. (1989). Thus one would expect a possible increase in the Breastfeeding Attitude scale by virtue of reactivity alone, and a greater effect size would be required to make any evaluation effect believable.

5.4.4. Population and sample considerations

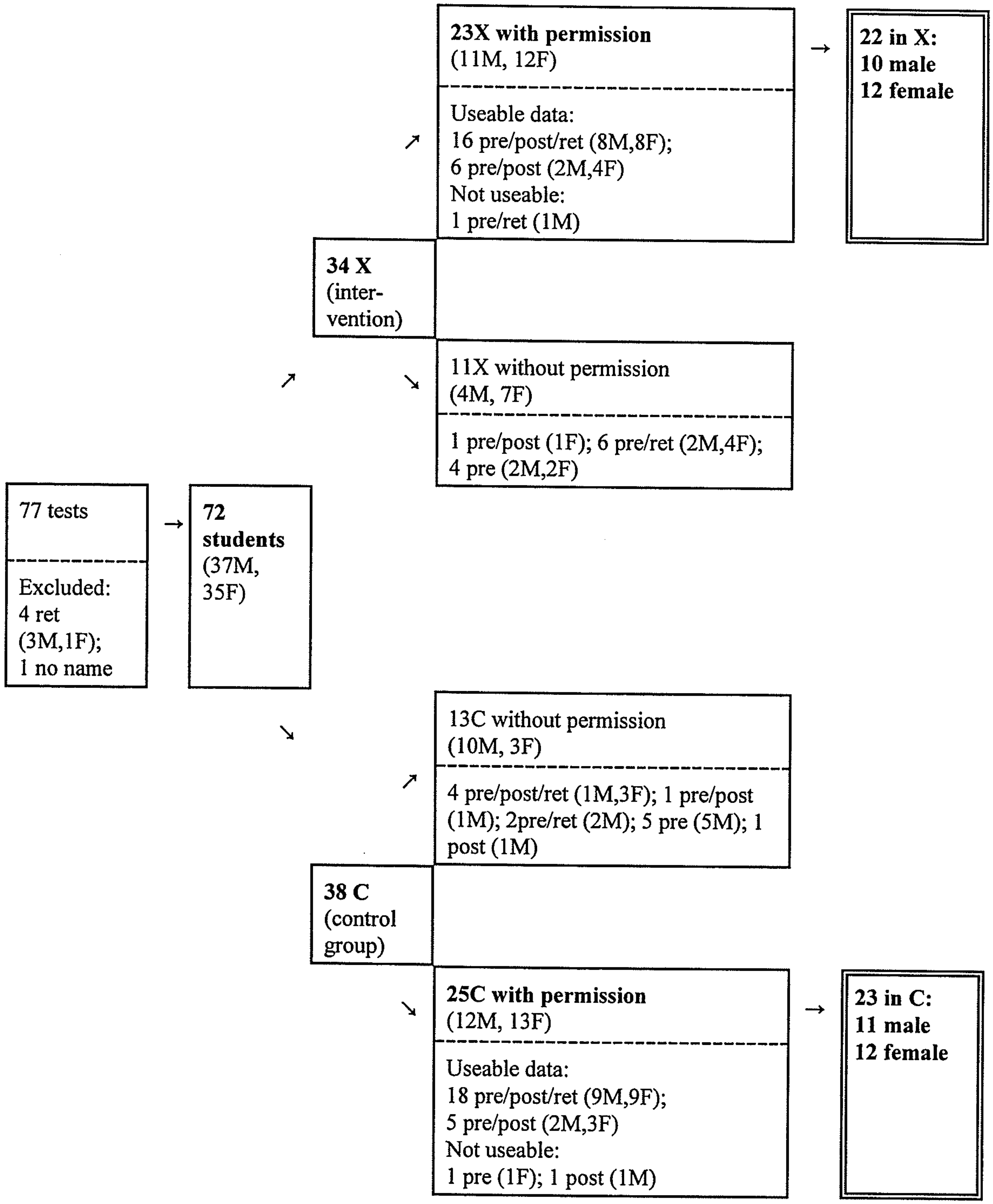
The target population was all adolescent males and females of Grades 7 and 8 in Sagkeeng First Nation. The sample was all students attending Sagkeeng Junior High School (Grades 7-8) during May and June 1997, who were present for at least one of the tests, and whose guardians/parents agreed to the student's participation.

According to school officials, many students who appeared for the first months of school were no longer attending in May and June, but there were no accurate lists in the office for a check on attendance. Anecdotal reporting from the school staff indicated that only about 60% of the students attended on any given day, and this was not necessarily the same 60% from day to day. An average attendance of 55 over the three test days (n=60 the day before; n=54 the session day; n=51 the retention test day) represented 73% of the total roster of identifiable students from the three test periods (n=75)[1]. This may under-estimate the total roster, since some students may have been absent all three days and therefore were not listed by the researcher. Of the identified students, 72% received the intervention. See Figure 5.1. for a detailed diagram of inclusion by group and gender. The response rate for identifiable students with permission and with "complete" (pretest, post-test and retention test results) or "nearly complete" (pretest and post-test) results was 45/71, or 63%; the intervention group has a response rate of 65% (22/34), and the control group a response rate of 61% (23/38). Permission was actually obtained from 48 students (response rate 68%), but 3 of those students had partial test results. In terms of an expected response rate of 80%, this was low. But given the fluctuating student attendance and the difficulty obtaining permission, this was realistic.

1

A total of 77 students (one unnamed) completed one, two or three of the surveys. The one unnamed pretest was probably a double count of one student whose name was recorded subsequently. Four of these students completed only the retention test, so were not randomized to receive the intervention or control session. Of the 72 students remaining, there was one fictitious name on the pretest. This male student may have been identified under a different name if he completed an identified post-test or retention test. Therefore, there were 71 identifiable student tests for linkage purposes.

Figure 5.1. Diagram of student test completion by gender and group†



† X = intervention group; C = control group;
pre = pretest; post = post-test; ret = retention test;
M = male; F = female

5.5. Results

5.5.1. Demographics and comparisons of the intervention and control groups

There were no significant differences between the demographics of those in the intervention and control group (see Table 5.4.). These groups were also similar in demographics to the entire group (comprised of those with incomplete results or those who did not give permission for analysis), with a slightly lower percentage of males in the research than in the general school population. Comparison of pretest results for those students randomized to the intervention or control groups also showed no significant differences in the pretest belief scores (see Table 5.5.).

Table 5.4. Demographics of students as a whole and by group*

Demographic indicators	entire group (n=76)	Intervention Group (n=22)	Control Group (n=23)	Difference between intervention and control group: p-value
Gender (% male)	53% male	45% male	48% male	p=0.87
Mean Age in years (SD)	13.3 (1.1) Range 11-16	13.1 (1.2) range 11-15	13.2 (0.9) range 12-15	p=0.68
Grade	Grade 7 59% Grade 8 41%	Grade 7 55% Grade 8 45%	Grade 7 52% Grade 8 48%	p=0.87
seen someone breastfeeding (% yes)	90%	90%	87%	p=0.75
was breastfed as a child (% no, yes, don't know)	no 23% yes 31% dk 46%	no 33% yes 24% dk 43%	no 17% yes 30% dk 52%	p=0.43
would want to have own child breastfed	bottle-fed 4% breastfed 48% mixed 17% dk 31%	bottle-fed 5% breastfed 48% mixed 9% dk 38%	bottle-fed 4% breastfed 39% mixed 22% dk 35%	p=0.71 (comparing any breastfeeding vs. bottle or dk)

*note: intervention and control "group" results only include those results that have been used in the analysis (see Figure 5.1). For results of entire group, breastfeeding questions included all those having permission and writing a post-test (n=55).

Table 5.5. Pretest comparisons of intervention and control groups

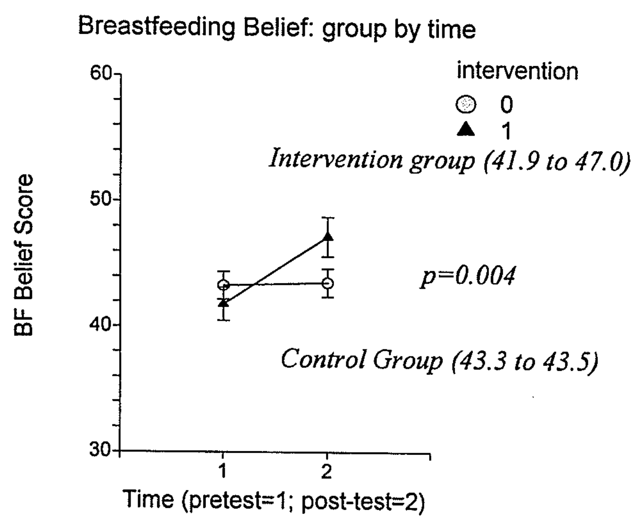
Variable comparisons		Intervention group	Control group	Comparison test: p-value†
Breastfeeding Belief pretest scores (SD 5 to 6)	a. the pre/post analysis (n=45)	41.8	43.3	p=0.39
		Females 41.3	Females 42.6	p=0.60
		Males 42.4	Males 44.1	p=0.52
	b. the pre/post/ret analysis (n=34)	40.9	43.7	p=0.16
		Females 39.0	Females 43.1	p=0.07
		Males 42.9	Males 44.3	p=0.66
Bottle Feeding Belief pretest scores (SD 7 to 8)	a. the pre/post analysis (n=44)	32.7	32.8	p=0.97
		Females 32.3	Females 33.6	p=0.71
		Males 33.2	Males 31.9	p=0.75
	b. the pre/post/ret analysis (n=33)	34.9	31.0	p=0.15
		Females 36.9	Females 32.9	p=0.20
		Males 32.9	Males 28.9	p=0.38
Breastfeeding Attitude post-test scores (SD 6)	a. the post analysis (n=45)	45.0	43.7	p=0.45
		Females 45.7	Females 45.6	p=0.97
		Males 44.2	Males 41.5	p=0.29
	b. the post/ret analysis (n=33)	43.3	44.2	p=0.61
		Females 41.4	Females 47.0	p=0.01*
		Males 45.1	Males 41.1	p=0.21

† two-tailed independent t-test, unless otherwise indicated
* significant at the p<0.05 level

5.5.2. Breastfeeding Belief Scores

The hypothesis stated that Breastfeeding Belief scores of the intervention group would increase from pretest to post-test, when compared with a control group before it received the educational intervention. This hypothesis was supported by the results. See Figure 5.2. for graphical representation. Appendix 14 includes all split-unit anova tables and Tukey-Kramer tests. Both "time" (p=0.003) and the interaction effect of "group by time" (p=0.0047) were significant, that is, the mean Breastfeeding Belief scores changed over time from pretest to post-test to retention test, and the pattern of change differed for the control and intervention groups. There were no statistically significant differences between the control group and the intervention group at the pretest, nor between the pretest and post-test control group results. Only the intervention group Breastfeeding Belief scores increased significantly by about 5 points from pretest to post-test.

Figure 5.2. Breastfeeding Belief Scores by group and time (n=45)



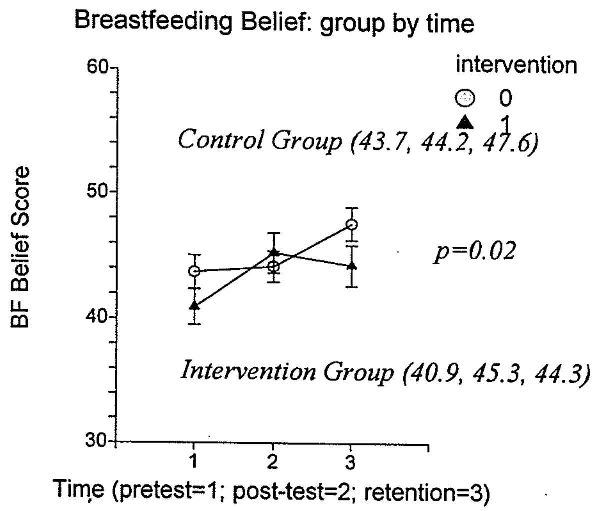
The second hypothesis that there was no significant difference between the intervention and control groups' retention test scores was also supported by the data. In an analysis using only those students with complete data (n=34) comprising of a pretest, post-test and retention test, the main effect of "time" (p=0.0003), and interaction effects of "group by time" (p=0.021) and "gender by time" (p=0.0035) were significant (see

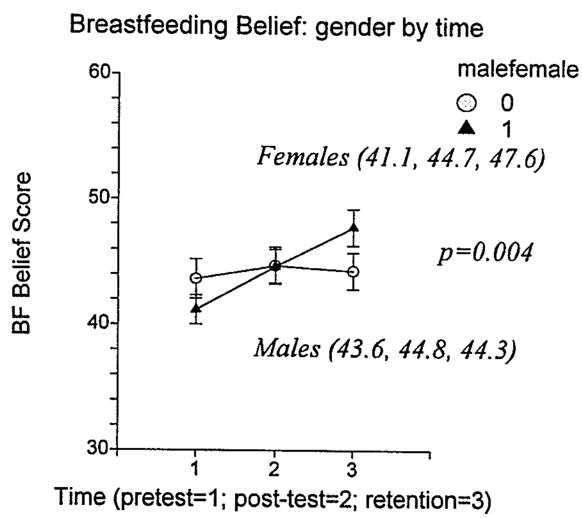
Appendix 14 for the anova table). This was verified through SAS analyses.

Figure 5.3. diagrams the mean results over time by group and by gender. In the intervention group, there was a rise of about 4 ½ points after receiving the educational session, and then a plateau or slight decrease over the next ten days resulting in a 3 ½ point rise from the original pretest. In the control group, there was no change pre- to posttest (before the breastfeeding education), but a rise of about 3 ½ points ten days laater (after receiving the breastfeeding education). So the pattern of *retained* knowledge, from pretest to retention test, was similar in the groups. But since the intervention group started at a statistically lower mean value than the control group (40.9 versus 43.7, $p<0.05$), the final results were also statistically different (44.2 versus 47.6, $p<0.05$). The patterns of increased scores was associated with the educational session in both groups.

Difference by gender was also significant. Male student mean values (n=17) stayed similar throughout the time period (43.6, 44.8, 44.3), with less than 1 unit difference between the pretest and retention test scores. In contrast, female student scores (n=17) tended to increase steadily (41.1, 44.7, 47.6), with a 6 ½ point rise from pretest to retention test ten days later. The pattern of the control and intervention female students over time was similar to Figure 5.2., only with larger treatment effects. The female "learning" occurred consistently after the breastfeeding session, and resulted in 6 to 7 point increases in Breastfeeding Belief scores. In contrast, the male "learning" over time for both groups was half a point.

Figure 5.3. Breastfeeding Belief Scores (n=34): group by time, and gender by time





An analysis of the individual items of the "Breastfeeding Beliefs" tool was used to detect overall student changes from pretest to post-test. Only one item reached significance using a Bonferroni correction factor of $p<0.004$: "breastfeeding helps a mother regain her figure" ($p=0.0006$). Several items reached $p<0.05$ statistical significance but not the critical level of 0.004, including: "breastfeeding provides the best food for a baby" ($p=0.007$); "babies enjoy breastfeeding" ($p=0.01$); "breastfeeding would make a mother and her baby develop close feelings" ($p=0.016$); "breastfeeding makes a mother feel good about herself" ($p=0.01$); "breastfeeding allows a mother to go places and do things outside the home easily" ($p=0.02$).

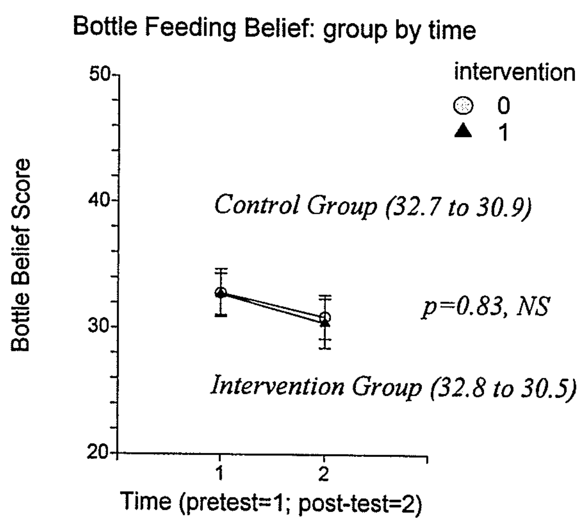
Each item was also analyzed for changes from pretest to retention test in female students only ($n=17$). Three items showed statistically significant increases over time: "breastfeeding would make a mother and her baby develop close feelings" ($p=0.003$); "breastfeeding saves time for the mother" ($p=0.0016$); and "breastfeeding helps a mother regain her figure" ($p=0.0016$). Other items were significant at $p<0.05$, but not the Bonferroni corrected value of 0.004. These included: "breastfeeding provides the best food for a baby" ($p=0.013$); "breastfeeding makes a mother feel good about herself" ($p=0.0067$); "breastfed babies are healthier" ($p=0.025$); "breastfeeding allows a mother to get more sleep" ($p=0.0069$); and "babies enjoy breastfeeding" ($p=0.0092$).

5.5.3. Bottle Feeding Belief Scores

One hypothesis stated that the Bottle Feeding Belief scores of the intervention group from pretest to post-test would *decrease* when compared with a control group before it received the educational intervention. This hypothesis was rejected, and the null hypothesis (no difference) was accepted. There was a non-significant decrease of about 2 points (32.8 to 30.7) for all students (p=0.051, NS). See Figure 5.4. for the graphical representation, and Appendix 14 for the split-unit anova and Tukey-Kramer tables.

The second hypothesis stated that there would be no difference between the intervention and control groups' retention test Bottle Feeding Belief scores. Accepting or rejecting this hypothesis was dependent upon the statistical analysis. The NCSS97 analysis only included those who had complete information (that is, wrote all three tests). "Time" was significant (p=0.03), but "gender by time" was not (p=0.076, NS). In the SAS analysis of complete data, both "time" and the "gender by time" interaction were

Figure 5.4. Bottle Feeding Belief Scores by group and time (n=44); pretest and post-test results

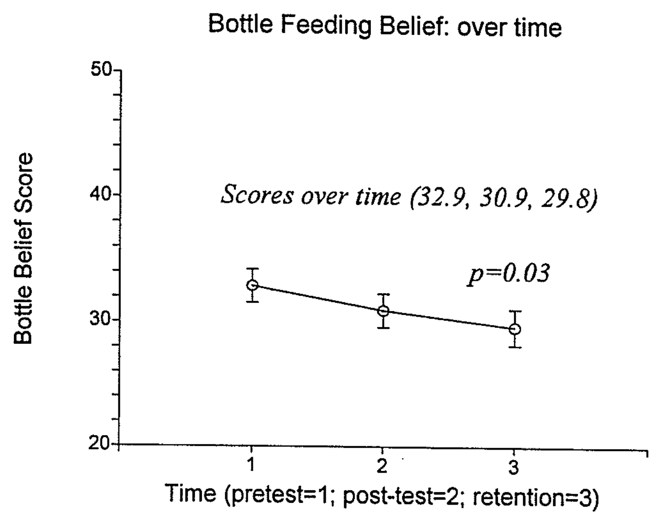


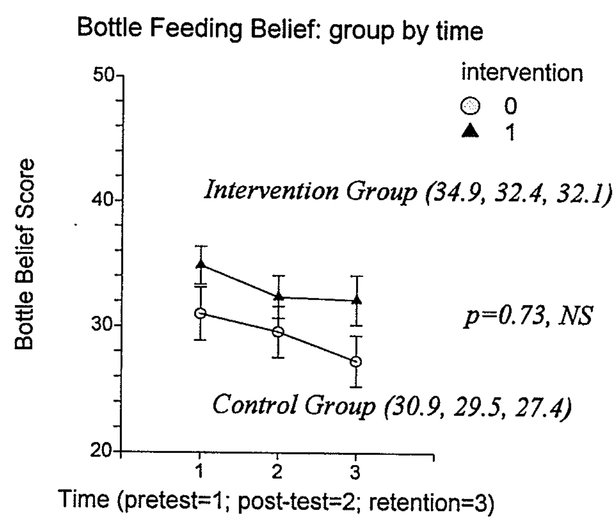
significant at the p=0.04 level. SAS analysis which replaced missing values through regression resulted in "time" (p=0.02) and "gender by time" (p=0.047) being significant. The two analyses which take into account intercorrelations (manova and mixed model unstructured GLM) both found the interaction effect to be non-significant (manova p=0.09; GLM p=0.07). Thus the interaction effect seems to "hover" on significance, and is probably worth looking at albeit with a skeptical eye!

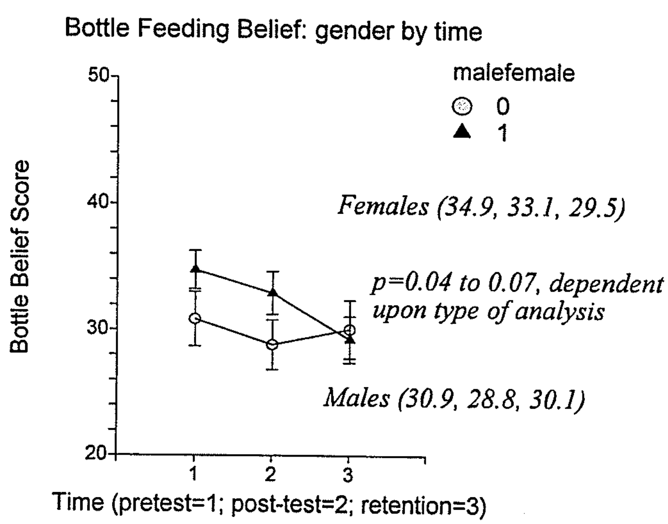
Over time, the overall mean Bottle Feeding Belief scores decreased from 32.9 to 30.9 to 29.8. For males, the three tests did not differ significantly over time. For the females, the retention test score (29.5) was significantly lower than either the pre- or post-test results (34.9 and 33.1). This seemed to be due to a large decrease (7.7 points) in scores of the females in the control group, double that of the intervention group (3.1 points). Figure 5.5. diagrams the mean results over time, then by group and gender.

Of note was the pattern of the groups over time. Even though the effect over time was not significant by group, the "pattern" of intervention versus control, predictable by the nature of the research design, was evident. In the intervention group, the "drop" of about 3 points in Bottle Feeding Belief scores occurred between the pre- and post-test, and then the results were stable over the ten days to the retention test. In contrast, the scores of the control group were somewhat stable over the pre- and post-test (during which they received the control session), and after receiving the educational intervention, their scores also dropped about 3 points ten days later at the retention test. But this small true treatment effect (0.34 standard deviation) would not have been detected as a statistically significant difference given the sample size.

Figure 5.5. Bottle Feeding Scores (n=33) over time, group by time, gender by time







Individual items were analyzed for female students over time (n=17), using the one-tailed Wilcoxon non-parametric test (equivalent to a paired t-test) to examine the hypothesis of a *decrease* in item scores from pretest to retention test (indicating less favourable beliefs about bottle feeding). Only one item showed a statistically significant decrease over time - "bottle feeding makes a mother feel good about herself" ($p=0.0016$). Other items reached $p<0.05$, but were not considered statistically significant decreases: "bottle feeding is convenient" ($p=0.04$); "bottle feeding saves time for the mother" ($p=0.02$); "bottlefed babies are healthier" ($p=0.036$); "bottle feeding would not cost very much money" ($p=0.005$).

5.5.4. Breastfeeding Attitude Scores

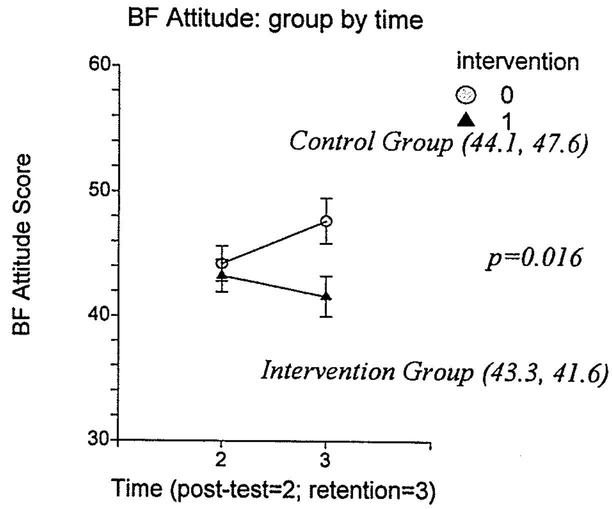
Students only wrote two Breastfeeding Attitude tests, a post-test and a retention test. The hypotheses stated that (a) the Breastfeeding Attitude post-test scores of the intervention group after receiving the educational class would be greater than the post-test scores of control group before it received the class, and (b) that both groups would have equivalent scores on the retention test ten days later.

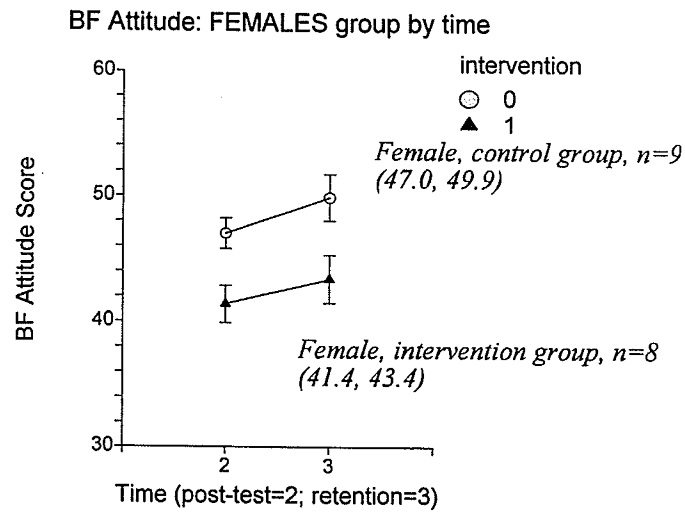
There was no difference in Breastfeeding Attitude post-test scores between the intervention and control groups ($p=0.47$, NS), contrary to the research hypothesis. Appendix 14 contains the complete analysis of variance table. There were differences in Breastfeeding Attitude scores from the post-test to retention test. The "group by time" effect was significant ($p=0.012$), and the three-way interaction of "group by gender by time" was also significant ($p=0.043$). The analyses were verified using complete and incomplete data sets in a SAS analysis, and performing manova and mixed model unstructured GLM. All of the analyses confirmed the NCSS97 "group by time" significant interaction effect, and all except the unstructured mixed GLM model also confirmed the three way "group by gender by time" interaction (the GLM model neared significance at p=0.057). Graphical analysis of the results is presented in Figure 5.6..

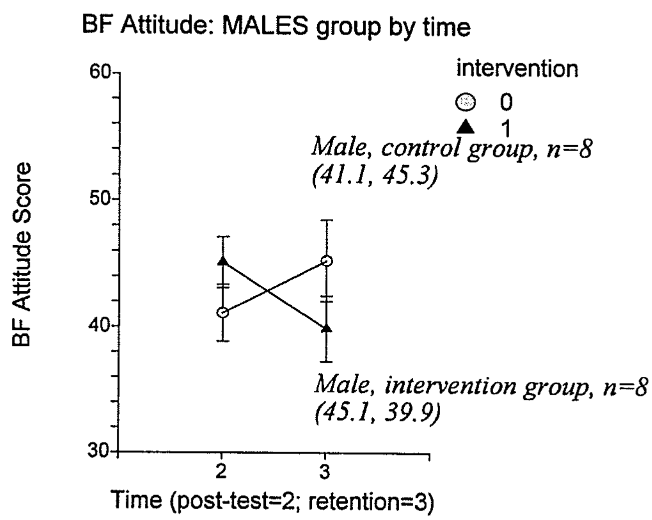
The group by time interaction partially confirmed the hypothesis. The intervention group did not differ in Breastfeeding Attitude scores from the post-test to the retention test (43.3 to 41.6, NS). But the control group, who received the educational session between the post-test and retention test, did experience a significant increase in mean score of about 3 ½ points. An interesting variation of these results from the original hypothesis was the fact that the control group had significantly higher scores at the ten-day retention test than did the intervention group (47.6 versus 41.6), after receiving a similar educational session.

Analyses by gender for each group by time interaction (see Figure 5.6) indicated that for females, there were significant differences by group (overall mean scores for the intervention vs. control were 42.4 versus 48.4), and by time (44.2 post-test, 46.6 retention test), but the non-significant interaction of group by time meant that each group experienced a similar pattern over time. The results for the males indicated that the main effects of "group" and "time" were not significant, but the interaction of "group by time" was significant. For the males in the control group, there was a significant increase (41.1 to 45.3) in score of about 4 points. But the males in the intervention group experienced a significant decrease (45.1 to 39.9) in scores.

Figure 5.6. **Breastfeeding Attitude Scores (n=33): group by time, group by gender by time**







Individual items comprising the "Breastfeeding Attitude" score were analyzed by group (n=17 control, 17 intervention) for the retention test, since this was the most relevant difference to the discussion of the effects of different sessions. Only one item was statistically significantly higher in the control group compared to the intervention group: "women should be encouraged to breastfeed their babies"(Mann-Whitney U test, one-tailed; $p=0.0004$). Several other items showed increases at $p<0.05$ level, but were not considered statistically higher: "I would encourage my friends to breastfeed their babies" ($p=0.007$); I would be comfortable, that is, not embarrassed, if I saw a woman breastfeeding her baby" ($p=0.018$); "Breastfeeding is fashionable" ($p=0.0045$).

When the items were analyzed for only female students over time, no statements reached statistically significant increases at the $p=0.004$ level. Only two increased over time by the traditional $p<0.05$ criterion: "Breastfeeding is a good thing for babies" ($p=0.036$); "It's okay for women to breastfeed if there are other women in the room" ($p=0.02$).

5.5.5. Other questions on the survey

About 90% of the students had seen someone breastfeeding. Only 31% of the entire group reported being breastfed as a child. Sixty-five percent of all students indicated an intent to have breastfed children, including both "breastfed" and "mix of breastfed/bottlefed" in the category.

5.6. Discussion

5.6.1. Effect of intervention on student beliefs and attitudes

The breastfeeding education class for adolescent students was tested for learning effects of beliefs and attitudes. A summary of the significant treatment effects for the school intervention study is given in Table 5.6. and Figure 5.7. Note that the comparisons are made between the *pretest* and *retention test* results for both the control and intervention group. This was done in order to yield a more comparable treatment effect.

Figure 5.7. Graph summary of treatment effects for the breastfeeding educational intervention (note: * indicates a statistically significant difference)

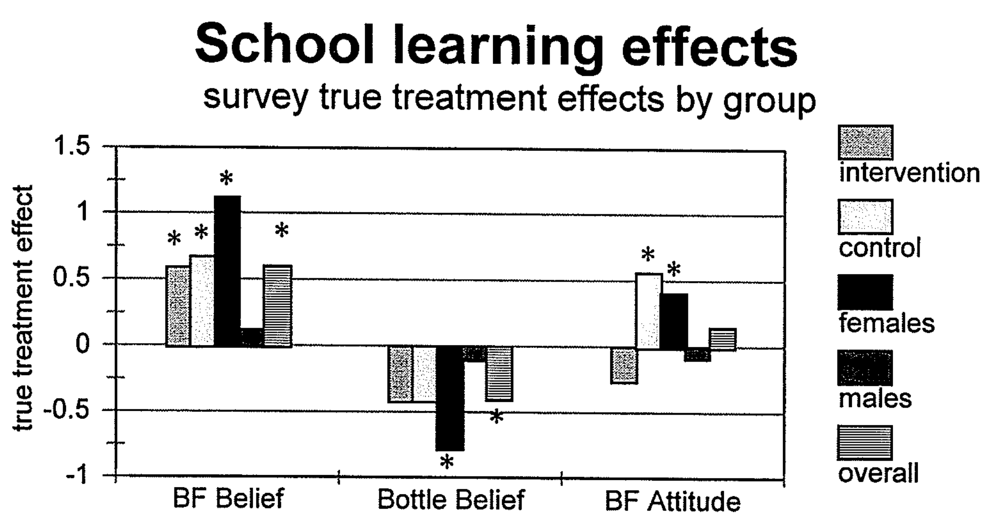
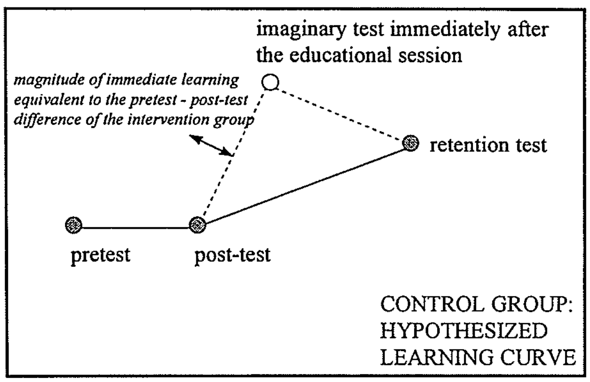


Table 5.6. Summary of treatment effects for the breastfeeding educational intervention

Latent Variable	Raw score differences from pretest to post-test (n=45) and pretest to retention test (n=34). These are statistically significant (p<0.05) unless indicated by an "NS"	Standardized true treatment effects (raw score as a proportion of the average standard deviation)
Breastfeeding Beliefs	(a) pretest to post-test effects: X increased 5.1 (SD 6) C increased 0.2 (SD 5.3), NS (b) pretest to retention test effects: X increased 3.4 points (SD 5.8) C increased 3.9 points (SD 5.8) Females increased 6.5 points (SD 5.8) Males increased 0.7 points (SD 5.8), NS Overall increased 3.6 points (SD 6.0)	(a)X: + 0.85 C: + 0.04, NS (b) X: +0.59 C: +0.67 Female:+1.12 Male: +0.12, NS Overall: +0.6
Bottle Feeding Beliefs	(a) pretest to post-test effects: no significant differences by group or gender, with all dropping 2.1 points over time (SD 8) (b) pretest to retention test: X decreased 2.8 (SD 6.9), NS C decreased 3.5 (SD 8.5), NS Females: decreased 5.4 points (SD 7) Males: decreased 0.7 points (SD 7), NS Overall: decreased 3.1points (SD 7.9)	(a) Overall: -0.26, NS (b) X: -0.41, NS C: -0.41, NS Female: - 0.77 Males: -0.10, NS Overall: -0.39
Breastfeeding Attitude	(a) post-test comparison: no significant differences by group or gender (b) post-test to retention test effects: X: decreased 1.7 (SD 6.3), NS C: increased 3.5 points (SD 6.3) Females increased 2.4 points (SD 5.9), NS Females in X increased by 2.0 (SD 5.9), NS Females in C increased by 2.9 (SD 5.9), NS Males decreased 0.5 points (SD 5.9), NS Males in X decreased by 5.2 (SD 5.9), NS Males in C increased by 4.4 (SD 5.9), NS Overall: increased by 0.9 (SD 6), NS	(a) Overall:+0.22, NS (b) X: -0.26, NS C: +0.56 Female: +0.41, NS (females in X +0.34, females in C +0.49, NS) Male: -0.08, NS (males in X -0.88, males in C +0.75) Overall: +0.15, NS

Even though the lines drawn in the figures of this chapter directly tie the control "post-test" result to the "retention test" result, it must be pointed out that there was no real "post-test" of the control group on the same day that they completed the educational session. Presumably, the immediate learning may have been greater than that recorded ten days later. So a truer picture may have included an imaginary control group post-session result higher than the retention test, and falling slightly to the retention test level ten days later (see Figure 5.8.). Therefore it was considered a fairer comparison to take the change from baseline pretest to retention test in comparing relative learning effects.

Figure 5.8. Hypothesized learning curve of the control group



The largest and most consistent treatment effects of the educational intervention were in the "Breastfeeding Beliefs" scores, with the effects showing a classic pattern of increase after the educational session in both the intervention and control groups. The true treatment effect[2] during the same-day testing of the intervention group was large (0.85). The learning effect from pretest to retention test over ten days was medium to large (0.59 for intervention, 0.67 for control group). But this effect was dependent upon

2
A "true treatment effect" TTE, sometimes referred to as the "treatment effect", is the observed difference in terms of standard deviation units rather than raw scores. According to Hassard (1991), a "small" TTE is 0.25, a medium TTE is 0.50 and a large TTE is 0.75.

gender. The clinical significance of this effect, an increase in raw scores of about 5 points immediately and 3 to 4 points over ten days, may be shown by a comparison to my previous research findings (Martens and Young, 1997). The difference in Breastfeeding Belief scores between women who intended to breastfeed and intended to bottle feed was about 5 points (41.1 versus 35.3; $t=3.1$, 34 df, $p=0.0038$). Similarly the difference in scores between women who actually breastfed their babies and those who actually bottle fed was also about 5 points (40.9 versus 35.7; $t=2.6$, 34 df, $p=0.01$), with differences from 2.4 for short-term (1 month or less) to 8.5 for longer-term (greater than one month) breastfeeding compared to those choosing to bottle feed. So a one-class breastfeeding educational module resulted in change which could possibly be associated with eventual increases in community breastfeeding initiation rates.

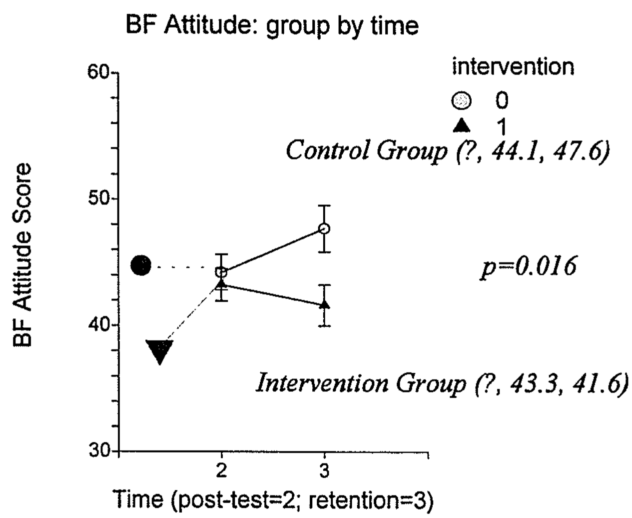
Because of the randomized nature of the educational evaluation, causal effects may be attributed. So the educational intervention caused a statistically and clinically significant positive increase in knowledge (beliefs) for both males and females concerning the benefits of breastfeeding. Joffe and Radius (1987) noted the importance of accentuating the positive messages about breastfeeding since positive attitudes were more predictive of intent to breastfeed than were perceived barriers. And this aspect, the positive aspects of breastfeeding, showed the most pronounced effects of learning.

The learning effects of "Bottle Feeding Beliefs" were as a result of inference rather than direct teaching. Emphasizing the benefits of breastfeeding did not necessarily teach the "deficits" of bottle feeding except through inference. The deficits of bottle feeding was not intended as a focus of the educational intervention, and was not included in the educational objectives for the session (see Table 5.1.). The learning which occurred over time, as indicated by a decrease in Bottle Feeding Belief scores (and thus a greater awareness of the negative aspects of bottle feeding), was not associated with a group assignment. Although there was a small decrease of about 2 to 3 points experienced by both groups on the day of the session and up to ten days later (true treatment effects 0.26 at post-test, NS; and 0.39 at retention test, p=0.03), the decrease over ten days was most differentiated by gender. Females seemed to "react" to the retesting of the Bottle Feeding Beliefs tool, showing a large decrease in scores (true treatment effect 0.77, raw score 7.7) in the control group females and a medium effect (true treatment effect 0.44, raw score 3.1) in the intervention group females. The effect of decreasing scores was both statistically and clinically significant. In my previous research (Martens, 1994), women who breastfed their babies had third-trimester "Bottle Feeding Belief" scores about 4 points lower than those who eventually bottle fed their babies (24.0 versus 28.1; t=2.3, 34 df, p=0.03). The question arises as to why those females in the control group experienced a true treatment effect almost double that of the females in the intervention group. This may have been influenced by differences in the educational sessions experienced by the control and intervention groups.

The most difficult test score to understand was the "Breastfeeding Attitude" score. This was due to the fact that the pretest attitude scores were not included. In retrospect, it would have been less frustrating to have had these pretest scores, even though reactivity was a possibility. The reactivity was estimated through the reliability study, and through the retesting of the control group before the session, so its effect could have been quantified. For the post-test only comparison of the intervention and control group, no differences were seen. Differences were only evident at the retention test, where the control group scores increased significantly (0.55 true treatment effect, 3.5 points raw score) after receiving the session. In the same interval, the intervention group score did not differ significantly (-0.27 true treatment effect, -1.7 raw score decrease, NS).

At least three hypothetical situations could be occurring to produce the observed results in the Breastfeeding Attitude scores. First, the groups could have had significantly different attitudes before the intervention even took place. Assuming that the intervention group would have scored much lower than the control group if a pretest had been done (see Figure 5.9), then the pattern of scores would have appeared in the typical pattern of learning occurring after the educational session was received.

Figure 5.9. #1 hypothesized "pretest" Breastfeeding Attitude scores of the intervention and control groups

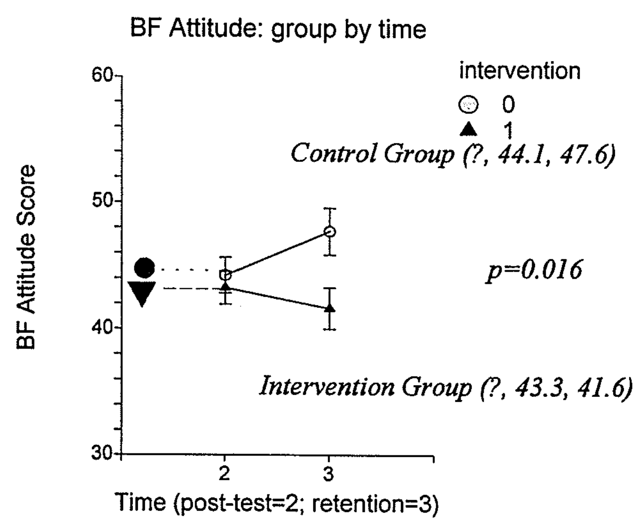


This hypothesis is strengthened by the personal demographics and the beliefs scores of the students in each group (see Table 5.4. and Table 5.5.). It is known that students who have been breastfed, and who have had more exposure to breastfeeding mothers, have more positive attitudes about breastfeeding (Pascoe, 1982; Cusson, 1985; Gregg, 1989). In the current research, almost twice as many students in the intervention group chose "not breastfed as a child" (32% versus 17%), and less identified themselves as "breastfed" (23% vs. 30%). This may indicate less nuclear family/extended family exposure to breastfeeding, so the intervention group may have had less positive attitudes about breastfeeding prior to the educational sessions. The mean pretest Breastfeeding Belief score of the intervention group was also lower than those of the control group, and females of the intervention group scored over 4 points lower in the pretest when compared with females in the control group. The Bottle Feeding Belief scores of the intervention group were either similar or higher than those in the control group, indicating more positive beliefs about bottle feeding. Comparison of the Breastfeeding Attitude scores is very limited due to the fact that the first attitude test was given *after* the intervention group and *before* the control group received the session. Even then, the student scores used for the "complete" analysis (n=33) indicated higher attitude scores in the control group, especially for the females of the control group (47.0 versus 41.4), as compared to the intervention group. This accumulated information of personal history and beliefs points toward a bias in the experiment, with the control group being more positive towards breastfeeding before any educational session occurred.

A second hypothesis concerning the "Breastfeeding Attitude" scores is that the increase in the control group was only due to reactivity of attitude testing. If this were the case, one would also expect to see an increase in the attitude scores in the intervention group. During the reliability study (Section 5.9.2), a significant increase of about 1.9 points (0.26 true treatment effect) was found. But the increase in the control group (0.55 true treatment effect, or 3.5 points), was almost double the effect of reactivity. The increase was even greater for control group males (0.75 true treatment effect, or 4.4 points).

A third hypothesis is that the educational session for the intervention and control groups differed in such a way that no change in attitude occurred for X, but a positive increase was elicited in C. This is diagrammed in Figure 5.10., with the intervention group maintaining their scores and the control group increasing their scores after receiving the session. So a difference between the two educational sessions could have resulted in different treatment effects by group.

Figure 5.10. #2 hypothesized "pretest" Breastfeeding Attitude scores of the intervention and control groups



Knowing that the peer counsellor was less nervous during the second (control) session, the session was later in the day, and the Peer Counsellor's baby was present and breastfed during the session, it was not surprising to find that the magnitude of the treatment effect over the ten-day period was greater for the control group than for the intervention group for the Breastfeeding Belief scores. It may also help to explain why only the control group experienced a large increase in Breastfeeding Attitude scores, if Figure 5.10. was the correct hypothesis. Despite the limitations of the first session, there was still a measurable and significant amount of learning for the intervention group, both immediately and ten days later. This is comforting to future educational planners, in that the video and booklet plus the presence of a breastfeeding woman was enough to elicit a positive learning environment, and a "polished presenter" is not necessarily required.

Female students showed a consistent pattern in the hypothesized directions - a large increase in Breastfeeding Beliefs (true treatment effect 1.12), a large decrease in Bottle Feeding Beliefs (true treatment effect 0.77, with 1.1 for females in C and 0.44 for females in X), and a small to medium increase in Breastfeeding Attitudes (true treatment effect of 0.34 in X, 0.49 in C) from pretest to retention test. In contrast, the male students showed no increase in Breastfeeding Beliefs (0.12 true treatment effect, NS), no decrease in Bottle Feeding Beliefs (0.10 true treatment effect, NS), and inconsistent results in Breastfeeding Attitudes (0.88 decrease for males in X, 0.75 increase for males in C). The fact that female students demonstrated larger treatment effects may be due to a greater interest in a topic which has been traditionally defined as a "female area of interest". It was possibly a difficult setting for the male students, with a "female" topic, a female speaker, and a seating arrangement where all their friends were at their table. They could have been hesitant to show any interest, or to put down valid answers for the surveys.

The learning by male students may have been greater than that detected by the scores. The community health nurse told me that one of the women in Sagkeeng was pregnant with her first child, and her nephew, a student who had attended the educational sessions, was encouraging her to breastfeed and listed many benefits. Another story was shared during my interview with the Peer Counsellor:

> "I was speaking to a lady I was interviewing up the river here and her boy is around twelve, thirteen. He came home and he says 'Oh yah I learned about breastfeeding. It was really good, very interesting.' [really] And he says she nursed right there, right in front of everybody, you know. [So you made a real impression on him.] Yah, and the mother was saying that that was an excellent idea and that we should do it more often and actually teach even, even classes about conception and birth, and teach that at junior high level because there's a lot of teenage girls getting pregnant. So she thinks it would be an excellent idea if I went beyond breastfeeding and went down to the birth, the conception part of it. [So she was comfortable with the idea that we had included the boys even though sometimes you think that it should just be a girl's education?] Ya she says it's good, it's good to learn. It's good to teach the boys because they're going to be fathers you know, future fathers. And they should know about breastfeeding and that it's natural..." (lines 6050-6073)

In the analysis of items from the survey tools, statements which showed change or "learning" from pretest to post-test could be classified into themes: physical health of mother and baby, emotional health, convenience, cost, embarrassment, and encouragement of breastfeeding. Table 5.7. summarizes these themes and the corresponding items. A comparison of the themes with the learning objectives of the session in Table 5.1. indicates that observable change corresponded to planned objectives.

Table 5.7. Themes of the Breastfeeding Beliefs, Bottle Feeding Beliefs, and Breastfeeding Attitudes items which changed significantly from pretest to retention test†

Theme	Breastfeeding Belief items	Bottle Feeding Belief items	Breastfeeding Attitude items
physical health	-provides the best food for a baby *helps a mother regain her figure -breastfed babies are healthier	-bottle fed babies are not healthier	-breastfeeding is a good thing for babies (females)
emotional health	-babies enjoy breastfeeding -makes a mother and her baby develop close feelings (* for females) -makes a mother feel good about herself		
convenience	-allows a mother to go places and do things outside the home easily -saves time for the mother (* for females) -allows a mother to get more sleep	-less convenient -does not save time for the mother	
cost		-bottle feeding costs very much money	
encouragement of breastfeeding			*women should be encouraged to breastfeed their babies -I would encourage my friends to breastfeed their babies -breastfeeding is fashionable
embarrassment issues			-I would not be embarrassed if I saw a woman breastfeeding her baby -it's okay for women to breastfeed if there are other women in the room (females)

†the statements have a hyphen (-) in front of them if they are significantly different from pretest to posttest at the $p<0.05$ level. If they reach significance at the Bonferroni correction level of $p<0.004$, a * indicates this preceding the statement

5.6.2. Other limitations and strengths of the data

The pretest - post-test control group design, and post-test only control group design control for threats to internal validity which include: testing, maturation, history (unless there was a unique intra-session history), instrumentation, selection if randomization assured equality of groups, and regression (Campbell and Stanley, 1963). The two sessions were planned to be identical, but as explained earlier, there may have been a threat to internal validity in the form of "history" due to a few unique circumstances in the educational sessions.

There may also have been threats in the form of "selection" bias, with the control group showing possible bias to more positive breastfeeding beliefs and attitudes. So the slightly greater treatment effects in the control group may be due to pre-intervention beliefs/attitude differences, or to the different intra-session history. Despite these limitations, the pattern of learning which occurred over the pre- to post-test period demonstrated the effectiveness of the educational session in increasing the Breastfeeding Beliefs scores of the students, especially the female students.

One can view the post-test to retention test time period as another separate experiment, with the control group now receiving the session and the intervention group acting as a control. The increased Breastfeeding Attitude scores for the group receiving the instruction, compared to the stable scores for the other group (see Figure 5.7.), could strengthen the claim of a causal relationship between the session and the learning effect.

However, there may be threats to external validity. An interaction of testing and X, where the pretest "sensitizes" the subjects, may be a competing hypothesis for the outcomes observed. The testing itself had small degrees of reactivity, since there was very little difference in scores observed over testing periods where no session was given. But the greater treatment effects in the control group may be an artifact of receiving two "beliefs" tests and one "attitude" test prior to the educational session. In contrast, the intervention group only received one measure of beliefs and no measure of attitudes before the educational session. The control group may have been more "sensitized" to hearing the educational messages due to greater testing prior to the session, and hence exhibited greater learning effects.

There may also have been a degree of reactivity, where the subjects knew that they were participating in research and therefore may have problem-solved differently than in a more "natural" setting. This could be a likely possibility, since the ethical requirements of research required full disclosure of the educational intervention and the students were aware of the topic. On the other hand, school interventions are fairly common, and the students may not react any differently to a future "special" session with an "outside" speaker when not involved in a research setting.

The fairly low response rate (63%) of "useable" results, indicates a possible bias in selecting those students who attend school more regularly. This may produce greater learning effects than in the general population of Sagkeeng adolescents.
Comparing age, grade and gender of those whose results were used (n=48) with those whose results were not used (n=28), there were no significant differences. Those students whose results were used in analysis tended to be slightly younger (13.2 vs. 13.6 years, p=0.07, NS), less likely to be in Grade 7 (52% vs. 71%, p=0.10, NS), and less likely to be

male (48% vs. 61%, p=0.28, NS). Gender was taken into account during the analysis, but the fact that the useable results were from students who were younger yet in Grade 8 indicates that these students could have been more motivated to stay in school and less likely to have been "held back" in school. So the external validity of this research would be narrowed to the students who are attending school on a regular basis.

5.6.3. Comparison of findings with the literature

In the only intervention recorded in the literature, Friel et al. (1989) found no effect in knowledge, and a small but significant 3% increase in attitude scores for Newfoundland female adolescents experiencing an advertisement campaign. In the present study, the overall effects of the breastfeeding education class were gender-specific, with male beliefs and attitude scores staying somewhat stable, but female Breastfeeding Belief scores increasing significantly by 16% from pretest to retention tests, female Bottle Feeding Belief scores decreasing significantly by 15%, and female Breastfeeding Attitude scores increased significantly by 6%. So a more directed educational intervention through the school curriculum resulted in larger increases over time, and changes in both knowledge and attitude.

Around 60% (±11%) of the Sagkeeng students intended to breastfeed their children, which was in the "high" range of the 40-50% results from Canada, USA and Britain (Friel et al., 1989; Pascoe and Berger, 1985; Cusson, 1985; Purtell, 1994). In the Sagkeeng Junior High School, around 30% of the students reported being breastfed as children (see Table 5.4), similar to other North American reports (Friel et al., 1989;

Berger and Winter, 1980; Pascoe and Berger, 1985; Purtell, 1994; Forrester et al., 1997; Ellis, 1983). As reported in Chapter 1, breastfeeding rates have been lower in Sagkeeng (40%) than in the general Canadian population (80%), and student reports seem accurate. Knowing this, it was surprising to see about 2/3 of the students indicating a desire to breastfeed their children, with only about 5% indicating a definite "bottle feeding" choice.

About 68% of Sagkeeng students agreed or strongly agreed with incorporating breastfeeding education in the curriculum, which is similar to the findings of USA students at 62% (Pascoe and Berger, 1985). Assuming that some of the 26% of students choosing the "neutral" position may have chosen "yes" in a dichotomous yes/no question, the percentage of students in favour of including breastfeeding education in the curriculum could be as high as the reported 94% of British students (Purtell, 1994).

Deficits in breastfeeding knowledge and negative breastfeeding attitudes of adolescents were noted in the literature (see Chapter 2). Sagkeeng students did indicate some deficits in knowledge, with overall Breastfeeding Belief pretest scores at 42.7 (SD 5.7) and retention scores at 45.8 (SD 6.2) out of a possible score of 60. To compare the Breastfeeding Belief scores with previously recorded scores of Sagkeeng prenatal clients interviewed in 1994, a transformation of the data was required. Only the first 10 items of the 12-item tool used in the school study were used in the prenatal client study. So the "revised Breastfeeding Belief" scores of the adolescents were: pretest 35.6 (SD 5.3), and retention test 38.4 (SD 5.4). The belief scores for the adolescents were comparable to those of prenatal women interviewed in 1994, where the mean was 37.5 (Martens, 1994), and 40.9 (SD 5.4) for those who chose to breastfeed.

The greatest perceived barrier to breastfeeding was cited as being "embarrassment" in several previous studies (Friel et al., 1989; Ellis, 1983; Forrester et al., 1997; Gregg, 1989). In the Sagkeeng School research, the statement "It's okay for women to breastfeed in a public place" had a mean of 3.5 (SD 1.0) and a median retention test score of 3, indicating a neutral response of "neither agree nor disagree". This was the lowest score of the individual statements comprising the Breastfeeding Attitude variable, and hints at a feeling of uncertainty or a negative reaction by the students which is similar to the literature review findings. Females rated this higher than males (3.8 versus 3.3 mean scores, p=0.2, NS), though not statistically different. This is in contrast to the finding of Forrester et al. (1997), where males were more supportive of breastfeeding in public than females. But Forrester's population was older, including USA high school and college students. Of greater importance in the findings of the current research (see Table 5.7.) was the fact that feelings of embarrassment could possibly be overcome through adolescent breastfeeding education. By direct teaching, students were more aware of the positive benefits of breastfeeding, including physical health, emotional health, convenience, and economic benefits. Simultaneously, the survey indicated a concurrent "learning effect" which implied less embarrassment about breastfeeding in public, and more willingness to support people in their breastfeeding choices.

5.7. Summary and policy recommendations

Despite the minor nature of the educational session, involving only one class period of 50 minutes in length, the learning effects were significant over a ten-day retention time. The greatest learning occurred in the area of "benefits" of breastfeeding, as indicated in the Breastfeeding Belief scores. This increase in students' breastfeeding knowledge was clinically important, since the magnitude of the treatment effect was also similar to the difference between women who intended to breastfeed or bottle feed, and women who actually breastfed their infants or did not (Martens, 1994). There may have been indications in increased positive attitudes about breastfeeding, but this was dependent upon the group assignment, and possibly due to differences in the learning environment or in attitudes prior to the sessions.

The magnitude of learning effects was gender-dependent. Female learning patterns supported the original hypotheses - large increase in Breastfeeding Beliefs, large decrease in Bottle Feeding Beliefs, and small to medium increase in Breastfeeding Attitude. The males showed little or inconsistent learning effect in beliefs or in attitudes, with the possible exception of the "control group" male Breastfeeding Attitude scores. The educational format needs revision to be more effective for male students. This may have been an artifact of the educational session format, where the male students were sitting with their friends and were situated at the back of the classroom. If the regular teacher were doing the session along with invited guests, then the student atmosphere may be less distracting. If there were a male speaker in person, the males may respond with increased learning.

In a community where respiratory infection, ear aches, diarrhoea and early onset Type II diabetes are child health problems, breastfeeding may possibly help lessen the pediatric illness burden as more women choose to breastfeed their babies. Creating positive adolescent breastfeeding beliefs and attitudes may also help the community be more "breastfeeding supportive". This, in turn, may lead to increased initiation and duration rates for breastfeeding, which could lead to increased role-modelling within the community, and further increases in positive breastfeeding attitudes and beliefs.

Recommendations:

- that the curriculum for Grades 7 or 8 include a breastfeeding education class
- that this session include the Sagkeeng video and booklet
- that the session include both male and female students
- that the peer counsellor of Sagkeeng be included in the sessions, and that a breastfeeding baby be one of the "guests"
- that the spouse of the peer counsellor or the spouse of a breastfeeding woman also speak, so that male students have an in-person male role model
- that further research of a qualitative nature with adolescent male students be done to understand what breastfeeding information they would find interesting and informative and what format would appeal to them

Chapter 6: Pine Falls Health Complex Policy and Practice Intervention

6.1. Introduction

This chapter discusses the evaluation of the Pine Falls Health Complex educational intervention strategy in 1997. Program effectiveness measures included changes in the WHO/UNICEF "BFHI", or Baby-Friendly Hospital Initiative (Marmet, 1993) criteria, changes in the beliefs and attitudes of the nursing staff, and changes in practice as noted in a chart audit. The chart audit measured in-hospital breastfeeding initiation rates, frequency and timing of breastfeeds, supplementation rates and amounts of supplements of breastfed babies, and documentation of breastfeeding technique. Measures were compared to a control site hospital, using a quasi-experimental pretest - post-test design.

6.2. The hypothesis

In comparison with a control hospital, there will be differences in hospital policy and practice of Pine Falls Health Complex before and after the educational intervention:

- there will be an increase in compliance with BFHI criteria
- there will be an increase in staff breastfeeding belief and attitude scores
- in the chart audits, there will be an increase in proportion of mothers initiating breastfeeding, initiating breastfeeding within the first hour after birth, and exclusively breastfeeding while in hospital, and an increase in proportion of charts with documentation of breastfeeding technique

6.3. The Pine Falls Health Complex intervention: background and description

Pine Falls Health Complex is located in a small rural town adjacent to Sagkeeng First Nation community. This hospital provides the only maternity service (besides emergent service) of the North-East Health Region of Manitoba, but many Pine Falls and Sagkeeng residents drive at least one hour to hospitals outside the region (Selkirk Hospital or Winnipeg hospitals) to give birth. Contrary to the experience of women in remote and northern First Nations communities, women in Sagkeeng have free choice as to their physician and their maternity hospital, and women are not evacuated from their community prior to delivery.

In 1997, Pine Falls Health Complex recorded 34 births, slightly lower than the expected birth rate of about 40 to 50 per year[1]. Hospital staff note that the number of women giving birth in Pine Falls varies as to the availability of physicians willing to do obstetrics. Typical of rural communities, physician turnover rates in Pine Falls are high. The majority of maternity clients are First Nations women, with at least three First Nations communities (Sagkeeng, Hollow Water, Little Black River) within driving distance of the hospital. In my 1994 research, 25% of Sagkeeng women gave birth at Pine Falls Health Complex, which could possibly represent almost half of the annual births within the facility. Therefore, breastfeeding-supportive policy and practices within the hospital could affect the women of Sagkeeng, and could be a model for other rural maternity facilities in the province. In the 1994 survey, 50% of Sagkeeng women giving birth in Pine Falls Health Complex initiated breastfeeding, compared to 58% in Winnipeg

[1] This information was supplied by the Pine Falls Health Complex Records Department

facilities, but this was not statistically significant due to the confidence limits of these percentages being about ± 20%. Average maternal age also did not differ by site of maternity services (22.5 years Winnipeg, versus 24.0 years Pine Falls; p=0.67, NS).

Discussions with the Sagkeeng Health Centre nurses, a Sagkeeng resident who works as a staff nurse in Pine Falls, and the Sagkeeng Peer Counsellor pointed to the need for hospital staff education on breastfeeding, especially in the practice of supplementation of breastfed babies. Information from national and provincial surveys of maternity hospitals (Levitt et al., 1995; Breastfeeding Promotion Steering Committee of Manitoba, 1998) verified the need for education within the hospitals of Manitoba (see Appendix 8). The Pine Falls Health Complex administrator and board of directors was supportive of staff breastfeeding education, and wished to cooperate in an educational strategy.

The educational strategy on breastfeeding-supportive policy/practice was comprised of a 1½ hour staff session, followed by the completion of an optional educational manual to be done by the individual staff members over the following month. Table 6.1. includes the objectives of the intervention session and self-paced manual. In order to evaluate program effectiveness, comparisons were made to a suitable control site. Arborg & Districts Health Centre is a small rural hospital which also provides service to First Nations clients, has a similar annual birth rate, and is about the same distance (150 km) from the major urban centre of Winnipeg. Pre- and post-intervention measures in both the Pine Falls Health Complex and Arborg & Districts Health Centre included hospital staff pretest and post-test questionnaires, and retrospective chart audits. The pretests were done in June 1997, just prior to the inservice sessions at Pine Falls.

Table 6.1. Objectives of the Pine Falls Health Complex inservice and self-paced manual

Objectives of inservice	After receiving the 1 ½ hour Inservice, the participant will be able to: 1. Discuss importance of hospital nurse informing clients of breastfeeding benefits 2. Be aware of the way in which babies show signs of initiation of breastfeeding in the first 90 minutes after birth 3. Teach clients how to breastfeed in the early days (normal voiding patterns, normal feeding patterns, managing engorgement, positioning, managing soreness) and how to maintain lactation if the infant is not able to breastfeed 4. Document the breastfeeding technique using the SAIB tool. 5. Identify appropriate and non-appropriate reasons for supplementation of full-term, healthy breastfed babies. 6. Identify the problems of artificial nipples in the early days of breastfeeding, and alternatives if supplementation is required. 7. Refer clients to an appropriate breastfeeding support person or group 8. Explain why the giving of free samples of formula is inappropriate. 9. Discuss the BFHI Criteria (Ten Steps and WHO Code)
Objectives of self-paced manual	After completing the self-paced Teaching Manual, the participant will be able to: 1. List four facts about breastfeeding which a maternity nurse may share with a client. 2. Describe the contents of the booklet, So You Want a Healthy Baby. 3. Use the Breastfeeding Answer Book to investigate one area of breastfeeding teaching. List all possible factors which may contribute to this breastfeeding problem. 4. Critique the existing hospital policy 5. Be familiar with the contents of the BC Baby-Friendly Initiative book and how this could be useful to the facility. 6. Be able to quote two research articles which relate to the "Ten Steps to Successful Breastfeeding" or to the "WHO Code of the Marketing of Breastmilk Substitutes".

The post-tests were distributed in January 1998, and chart auditing at both sites took place in February 1998.

During the year-long research process, the political climate in hospital facilities was stressful. Provincial regionalization of health care, and the creation of regional rather than institutional boards of directors, caused uncertainty within the health care profession. Calls for increased funding and decreased workloads persisted, and the atmosphere was not conducive to asking staff to do any additional work outside their realm of essential services. During the week when the research results were to be mailed, the nursing staff of Pine Falls went on a "one-hour" strike, which was covered by the news media throughout Manitoba. The staff requested that the Minister of Health recognize the increased work load and decreased quality of patient care. I decided to delay release of the results by an additional two weeks, since I felt it was inappropriate to disseminate research results that demonstrated an increase in the quality of care of maternity clients.

After completion of the research, the control hospital was given the option of a similar intervention. The hospital scheduled it for January 1999 as an *optional* but paid activity, unlike the mandated inservicing at Pine Falls. The session was attended by ten persons, but only four were hospital staff with the rest being public health nurses.

6.4. Evaluation of the hospital intervention: design and methods

6.4.1. Research design

The quasi-experimental designs used to evaluate the effectiveness of a hospital intervention were two triangulated measures - staff surveys and chart audits.

The staff survey results were linked by person, so the same sample and the same survey measures were given at the same time periods at both sites.

Pine Falls	O_1	X	O_1	
Control Hospital	O_1		O_1	(received X afterward)

The staff survey measured BFHI Compliance, Breastfeeding Beliefs, Bottle Feeding Beliefs, Breastfeeding Attitudes, and some basic knowledge regarding breastfeeding management in the first three days after birth. The pretest was completed just before the intervention began in Pine Falls Health Complex, in June 1997. The post-test was distributed seven months after the inservice (January, 1998). This quasi-experimental repeated measures design controls for all threats to internal validity except regression, and the interaction of selection and maturation. The more similar the groups on pretest measures, the more one could assume that internal validity would not be compromised (Campbell and Stanley, 1963:48, 50).

The second measure of effectiveness consisted of chart audits of maternity clients. The chart audit design was a quasi-experimental design, but had separate and presumably random samples of maternity clients for the pretest and post-test measures, selected only by the date of birth (Campbell and Stanley, 1963:55).

Pine Falls	R	O_2		
	R		X	O_2
Control	R	O_2		
	R			O_2

Charts were audited retrospectively eight months after the Pine Falls educational sessions (February, 1998), and after the staff post-tests were distributed to avoid staff reactivity to chart auditing. This included all maternity charts for about six months before and six months after the June 1997 inservice, except in the case of Arborg. Due to lack of physician services after September 1997, there were no more Arborg client charts from this point up to the end of data collection. Chart auditing included obstetric and demographic information, and information about infant feedings while in hospital (see Appendix 12). This quasi-experimental design is strong, controlling for all threats to validity except the interaction of selection with maturity (Campbell and Stanley, 1963).

6.4.2. Statistical design

The hospital staff survey involved pretests and post-tests of the same sample linked through identifiers. The pretest and post-test outcomes from the survey tools (BFHI Compliance, Breastfeeding Beliefs, Bottle Feeding Beliefs, and Breastfeeding Attitude scores) were analysed using a repeated measures (split-unit) analysis of variance, with the explanatory variables being "group" (intervention or control), "time" (before or after the intervention), and the interaction of "group by time". Further subsection testing of any tool used a Bonferroni correction factor, which stiffens the criteria for accepting a statistical difference by 0.05/n, where n is the number of statistical tests performed.

For the hospital chart audits, before- and after-intervention quantitative measures were analysed using multi-way analysis of variance and multiple regression for interval data. Mantel-Haenszel Chi-squared tests, Fisher's exact tests, and logistic regression was used to analyzed differences in proportions. Outcome measures included number and volume of supplements per day, frequency of breastfeeds, time to first breastfeed, and documentation of breastfeeding technique. Explanatory variables included site (control or intervention), time (before or after the intervention), the interaction of site by time, and when possible, other explanatory variables that may have confounded the outcome, such as parity and infant birth weight. All data was screened prior to analysis for outliers, and for necessary transformations. Any data that did not conform to assumptions of normality was tested using appropriate non-parametric techniques.

6.4.3. Instrumentation

For evaluating the effect of the intervention on compliance with WHO/UNICEF recommended maternity policies and practices, the staff surveys included a "BFHI Compliance Tool" (see Appendix 12). This was compiled using several sources: a Manitoba provincial survey of maternity hospitals (Breastfeeding Promotion Steering Committee of Manitoba, 1998); two WHO/UNICEF appraisal tools for assessors (WHO/UNICEF, 1992; U.S. Committee for UNICEF Interim Activities in the United States, 1993); and a BFHI compliance tool by Kovach (1996). The Manitoba survey was tested for content validity by experts, and through pilot testing in Brandon General Hospital and Norway House Hospital. No formal reliability assessment was done. The only literature-based assessment tool for BFHI compliance (Kovach, 1996) was designed for major urban hospitals and used to predict scores for 38 sites, but there was no formal test for reliability.

For the purposes of this research, I designed the "BFHI Compliance Tool" (Appendix 12) to be applicable to *small rural hospitals* where the staff do multiple tasks, and where Cesarian births and premature births are emergent-only. Criterion-related concurrent validity was assessed after the research project, where the staff survey responses were compared to information from chart audits. Construct validity was based on the framework of the BFHI Criteria, so that each construct of the "Ten Steps to Successful Breastfeeding" and "WHO Code of the Marketing of Breastmilk Substitutes" (see Appendix 7) had corresponding operationalized measures of two or three items, weighted as "four" in the total score of 44 (four points for each of the 11 constructs).

Staff Breastfeeding Beliefs and Bottle Feeding Beliefs tools were based on the Breastfeeding Beliefs and Bottle Feeding Beliefs tools in my Masters research, with minor changes (Martens, 1994; Martens and Young, 1997). The original tools were assessed for content validity, and demonstrated predictive validity for breastfeeding decisions when used with First Nations women in their third trimester of pregnancy (see Chapter 3). Because the population using the tool differed, content validity and reliability (test - retest) were reassessed prior to the present research. The Breastfeeding Attitude tool was similar to that used in the Sagkeeng Junior High School intervention (see Chapter 5). See Table 6.2. for the items in each survey tool.

Prior to use, the four tools - BFHI Compliance, Breastfeeding Beliefs, Bottle Feeding Beliefs, and Breastfeeding Attitudes - were assessed for content validity and reliability (test - retest over one week) by staff members at Bethesda Health & Social Services District Hospital, in rural southern Manitoba (Steinbach). For the reliability study, 10 nurses completed the pretest, and 9 nurses completed the identical test one week later. Because of the non-significant differences in paired t-test results, and the highly significant Pearson's correlation coefficients ($r \geq 0.91$), it was assumed that the survey tools were reliable over a one-week period of time (see Table 6.3.). For the three tools, "Breastfeeding Beliefs", "Bottle Feeding Beliefs", and "Breastfeeding Attitude", the summation of the Likert-scale responses to individual questions yielded the "score" of each latent variable. To test for internal consistency of these tools, Cronbach's Alpha scores were determined. The value of Cronbach's alpha considered acceptable in order to demonstrate internal consistency is at least 0.70. , and a score of at least 0.80 is preferable

(Spector, 1992:32; Carmines and Zeller, 1979). The reliability study results yielded Cronbach's Alpha scores for Breastfeeding Beliefs, Bottle Feeding Beliefs and Breastfeeding Attitude tools of 0.92, 0.92 and 0.95 respectively. For the actual research using both hospital sites' data, the Cronbach's Alpha scores were 0.84, 0.86 and 0.89 respectively. These tools were assumed to demonstrate acceptable internal consistency reliability. This test was not used to analyze the BFHI Compliance score, since this was a compilation of questions which were designed to measure 11 different constructs corresponding to the 11 different criteria for Baby Friendly Hospital designation.

The survey tools were also assessed for content validity by each of the ten staff members, and changes were made according to the written comments. Four of the statements in the "beliefs" sections were originally phrased "It's good for women to breastfeed if they _". This was changed to read, "It's *advisable* for women to breastfeed if they _". The original attitude tool phrased the first two questions, "... a good thing for mothers/babies." This was changed to "... a good thing for *most* mothers/babies." In the attitude item, "I would be comfortable if I saw a woman breastfeeding her baby in a public place", one word was inserted to read "I would be comfortable if I saw a woman *confidently* breastfeeding her baby in a public place."

The chart audits (Appendix 12) were completed by one hospital staff nurse at each site. Each staff nurse was trained by myself, to ensure inter-rater reliability. The abstracted information was assessed for intra-rater reliability by comparing information abstracted a second time from a random 20% sample (8/41 in Pine Falls, 7/34 in Arborg). At the time of re-audit, the auditors did not have access to the original chart audit results.

Table 6.2. Quantitative survey tools, and individual items, used in the hospital research

Breastfeeding Beliefs or Bottle Feeding* Beliefs Score	Breastfeeding Attitude Score
Rated on 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), summed for composite score. Possible range: 14 to 70 (*interchange the word "bottle feeding" for breastfeeding)	Rated on a 5-point Likert scale (1 =strongly disagree, 5 = strongly agree), summed for composite score. Possible range: 11 to 55
1. Breastfeeding [bottle feeding] helps a mother and her baby develop close feelings	1. Breastfeeding is a good thing for most mothers
2. Breastfeeding is the most natural way to feed a baby	2. Breastfeeding is a good thing for most babies
3. Breastfeeding is convenient	3. Breastfeeding the baby is a good thing for the male partner
4. Breastfeeding provides the best food for a baby	4. It's okay for women to breastfeed if there are other women in the room
5. Breastfeeding saves time for the mother	5. It's okay for women to breastfeed if there are men in the room
6. Breastfeeding makes a mother feel good about herself	6. It's okay for women to breastfeed in a public place
7. Breastfeeding helps a mother regain her figure	7. Women who are uncertain should be encouraged by our staff to breastfeed their babies
8. Breastfed babies are healthier	8. I would encourage my own friends to breastfeed their babies
9. Breastfeeding allows a mother to go places and do things outside the home easily	9. I would be comfortable (not embarrassed) if I saw a woman confidently breastfeeding her baby in a public place
10. Breastfeeding would not cost very much money	10. Women who initially choose to bottlefeed should be informed about the benefits of breastfeeding
★11. It's advisable for women to breastfeed if they smoke	11. There are real differences in health between babies who are breastfed and babies who are bottlefed
★12. It's advisable for women to breastfeed if they drink alcohol once in a while	
★13. It's advisable for women to breastfeed if they have diabetes	
★14. It's advisable for women to breastfeed if they eat a lot of "junk" foods	

★these items were added to the original Breastfeeding Beliefs [Bottle Feeding Beliefs] tool from Martens, 1994

Table 6.3. Reliability study of the nursing staff surveys (one week test-retest)

Instrument (range of scores possible, with statements rated on 5-point Likert Scales)	Pretest mean (SD) n=10	Post-test mean (SD) n=9	Difference of pre- and post-test: two-tailed paired t-test p-value NS=not significant	correlation coefficient, pretest and post-test Pearson's correlation (p-value)
BFHI Compliance Score (0 to 44)	32.4 (4.4)	33.8 (4.9)	p=0.07, NS	r=0.91 (p=0.0007)
Breastfeeding Belief (13 to 65)†	57.6 (7.4)	58.8 (7.1)	p=0.16, NS	r=0.95 (p=0.0001)
Bottle Feeding Belief (13 to 65)†	29.6 (8.7)	30.2 (9.7)	p=0.46, NS	r=0.97 (p=0.0002)
Breastfeeding Attitude (11 to 55)	45.3 (8.1)	46.9 (6.5)	p=0.10, NS	r=0.96 (p=0.00003)

†in the pretest version, one item was missing from the Breastfeeding Beliefs and Bottle Feeding Beliefs tools that was later used in the research version. So the range of possible scores for this section was 13 to 65. The research version range was 14 to 70.

In the basic information extracted from the charts, there was 98.7% reliability between the original and the re-audited charts. Out of the 17 variables in the 15 charts (255 entries), only 3 results did not match. This basic information included place of birth, timing (pre- or post-test), parity, gender of infant, type of delivery, medication required during labour/delivery, whether breastfeeding was initiated, whether breastfeeding was exclusive or supplemented, whether the charts documented breastfeeding technique adequately, the date of birth and of discharge including day, month and year, the type of supplement given, and the infant's birth weight.

In the more difficult sections of the chart audit, more discordance was noted. For the number of supplements given, 4 of the 15 charts did not exactly correspond, but the mean total number of supplements was not significantly different (2.8 first audit, 2.6

second audit; paired t-test t=0.61, 9 df, p=0.56, NS). For total amount of supplement, 3 out of 15 were discordant, but not significantly different (76.5 ml and 83.5 ml; paired t-test t=0.42, 9 df, p=0.69, NS). For the number of breastfeeds during the hospital stay, 3 of 15 were discordant, but a paired t-test indicated that the means were not significantly different (13.4 versus 13.7, t=1.15, 9df, p=0.28). For the timing of the first feed, there was no discordance in the Arborg audits (means 79.4 minutes before, versus 79.4 minutes after), but half of the Pine Falls audits differed substantially, thought not statistically significant due to small sample sizes (117.8 minutes versus 73.8 minutes, p=0.18, NS). The variable "time to first feed" was considered to be unreliable data.

6.4.4. Population and sample considerations

The target population for the staff educational intervention was all nursing staff, including casual, part-time and full-time, who were interacting with clients giving birth in the facility. The sample included all nursing staff of the Pine Falls and Arborg facility who were employed at both the pretest and post-test times, and who agreed to participate in the research. Prior to the research, a target response rate of 80% was proposed. Statistical calculations prior to the research (see Chapter 3) indicated that if 15 staff members took part at each site for the pretest and post-test linked results, assuming a Type I error probability of 0.05, two-tailed testing, and a power of 80%, then the minimum true treatment effect detectable was 0.75.

For the nursing staff survey, 18 out of 19 nurses employed at Arborg & Districts Health Centre, and 20 out of 24 nurses at Pine Falls Health Complex, gave permission for the use of their pretest results for research. Of the 18 in Arborg, 16 (89%) completed the post-test as well. Of the 20 in Pine Falls, 15 (75%) completed the post-test as well. Two reminders were sent out - one was a general reminder to all staff at both sites, and the second was a reminder if their survey had not been received or a thank-you note to those who had returned the survey. All staff members originally enrolled in the research were still available and working in the hospital at the time of the post-test.

Although the response rate at Pine Falls fell short of the projected 80% target, it was credible considering the political climate at the time not being conducive to asking staff to do any additional work outside their realm of essential services.

Eight Pine Falls staff members (one-third of the total staff of 24, or 40% of the 20 agreeing to participate in research) also completed the optional self-paced educational manual in the two months following the June 1997 inservice, receiving a certificate of recognition and a note in their personnel files. A team was also formed to review and update the hospital's breastfeeding policy and protocol statement.

For the medical chart audit, the target population was all women who gave birth in Pine Falls and Arborg hospitals. The sample consisted of the charts of all women giving birth during the 6-month time period before the intervention, and the six-month time period after the intervention, excluding women whose infants were given up for adoption. For the chart audits, assuming a large true treatment effect size of 1 (similar to Nylander et al., 1991), probability of Type I error at 0.05, one-tailed testing, and a power of 80%, the number of charts of *breastfed* babies required for audit would be 13 before the intervention and 13 after at each site. Assuming a 65% initiation rate of breastfeeding in Pine Falls Health Complex, and a birth rate of 34/year, then a 6-month period would yield about 11 chart audits. Therefore, chart audits continued until 13 charts of breastfed babies were audited before the intervention, and 13 after (except at Arborg, where only 9 post-test charts were available due to cessation of maternity services).

In Pine Falls Hospital, 41 charts were originally audited. This included 21 "pretest" (13 breastfed) and 20 "post-test" (13 breastfed) charts. Eight (8) charts were reaudited completely for the reliability check. In Arborg Hospital, 34 charts were originally audited. This included 20 "pretest" (14 breastfed babies, 1 transferred to Winnipeg because of prematurity, thus no indication of feeding status) and 14 "post-test" charts (9 breastfed babies). Seven (7) charts were reaudited completely for the reliability check. In addition to this, 4 charts were also investigated for missing or incomplete data in the original chart audit.

6.5. Results of the hospital nursing staff survey

6.5.1. Test score comparisons of completers and non-completers

Table 6.4. compares the mean pretest results of those who completed the post-test and those who did not. None of the differences were considered statistically significant.

6.5.2. BFHI Compliance Scores

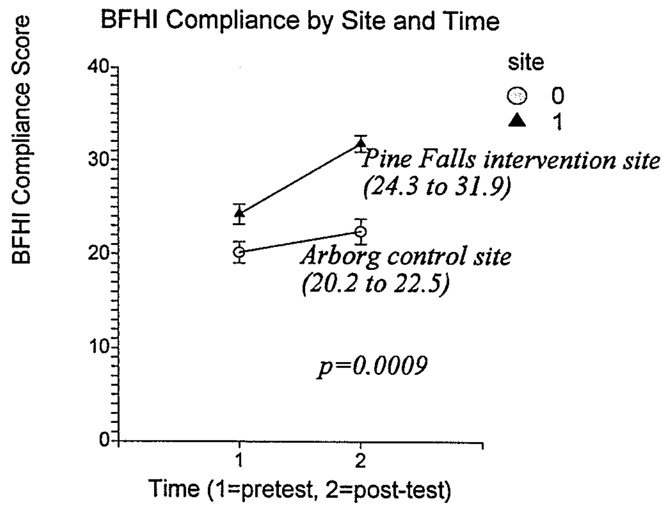
The research results supported the hypothesis that there would be a significant increase in BFHI Compliance scores at the intervention site Pine Falls, compared with the control site Arborg.

Table 6.4. Comparison: pretest scores for those only having a pretest score (non-completers) with those completing pre- and post-test (completers)

Site	Survey tool	Mean Score: Non-completers (SD)	Mean Score: Completers (SD)	Statistical Test Value (t-test)
Pine Falls (n=15 completers, n=5 non-completers)	BFHI Compliance	24.1 (7.0)	24.4 (4.2)	p=0.90
	Breastfeeding Beliefs	48.8 (14.2)	54.8 (6.9)	p=0.21
	Bottle feeding Beliefs	38.6 (8.3)	38.9 (6.1)	p=0.94
	Breastfeeding Attitude	44.8 (8.7)	43.6 (6.1)	p=0.73
Arborg (n=16 completers, n=2 non-completers)	BFHI Compliance	20.2 (0.7)	20.2 (5.1)	p=0.99
	Breastfeeding Beliefs	56.0 (5.6)	54.3 (6.2)	p=0.72
	Bottle feeding Beliefs	36.0 (1.4)	40.1 (8.3)	p=0.51
	Breastfeeding Attitude	48.5 (6.4)	43.9 (5.7)	p=0.30

The interaction effect of "site by time" was significant (p=0.005, split-unit anova, see Appendix 15 for the anova and Tukey's tables), and confirmed by SAS analysis using complete and incomplete data (using multivariate replacement for missing values), and using an unstructured mixed procedure to compensate for intercorrelation of data (site by time interaction p=0.004). There was a statistically significant increase in the BFHI Compliance score at the intervention site (24.4 to 31.9), but not at the control site (20.2 to 22.5). The BFHI Compliance score included measures of 11constructs (the Ten Steps to Successful Breastfeeding statements, WHO Code compliance), with each given a weight of 4 points for a maximum score of 44. An increase of "8" in the Pine Falls BFHI Compliance score translates into increased compliance with two additional policy and practice recommendations of the eleven. Pine Falls also had a significantly higher BFHI Compliance score than Arborg before the intervention occurred (24.4 versus 20.2, $p<0.05$). See Figure 6.1. for results by site over the 7-month interval of time.

Figure 6.1. BFHI Compliance Scores over time by site



A post-hoc analysis of improvement by item used a Bonferroni correction factor for multiple testing ($p \leq 0.002$). Only one item showed a statistically significant increase ($p=0.00046$) over time; "2. Have you been oriented to the breastfeeding policy of the hospital?", with 15% saying "yes" before, and 87% after the intervention. Items showing improvement, but not significant (p-values between 0.004 and 0.009) included:

1. Does your facility have a written policy on breastfeeding? (yes: 40% to 87%)
3. Is the policy based on the WHO/UNICEF "Ten Steps to Successful Breastfeeding"? (yes: 5% to 47%)
9. Do you advise breastfeeding mothers to avoid using bottles during the time that breastfeeding is becoming established (first 3 to 4 weeks)? (always/most of the time: 30% to 67%)
13. Has your facility encouraged the establishment of support groups or persons for breastfeeding mothers in the community? (always/most of the time: 45% to 67%)
18. Does your facility routinely order healthy breastfed babies to receive another liquid other than breastmilk (i.e. water, glucose, formula)? (rarely or never: 45% to 87%)

The items which reflected change in the direction of increased compliance centred around

Steps 1, 6, 9 and 10 of the Ten Steps:

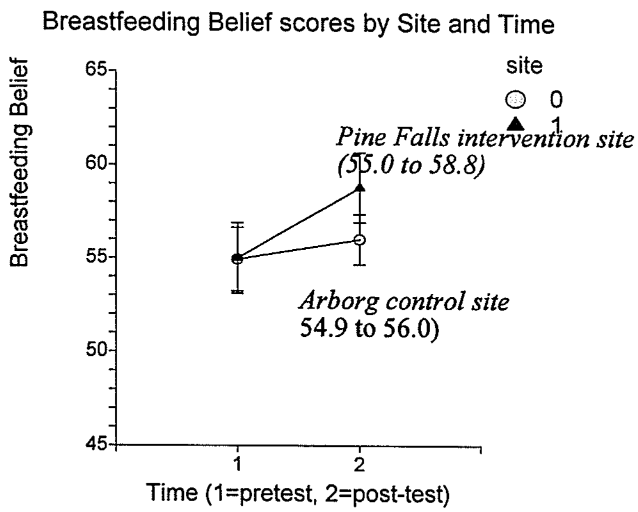
Step 1.	*Have a written breastfeeding policy that is routinely communicated to all health care staff*
Step 6.	*Give newborn infants no food or drink other than breastmilk, unless medically indicated.*
Step 9.	*Give no artificial teats or pacifiers to breastfeeding infants.*
Step 10.	*Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.*

6.5.3. Breastfeeding Belief Scores

The research results supported the hypothesis that there would be an increase in staff Breastfeeding Belief scores at the intervention site, compared to the control site. Similar to the BFHI Compliance scores, the Breastfeeding Belief Scores were analyzed using a split-unit anova (see Appendix 15 for the anova and Tukey's tables), with increased scores over time ($p=0.02$) . Figure 6.2. illustrates the site results over time. Although there was not a statistically significant interaction effect of "site by time" in the NCSS97 analysis ($p=0.19$, NS), or SAS analysis ($p=0.11$), multiple comparison tests for both indicated no differences pretest to post-test for Arborg (54.9 to 56.0, NS), but a significant increase for Pine Falls (55.0 to 58.8, $p<0.05$). Despite equivalent site scores at the pretest, only Pine Falls experienced a significant increase in Breastfeeding Belief scores at the post-test (55 to 58.8, $p<0.05$).

In a post-hoc analysis using a Bonferroni correction factor for multiple testing ($p\leq0.0036$), each item of the Breastfeeding Belief score was individually analyzed for pre- to post-test differences at Pine Falls Hospital site.

Figure 6.2. **Breastfeeding Belief Scores by site and time (pretest June 1997; post-test January to March, 1998) (n=28)**

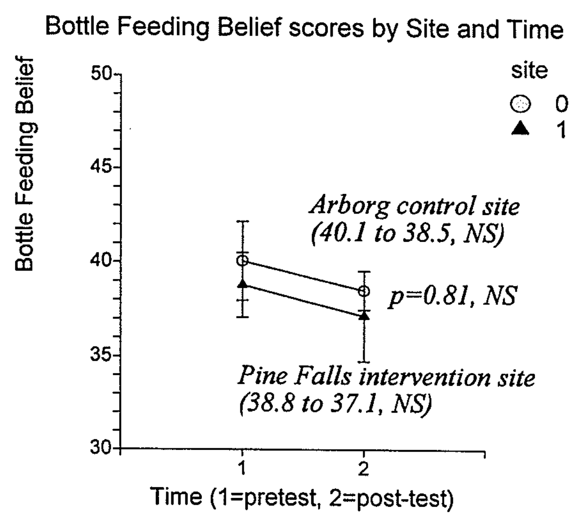


Several of the "lifestyle"questions showed more positive ratings: the acceptability of breastfeeding if a woman smoked, had diabetes, or drank alcohol once in a while; and the advantage of breastfeeding in postpartum weight loss, in convenience, and in being able to go places. But the only statement which showed a statistically significant increase in overall rating was "It's advisable for women to breastfeed if they eat a lot of 'junk' foods" (Wilcoxon test, one-tailed, p=0.0026; pretest median 3 or "neither agree nor disagree", range 1 to 5; post-test median 4 or "agree", range 3 to 5).

6.5.4. Bottle Feeding Beliefs

Contrary to the hypothesis, the intervention site did not show a significant decrease in the Bottle Feeding Belief scores over time. Figure 6.3. illustrates the scores over time (see Appendix 15 for the split-unit anova and Tukey-Kramer tables). The two sites had comparable scores at the pretest, and seven months later neither Pine Falls (38.8 to 37.1, NS) nor Arborg (40.1 to 38.5, NS) experienced a significant decrease in Bottle Feeding Belief scores.

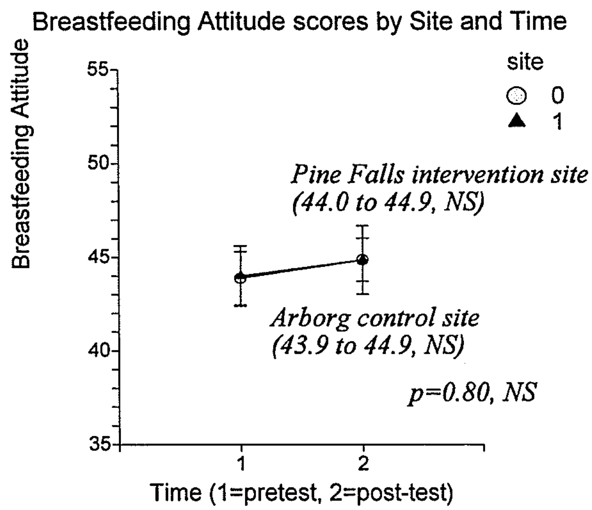
Figure 6.3. Bottle Feeding Belief Scores by site and time (pretest June 1997; post-test January to March, 1998) for those completing both pre- and post-test, n=30



6.5.5. Breastfeeding Attitude Scores

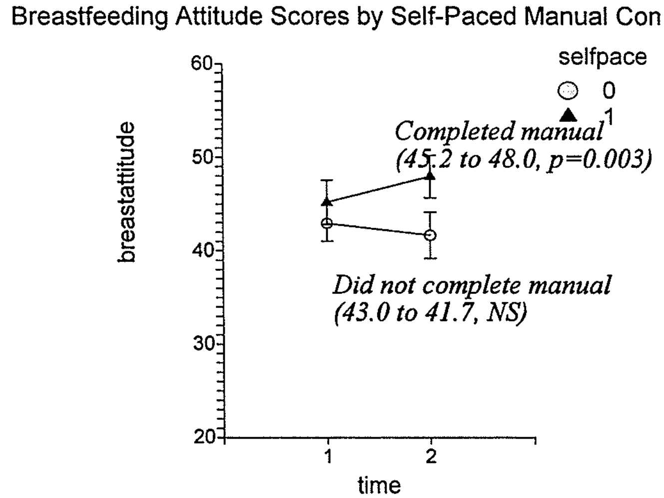
Contrary to the original hypothesis, there was no difference in Breastfeeding Attitude score over time or by site. Breastfeeding Attitude Scores were analyzed using a split-unit anova (see Appendix 15 for split-unit anova and Tukey-Kramer tables). Figure 6.4. illustrates the site results over time. The two sites had comparable scores at the pretest, and seven months later neither Pine Falls (44.0 to 44.9, NS) nor Arborg (43.9 to 44.9, NS) experienced a significant increase in Breastfeeding Attitude scores.

Figure 6.4. Breastfeeding Attitude Scores by site and time (pretest June 1997; post-test January to March, 1998)



One-third of the Pine Falls staff (8/24) completed the self-paced manual in the month following the June 1997 inservice. Those who completed the manual had similar pre- and post-test scores compared to non-completers for the BFHI Compliance, Breastfeeding Beliefs, and Bottle Feeding Beliefs scores. But there was a statistically significant effect of Breastfeeding Attitude Scores, with those completing the self-paced manual having increased scores over time ($p=0.003$), but those not completing the manual having similar scores throughout (see Figure 6.5.). There was also a significant difference on the pretest scores, with those who completed the manual having a higher mean pretest score than those who did not (45.2 versus 43.0, $p<0.05$).

Figure 6.5. Effect of Self-Paced Manual completion on Breastfeeding Attitude Scores over time (Pine Falls staff only, n=20 with 8 completed, 12 not)



6.5.7. Other issues of nursing practice

Two "stand alone" items on nursing practice and knowledge were contained in the questionnaire. One question addressed the number of wet diapers expected in the *first two days* of life of a healthy full-term exclusively breastfed newborn. The research-based 'correct' answer was "1 or 2 wet diapers per 24 hours"(Mohrbacher and Stock, 1997:115). At the intervention site (Pine Falls), 10% (n=2/20) answered correctly in the pretest, and 33% (n=5/15) in the post-test, for an OR=3.9 (Mantel-Haenszel test, 95% CI 0.7 to 32.9, p=0.11, NS). At the control site (Arborg), 0% (n=0/18) answered correctly in the pretest, and 6.7% (n=1/16)in the post-test, for an OR=3.4 (95% CI 0.08 to 1.4, p=0.48). Even though Pine Falls' correct responses increased by 23% compared to Arborg's 7% over time, there was no difference in Odds Ratios by site (Heterogeneity Test, p=0.88, NS).

Although 100% of staff at both sites during the pretest identified "bottles" as the only mode and the most frequent mode of supplementing infants in hospital, the results differed in the post-test. At the control site, 100% of the staff checked off "bottles" as a mode of supplementing babies, with only 2 persons identifying "eye droppers" as an alternate method. At the intervention site, a variety of modes were checked off, with "bottles" the most frequent, but "syringe feeds", "cup feeds", "spoon feeds", "dropper feeds", "finger tube feeds" and SNS"[2] all checked off as possibilities. Nurses wrote in comments, stating that although they knew other modes of feeding were possible, limited patient contact time forced them to resort to bottle feeds as the most common mode.

> "Time is our biggest problem. We don't have time to spend with them." (Nurse A at intervention site)

> "When working in a rural facility we are all things to all people so we do not have much time to stay with postpartum patients except for the bare minimum to do the absolute essential tasks. Staffing is not conducive to being able to spend ½ hour to 1 hour with one patient." (Nurse B at intervention site)

6.6. Results of the hospital chart audit

6.6.1. Chart audit numbers

In Pine Falls Hospital 41 charts were audited, including 21 pre-intervention (13 breastfed) and 20 post-intervention (13 breastfed) charts. In Arborg Hospital 34 charts

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The "supplemental nutrition system", or "SNS", is comprised of a bottle hung around a woman's neck, with small filament tubes which transmit the fluid in the bottle and which can be taped to the breast. When the baby breastfeeds, the baby suckles normally at the breast but simultaneously receives fluid from the bottle through the small tubing.

were audited, 20 pre-intervention (14 breastfed babies, 1 transferred out with no indication of feeding status) and 14 post-intervention charts (9 breastfed babies).

6.6.2. Demographics of clients

Table 6.5. compares the demographic and obstetric indicators for the clients of the intervention and control hospital sites. Although similar in most aspects, Pine Falls had a much higher proportion of Treaty-status women clients (76% versus 27%, Fisher's Exact Test, p=0.00003), and a slightly higher though not statistically different proportion of multiparas (90% versus 77%, Fisher's Exact Test, p=0.12, NS). No statistically significant differences over time *within* each site were noted (see Table 6.6.), but Pine Falls did have 21% more First Nations women in its post-intervention chart audit sample.

Table 6.5. Comparison of clients at intervention and control site hospitals

Demographic or Obstetric Indicator	Pine Falls (intervention site) n=41	Arborg (control site) n=34	Statistical significance†
Medication during labour and delivery (% yes)	100%	100%	F; p=1.0, NS
Type of delivery (% vaginal)	100%	100%	F; p=1.0, NS
Infant birth weight in grams (SD) [range]	3503 (SD 397) [2700 to 4420)	3610 (SD 515) [2555 to 4520]	T; p=0.31, NS
Infant gender (% female)	57.7%	35.3%	F; p=0.16, NS
Any breastfeeding initiated (% yes)	63.4%	69.7%	F; p=0.63
Treaty-status or First Nations community home address of woman (% yes)	75.6%	26.5%	F; p=0.00003*
Parity of woman (% multiparous)	90.2%	76.5%	F; p=0.12, NS

† T=independent t-test; F=Fisher's Exact Test; NS=not statistically significant, *=statistically significant using p<0.05 criterion

Table 6.6. Comparison of parity and First Nations classification within each hospital site by time

Site and demographic		"Before" June 3/97	"After" June 3/97	Statistical significance p-value (Fisher's Exact Test)
Pine Falls	multiparous	91%	90%	p=1.0, NS
	First Nations (Treaty-status or postal code)	86%	65%	p=0.16
	sample size (n)	21	20	
Arborg	multiparous	80%	71%	p=0.69
	First Nations (Treaty-status or postal code)	20%	36%	p=0.44
	sample size (n)	20	14	

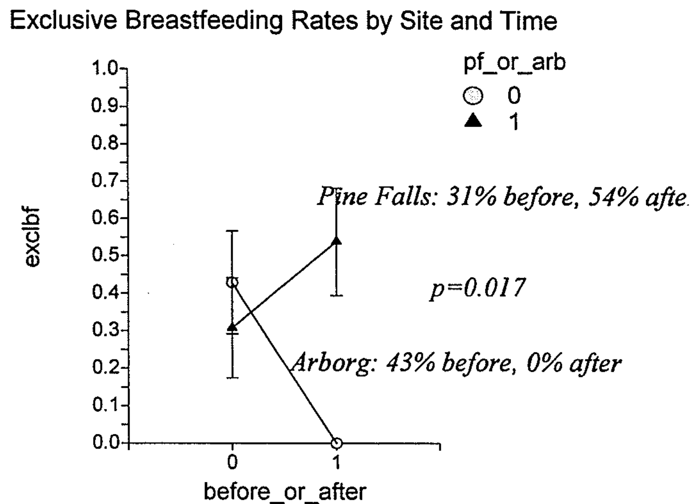
6.6.3. Exclusive breastfeeding rates, amount and reasons given for supplementation

The research data supported the alternate hypothesis of increased exclusive breastfeeding[3] rates at the intervention site compared to the control site. Pine Falls showed an increase (31% to 54%) while Arborg showed a decrease (43% to 0%) in exclusive breastfeeding rates (logistic regression model $\chi^2 = 10.15$, 3 df, p=0.017), as illustrated in Figure 6.6.. In other words, all breastfed babies born at Arborg Hospital from June 1997 to the end of September were supplemented with additional fluids. This must be viewed with caution, due to the small sample size for the post-intervention chart audit at Arborg (n=14, 9 being breastfed babies).

3

"Exclusive breastfeeding" was defined as breastfeeding at the breast, or being given maternal breastmilk, during the hospital stay, with no other food or liquid being given.

Figure 6.6. **Exclusive breastfeeding rates in hospital by hospital site and by time, before and after June 1997 (n=26 breastfed babies in Pine Falls, n=23 breastfed babies in Arborg)**



Equation 6.1. details the logistic regression model. Because there were significant differences between sites as to parity, and proportion of First Nations clients, I considered adjusting the model predicting "exclusive breastfeeding" for First Nations classification, parity and birth weight. Problems were encountered when attempting this. Only 9 of the 34 Arborg records indicated First Nations classification, and only 3 of the 23 breastfed babies. All 3 were in the "before" time period, leaving none for comparison "after". Similarly with parity, only 4 of the 41 records in Pine Falls were primiparas, and only 2 of the 26 breastfed babies. Both of these were in the "before" time period, leaving none for comparison "after". So a model could not incorporate these two variables.

Equation 6.1.

$$\ln(\text{exclusive breastfeeding proportion}) = -0.29 - 0.52(PF) - 13.9(After) + 14.9(PF \times After)$$

where PF = 1 if the site is Pine Falls, 0 if Arborg
"After" = 1 if after June 3, 1997; 0 if before
PF x After = interaction of "PF" and "After", with PF = 1 if Pine Falls, 0 if Arborg; and After = 1 if after June 3, 1997, 0 if before

Model adjusted for birth weight. Correctly classified 67%.
Chi-sq=10.2, 3 df, p=0.017

Using Equation 6.1., the relative "risk" of exclusive breastfeeding for Pine Falls clients was 1.8 times greater after the intervention as compared to before, so post-intervention clients were almost twice as likely to exclusively breastfeed while in hospital. In the "before" time period, the relative risk of exclusive breastfeeding in Pine Falls compared to Arborg was 0.72, meaning that Pine Falls clients before June 3, 1997, were less likely to exclusively breastfeed. Any comparison involving Arborg in the "after" time period was difficult, since the 0% exclusive breastfeeding made a relative risk meaningless.

Prior to the chart re-audit for reliability, a question was posed to me regarding the necessity of supplementation. A pediatrician noted that supplementation for First Nations infants may be medically necessary due to hypoglycemia induced by maternal diabetes or gestational diabetes. During the re-audit, all previously audited charts were once again audited for indications of First Nations status (Treaty number, or postal code of a First Nations community), and for indications of medical reasons for supplementation of breastfed babies. Both the audit nurses and the pediatrician expressed the opinion that if hypoglycemia were a concern, then the infant charts would record this. In Pine Falls, 15 breastfed babies were supplemented - 14 (93%) charts indicated no medical reason, and 1 chart indicated "jaundice". In Arborg, 17 breastfed babies were supplemented, with 14 (82%) charts indicating no medical reason, and 3 (18%) charts indicating possible hypoglycemia. Non-medical supplementation reasons cited at both hospitals included "difficulty breastfeeding", "fussy baby", "mother worried that baby was not getting enough milk", and "mother's request".

Comparisons of supplementation amounts were investigated in two ways: first, the actual number of supplements given; secondly, the volume of supplements given. To compare the actual number of supplements given, the number was compared on a "per day" basis, that is, the number of supplements per 24 hours, to exclude the bias of shorter or longer hospital stays. No significant differences were noted in a multi-way anova analysis, either by site ($p=0.81$), time ($p=0.63$) or the interaction of site by time ($p=0.92$). The mean number of supplements given per day was 1 (Arborg before 1.0, after 1.1; Pine Falls before 0.9, after 1.1). This included all breastfed infants ($n=49$), so any exclusively breastfed infants were included as having been given "zero" supplements/24 hours. The analysis was repeated to exclude exclusively breastfed babies, only analyzing the average number of supplements given to *supplemented* babies. Once again, there were no statistical differences by site ($p=0.21$), time ($p=0.33$) or the interaction of site by time ($p=0.12$). A somewhat surprising trend was evident, opposite to the proposed hypothesis of decreased supplementation. At the control site, the number of supplements given per day were similar over time (Arborg before, 1.4/day; after 1.1/day), but at the intervention site, the number of supplements given per day rose by about 1 standard deviation (Pine Falls before, 1.2/day; after 2.3/day). Because of the non-normal distribution of data for

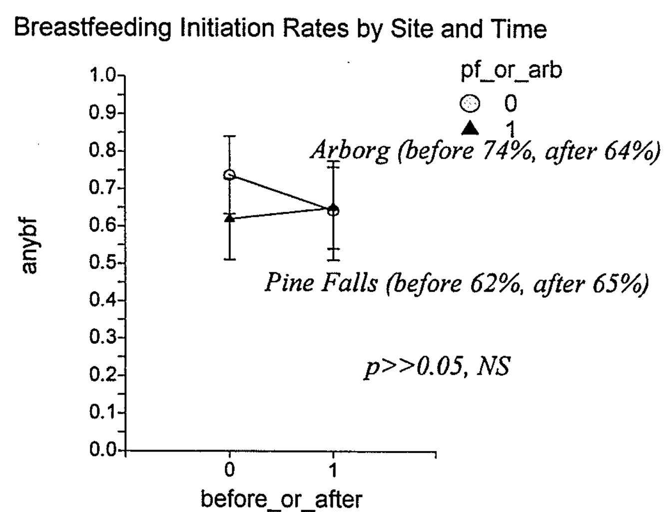
Pine Falls in the "after intervention" period, the median of 1.6/day may be a better representation of the typical supplementation.

In order to compare the *amount* of supplementation given, a similar analysis was performed. The amount given to breastfed babies per day of hospital stay was calculated using the total number of millilitres of supplement given, divided by the hours from birth to hospital discharge converted to days. Using a multi-way anova, the mean amount of supplement given to breastfed babies was not statistically different by site (p=0.88), time (p=0.97) or the interaction of site by time (p=0.78). The actual mean amounts per day given at Pine Falls were 27.8 ml/day before (n=13), and 25.4 ml/day after (n=13), and at Arborg 23.6 ml/day before (n=14), and 26.7 ml/day after (n=9). Excluding exclusively breastfed babies from the analysis, the amount of supplement per day given to *supplemented* babies was not statistically different by hospital site (p=0.23), by time (p=0.98) or by the interaction of site and time (p=0.21). In Pine Falls, the amounts were 40 ml/day before (n=9), and 55 ml/day after (n=6); in Arborg, the amounts were 41 ml/day before (n=8) and 27 ml/day after (n=9). Note, however, that the proportion of supplemented babies decreased in Pine Falls, so fewer infants were being supplemented in the post-intervention period. But in Arborg, the supplementation rate actually increased to 100%, so that all breastfed newborns were supplemented in the post-intervention period.

6.6.4. Breastfeeding initiation rates plus frequency, timing and documentation of breastfeeding

Contrary to the research hypothesis, the intervention strategy was not associated with changes in breastfeeding initiation rates. At Pine Falls, 62% ± 15% initiated breastfeeding in the pre-intervention period and 65% ± 15% after, (n=41; $\chi^2 = 0.04$, 1 df, p=0.84, NS). Similarly at Arborg, 74% ± 16% initiated breastfeeding before June 1997, and 64% ± 16% after, (n=33; $\chi^2 = 0.34$, 1 df, p=0.56, NS). See Figure 6.7. for initiation rates by site over time.

Figure 6.7. Breastfeeding initiation rates in hospital by hospital site and by time, before and after June 1997 (n=41 in Pine Falls, n=33 in Arborg)



A logistic regression model was used to determine variables associated with initiating any breastfeeding, including hospital site, time (before or after), the interaction of site by time, parity, birth weight, and First Nations classification. The only variable selected as a unique and significant predictor of breastfeeding initiation was "First Nations classification" (logistic regression, $\chi^2 = 7.62$, 1 df, p=0.006). Initiation rates were 52% for First Nations women, and 82% for other women, giving a relative risk of breastfeeding of 0.63 if classified "First Nations". Parity was not associated with differences in initiation (68% initiation for multiparas, 58% for primiparas; Fisher's exact test, p=0.52). See Equation 6.2. for the logistic regression model.

Equation 6.2.

ln (any breastfeeding initiated) = 1.54 - 1.44(TS)

where TS=First Nations classification through Treaty Status number or postal code
Model adjusted for birth weight, parity, hospital site, time, site by time interaction. Correctly classified 66%.
Chi-sq=7.62, 1 df, p=0.006

The frequency of breastfeeds (mean number of breastfeeds per 24 hours) were compared by hospital (multi-way anova F=2.73, 1 df, p=0.11), time period (p=0.87), and site by time interaction (p=0.65). There were no statistically signficant differences noted. In Arborg, "before" and "after" frequencies were 5.8/day and 5.9/day; in Pine Falls, frequencies were 5.3/day and 5.0/day (p=0.67, NS).

Chart audit data on the timing of the first breastfeed after delivery were not considered reliable in the Pine Falls audit, but were reliable in the Arborg audit (see Section 6.4.3). The data were not normally distributed, so the best representation of the "average" was the median, not the mean. In the Arborg audit, the median time to first breastfeed was 104 minutes before June 1997 (20% of the babies breastfed before 1 hour), and 70 minutes after June 1997 (40% breastfed before 1 hour). This was not statistically different (Mann-Whitney U test, p=0.12, NS). Although the information may be unreliable, the chart audit in Pine Falls indicated that the median time to first breastfeed was 50 minutes before the intervention (50% of babies breastfed before 1 hour), and 82 minutes after the intervention (45% breastfed before 1 hour).

No differences in percentage of charts with adequate documentation of breastfeeding technique were noted by time, site, or the interaction of site by time. In Arborg, all of the charts had either none or minimal information about breastfeeding technique (14/14 before, 9/9 after), and in Pine Falls most charts had minimal information (12/13 before, 12/13 after), with one chart in each time period containing detailed information.

6.7. Discussion

6.7.1. Effect of the intervention on nursing staff perceptions of policy, practice, beliefs and attitudes

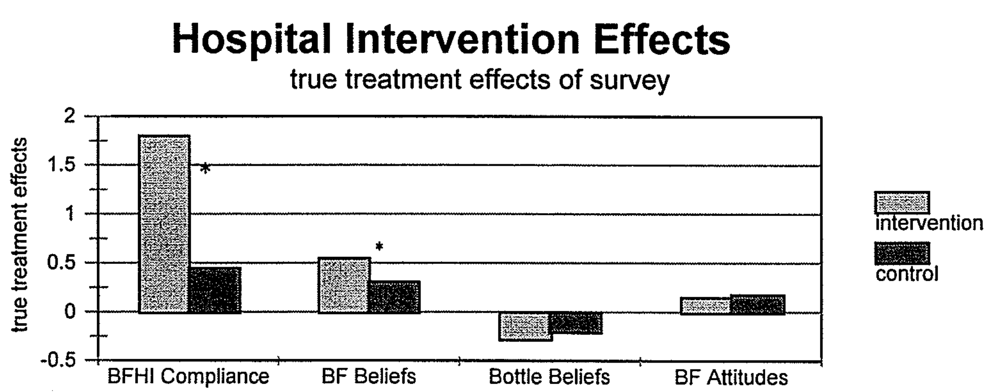
Statistically and clinically significant intervention effects in BFHI Compliance and in Breastfeeding Belief scores were noted at Pine Falls Hospital, the intervention site, but no differences were noted at the control site of Arborg Hospital (see Table 6.7 and Figure 6.8). The increased BFHI Compliance score increases were most pronounced for Step 1 (breastfeeding policy), Step 6 (no supplementation unless medically indicated), Step 9 (avoiding bottle and pacifier nipples) and Step 10 (referrals to breastfeeding support persons/groups) of the Ten Steps to Successful Breastfeeding (WHO/UNICEF, 1989). Both hospital sites were accepting free formula through a contract with a formula company, contrary to the WHO Code. This needs attention by the policy-makers such as the regional health authority boards, rather than the nursing staff.

The effects on BFHI Compliance and on Breastfeeding Beliefs seem plausible when the objectives of the intervention inservice (Table 6.1.) are reviewed. Steps 1, 6, 9 and 10 were all discussed specifically during the inservice. The Breastfeeding Beliefs tool contained questions which focussed on the domain of benefits of breastfeeding, also discussed during the inservice. The overall increase of Breastfeeding Beliefs scores at Pine Falls was mainly due to increased nursing staff supportiveness for women to breastfeed given different lifestyle and health issues, such as when a woman smokes, drinks alcohol occasionally, eats 'junk foods', or has diabetes. These issues were specifically addressed in the inservice. Lifestyle barriers to breastfeeding, which Sagkeeng women had identified during previous research (Martens, 1994), were discussed during the hospital inservice. These included beliefs that the women were hesitant to breastfeed if they ate "junk food" or smoked, since they believed that the bad foods or smoke passed through breastmilk and caused harm to the baby. Sagkeeng Health Centre efforts focussed on messages that it was okay to breastfeed even if a woman smoked or ate "junk" food, and hospital staff survey results indicated a trend to understanding the perceived barriers to breastfeeding for First Nations clients.

Table 6.7. Chart and graph of true treatment effects by hospital site: nursing staff survey and chart audit results

	Comments on pre-intervention and post-intervention scores (X=intervention site, C=control)	True Treatment Effect (standardized difference between pre- and post-intervention scores) or percentage difference
BFHI Compliance Score	X: increase of 7.5 (SD 4.2), p<0.05 C: increase of 2.3 (SD 5.1), NS	X: +1.8 C: +0.45
Breastfeeding Beliefs	X: increase of 3.8 (SD 6.9), p<0.05 C: increase of 1.9 (SD 6.2), NS	X: +0.55 C: +0.31
Bottle Feeding Beliefs	X: decrease of 1.7 (SD 6.2), NS C: decrease of 1.6 (SD 8.3), NS	X: -0.27 C: -0.19
Breastfeeding Attitudes	X: increase of 0.9 (SD 6.1), NS C: increase of 1.0 (SD 5.7), NS	X: +0.15 C: +0.18
% answering correctly regarding newborn output in early days	X: 10% pre to 33% post, NS C: 0% pre to 67% post, NS	X: +23% C: +6.7%
% initiating breastfeeding	X: 62% to 65%, NS C: 74% to 64%, NS	X: +3% C: -10%
% of breastfed babies exclusively breastfed	X: 31% to 54%, p=0.02 C: 43% to 0%, p=0.02	X: +23% C: -43%
% breastfed within first hour after birth	X: 50% to 45%, NS C: 20% to 40%, NS	X: -5% C: +20%

Figure 6.8. True treatment effects of hospital staff survey, by site (* denotes significant difference between intervention and control site, p<0.05)



A possible alternate hypothesis which may explain the increase in BFHI Compliance scores may be found in the statistically significant differences of the scores on the pretest. Before the intervention, Pine Falls complied with about 6 of the 11 criteria (Ten Steps and WHO Code), whereas Arborg complied with about 5. So Pine Falls had a "more compliant" hospital before the intervention, and possibly had a greater maturation rate to increased BFHI Compliance even without an inservice. This competing hypothesis could be refuted by the fact that other pretest indicators (beliefs and attitudes, exclusive breastfeeding rates) were statistically equivalent. But the *clinical* difference of compliance between 5 or 6 of the 11 statements would be considered insignificant in terms of representing only about half of the international standards for Baby Friendly Hospitals. Only at the post-test, when Pine Falls Hospital complied with about 8 of the eleven criteria, whereas Arborg still only complied with 5, would the difference be clinically worthy of note.

The stability of the Bottle Feeding Beliefs and Breastfeeding Attitude scores over time, both at the intervention and control site, were not surprising given that these items were not directly discussed during the inservice education. One assumption of the researcher was that the attitude toward breastfeeding would become more "positive" if the staff were informed of appropriate policy, practice and current research about the benefits of breastfeeding. But no direct attempt was made during the inservicing to address attitudes towards breastfeeding, since the focus was upon instituting practice and policy conducive to a supportive breastfeeding environment in hospital. Those nurses who completed the optional self-paced manual had significantly increased Breastfeeding

Attitudes over time. This could indicate that reinforcement of the key inservice objectives resulted in more positive attitude changes. But a strong competing hypothesis is that this group also had higher pretest attitude scores, compared to nurses not volunteering to do the extra studying. Nurses who already had a more positive attitude to breastfeeding were more likely to incorporate new learning and change at a different rate. This could presumably mean that the completion of the self-paced manual was not particularly useful as a way to increase hospital compliance with the BFHI criteria, or as a way to increase staff knowledge about breastfeeding. On the other hand, about 1/3 of the staff did complete the extra education, and this may be an unidentified "momentum" to elicit change which could have influe3nced other staff practices and indirectly could have contributed to increased BFHI Compliance scores for the entire site.

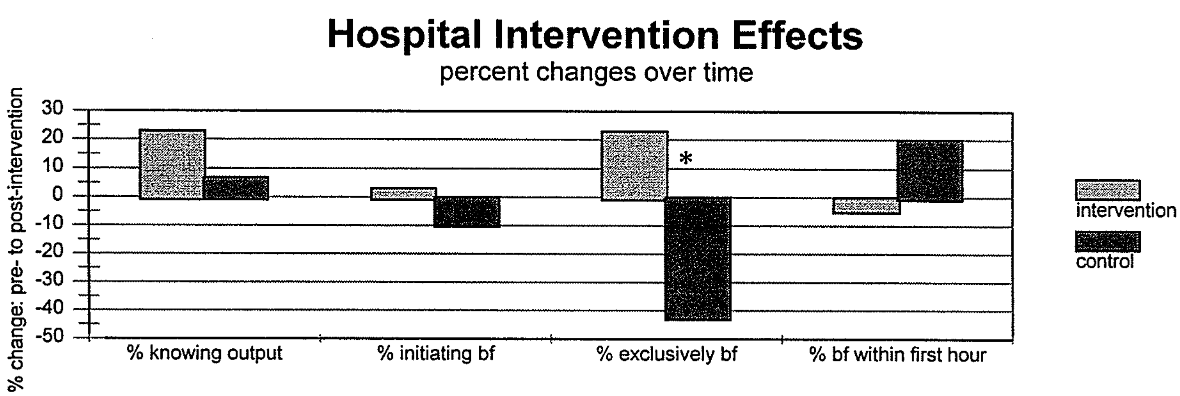
There was no statistically significant change in the percentage of staff having correct responses to the number of wet diapers expected of an exclusively breastfed baby in the first two days after birth. This was surprising, since this fact was stressed both in the inservice and in the "summary sheet" sent to all nurses a few months later. It may also be a Type II error of small sample sizes, since the Pine Falls increase from 10% to 33% correct responses from pre- to post-test was at the $p=0.10$ level of significance in a Fisher's Exact Test. This contrasts with the small (0% to 6%) increase of correct responses at Arborg, with a correspondingly large p-value ($p=0.48$, Fisher's Exact Test) indicating non-significant differences.

There was also no significant change at either site in the most frequently used mode of supplementation, "bottle". At the intervention site, there was an awareness of that different modes could be used, but this knowledge was coupled with frustration at the lack of time to help maternity clients if they experienced breastfeeding difficulties.

6.7.2. Effect of the intervention on maternity chart audit information

Chart audits were the second way of measuring the effectiveness of the intervention, and these findings (see Figure 6.9.) reinforced some of the findings of the staff surveys but contradicted others.

Figure 6.9. Percentage change in selected indicators, by site (* denotes significant difference between intervention and control site, p<0.05)



Parallelling the increased BFHI Compliance score, the chart audit at the intervention site of Pine Falls found that 23% more babies were exclusively breastfed in the seven months following the inservice (31% before, to 54% after). This was also internally consistent with the finding that more Pine Falls staff (10% before, 33% after) were aware of appropriate newborn voiding patterns, and more nurses reported that they rarely or never offered routine supplementation to breastfed babies (45% before, 87% after). This may reinforce the causal effect of the intervention on supplementation practices at Pine Falls. But a competing hypothesis is the bias associated with demographic difference before and after June 1997 in Pine Falls (see Table 6.5 and 6.6). Pine Falls Hospital had a decrease in the proportion of First Nations clients post-intervention (86% to 65%, p=0.16, NS). This may be confounding the observed increase in Pine Falls' exclusive breastfeeding rate if First Nations breastfeeding women were more likely to supplement their infants. Using a Chi-square analysis, no significant difference in supplementation rates was found by maternal First Nations classification (First Nations 71% supplemented, non-First Nations 61%; n=49; $\chi^2 = 0.61$, 1 df, p=0.44), although a trend to slightly higher supplementation by First Nations status did exist.

The dramatic decrease in exclusive breastfeeding rates at the control site (43% to 0%) reflected the anecdotal stories during this time. Many nurses and new mothers in Manitoba were complaining that the staff lacked time to help with difficult breastfeeding situations, and were inclined to give supplements due to pressures of high caseloads and short client hospital stays. But the inservice education may have "protected" Pine Falls in such a way that their trend was the reverse of the norm.

The number and volume of supplements per day showed no statistically significant differences over time. In Pine Falls, opposite to the hypotheses, there was actually a trend to *increased* supplementation frequency (1.2 supplements/day to 2.3 supplements/day) and *increased* volume (40 ml/day to 55 ml/day) when only supplemented babies were included in the analysis. Upon consideration, this may actually be consistent with the observed increase in exclusive breastfeeding rates. If the Pine Falls staff were discouraging non-medical supplementation after the intervention, then breastfed babies were supplemented only in situations of greater need as perceived by the nurse or physician, even though the chart documentation did not give a "medical" reason. Babies were given "trace" amounts of unnecessary supplements less frequently in the post-intervention time, resulting in a greater mean volume for those babies who were still supplemented.

The intervention had no detectable effect on increasing breastfeeding initiation rates. During the inservice, nursing staff verbalized their concern that breastfeeding education needed to take place prenatally. A discussion ensued as to how nursing staff within a hospital could encourage women to consider alternatives (see Martens, 1997), especially by asking the question, "What do you know about breastfeeding?", rather than "Are you going to breastfeed or bottle feed?" (Hartley and O'Connor, 1996). With nurses feeling pressured for time, it is not surprising that initiation rates remained stable despite the intervention. Probably the emphasis on increased access to prenatal breastfeeding instruction would be a more realistic goal than expecting busy hospital staff to educate women during labour, delivery or early postpartum.

Client breastfeeding practices, including the frequency of breastfeeds and the timing of the first breastfeed following birth, appeared to be unchanged by the educational intervention. As recorded in the charts at both the intervention and control hospitals, the frequency of breastfeeds was 5 to 6 breastfeeds/24 hours. This is lower than the recommended minimum of 8 per 24 hr. (Riordan and Auerbach, 1999:298), but may be an artifact of charting. One would assume that normal "cluster feeding"where an infant may breastfeed several times in the space of one or two hours, may have been recorded as only "one feed" rather than several feeds in the chart. So, too, knowing that breastfeeding within the first hour after birth is optimal and physiologically appropriate (Klaus, 1987; Widstrom et al., 1987; Widstrom and Thingstrom-Pausson,1993), it is inappropriate that only half or less of the infants were breastfed within an hour of birth. The obstetric team, including physicians and nurses, may need education as to standards of practice for post-delivery breastfeeding.

Documentation of breastfeeding was found to be non-existent or minimal in the charts at both sites. Although a new form for chart documentation of breastfeeding effectiveness was presented to the nursing staff during the inservice, there was no evidence of chart documentation improvement at the intervention site. The introduction of a tool during an inservice, without putting into place a mechanism for its use, was not effective. Possible approaches in the future could include: (a) inclusion of a documentation form in the written policy of the hospital; (b) using a hospital team approach to create an "in house" tool; or (c) specific inservicing regarding the use of such a documentation tool.

6.7.3. Insights on hospital practices: qualitative interviews of Sagkeeng women

In the qualitative in-person interviews for the evaluation of the Sagkeeng Peer Counsellor program (see Chapter 4), there were questions about the helpfulness of the hospital staff and about whether the breastfed babies were supplemented in-hospital. Of the seven interviewed women who gave birth in Pine Falls Health Complex, three had given birth prior to the June 1997 educational intervention, and four after. Prior to the intervention, two of the three reported receiving help with breastfeeding from the staff, as well as supplements. Both infants were given glucose water, one due to jaundice and one due to difficulties with breastfeeding due to maternal breast engorgement. Three of the four post-intervention maternity clients reported supplementation of their breastfed babies - one by request of the mother. One woman suggested it was because of her "low blood", but she said, "They never gave me a reason. They just wanted me to give him glucose water" (lines 2336-7). The third woman did not think she had enough milk. In her own words; "for the first, I don't know, week and a half, about a week, because my milk wasn't coming in. He was always wanting to eat, but there was nothing" (lines 4182-3). But most women reported receiving nursing staff help with latching their babies, or as one woman put it: "Well, they showed me how to hook him up to the nipple and how and what position to hold him, or when I'm laying on my side, when I'm trying to sleep" (lines 3484-87).

Sagkeeng women (most of whom had given birth in other hospitals) also gave some insights into appropriate or non-appropriate forms of nursing care. This included areas of informational help, as well as emotional and physical support. The following women spoke of receiving highly appropriate forms of nursing care;

> "They gave me information about breastfeeding, and helped me latch her on. And lots of support, lots of support." (lines 1003-4)

> "[How did you feel in the hospital?] Relaxed ... I just wanted to breastfeed and it felt good." (lines 1294-6)

> "They were patient with me when I was trying to give up, and they kept on encouraging me. And so I just kept on. This one nurse just kept on helping me. She didn't latch on right. [The nurse] just showed me how again. She was really good - gave me a good experience with her. And I didn't have cracked nipples with her, so that was good." (lines 2877-2882)

> "... I had surgery so I wasn't feeling quite too good. ... The nurse really helped me by rubbing my back. She would give me a hug, you know, when I was in pain. She was really nice." (lines 1986-90)

But sometimes the nursing care was inadequate, and possibly detrimental to the dignity of the maternity client. One baby was being cup-fed glucose water in the hospital, but the reason for this supplementation, as well as the explanation of the cup-feeding technique, left this woman bewildered;

> "They gave her some kind of thing {supplement} because she wasn't getting enough milk. She was just being greedy. ... They said that they were feeding her like a cat or something. [They fed her how?] I don't know how they fed her. They said they were going to feed her ... I think they gave her someting anyways, but not from my milk. ... They said it's feeding her like how cats feed their babies, their little kittens, something like that, so they gave it to her in a little cup or something." (lines 2686-2704)

Another woman who was having difficulty breastfeeding her baby described a scene that borders on abusive, although the nurse was probably well-meaning but disempowering;

> "Well {the hospital staff} didn't really help me. Well, one lady, she just pushed my baby towards me, just stuck my tit into {the baby's} mouth. [So she was quite forceful?] Yah, she was even on top of me, never mind, standing on top of me". (lines 1691-94)

Some multiparous women related that the nursing staff assumed they knew what they were doing with breastfeeding. One woman had only breastfed her previous child for three weeks, but commented; "They didn't really help me. I just did it on my own ... they just thought that I knew what I was doing" (lines 2512-16).

For some women, the hospital was intimidating. As one younger mother related; "{I felt} lonely and pretty scared. When {my relatives} left, I was still all emotional. I just started crying 'cause I felt cared and all" (lines 1166-72). But a small rural hospital setting may be conducive to care. As one woman commented;

> "I was pretty relaxed. It was better than {a city hospital}, because over there they were far off. First, you know, you had different nurses come in, and they didn't know what was. Once you get used to a nurse, then there was another one coming in. So I found {Pine Falls} to be more relaxing." (lines 4165-73)

6.7.4. Comparison of treatment effects with other research findings

Interventions to reduce in-hospital non-medical supplementation of breastfed babies have demonstrated decreases of supplementation rates from 13% to 28% (Valdes et al., 1996; Wright et al., 1996; Wilmoth and Alder, 1995; Winikoff et al., 1987). In comparison, the Pine Falls intervention site showed a decrease of 23% in supplementation rates over the 8-month period, compared to an increase of 43% at the control site. The chart audit results at the intervention site were presumably more valid and reliable than some of the results recorded in the literature, since one literature report was based solely on self-reports of workshop attenders (Valdes et al., 1995), and others did not have a control site comparison (Wright et al., 1996; Wilmoth and Elder, 1995).

Similar to the finding that initiation rates were not affected by the intervention strategy in Pine Falls Health Complex, two pre-experimental studies (Iker and Mogan, 1992; Bruce and Griffioen, 1995) also showed no differences after educational programs and policy changes. One quasi-experiment (Winikoff et al., 1987) did note a 28%

increase in initiation rates compared to the control hospital, in a comprehensive intervention involving the entire health care provider team.

Changes in BFHI compliance have been measured by Westphal et al. (1995) in a quasi-experimental design which involved an intensive 18-day course for three health care providers of the intervention sites. The compliance with the Ten Steps to Successful Breastfeeding was quantified through the use of a measurement tool, focus groups, and in-person interviews. Changes in compliance, out of a score of "10", ranged from 0.5 to 3.9 pretest to post-test in the intervention sites, and from -0.7 to 1.1 in the control sites. This is similar to the findings of the present study, where the intervention site experienced a 7.6 rise out of 44 points, equivalent to a 2 point rise out of the 11 points measured, while the control site experienced a 2.3 out of 44, or ½ point rise out of 11. But the present findings were associated with a much lower cost-investment of the hospitals, where mandated staff training consisted of a 1 ½ hour session, with an optional self-paced manual which took about two hours to complete.

6.8. Summary and policy recommendations

Despite limited funding, uncertain times due to regionalization of health care, and nurses' concerns about full case loads, a rather minor educational intervention was associated with an increase in compliance with the WHO/UNICEF BFHI standards, in breastfeeding knowledge, and a decrease in non-medically indicated supplementation of breastfed babies. This intervention consisted of 1½ hours of education, plus reinforcement of the concepts through optional completion of a self-paced manual. A key element of the intervention may be the mandated nature of the inservice, which was during paid staff time and which required attendance by all nursing staff.

Recommendations:

From the results of this research, the following recommendations are put forth for the hospitals' consideration. These recommendations will need a team effort from the physicians, administration and nursing staff:

- encourage and continue *mandated and paid* breastfeeding education by all nursing staff on an annual basis. Encourage mandated breastfeeding education for physicians practicing obstetrics in the hospital.
- encourage adoption of policy and protocol to address issues where the hospital is non-compliant with WHO/UNICEF Ten Steps to Successful Breastfeeding and the WHO International Code of the Marketing of Breastmilk Substitutes
- have a meeting of the hospital and community nursing personnel to address the importance of prenatal breastfeeding education and postpartum referral systems for breastfeeding support, through health care providers or peer counsellors
- set forth "medical indications" for supplementing breastfed newborns, and record the reason for any given supplementation. Investigate reasons for high supplementation rates of breastfed babies in hospital.
- reinforce the appropriate clinical expectations of wet diaper counts in the first two days, and appropriate guidance including the non-timing of feeds and the normalcy of cluster feeds

- design and implement standard documentation for breastfeeding latch, positioning and effectiveness to streamline reporting for nursing staff and to increase consistent reporting of problems
- ensure that the majority of babies would be given the opportunity to breastfeed within the first hour according to WHO recommendations
- review current practice of accepting free formula from formula companies, in light of the WHO recommendation that formula be purchased for at least 80% of cost.
- begin the process to establish the hospital as a "Baby Friendly" site, through efforts in the next few years to prepare for Canadian BFHI accreditation.

Chapter 7: Coming Full Circle - Community trends from 1992-1997

7.1. Introduction

The last three chapters have "dissected" the breastfeeding promotion strategy of Sagkeeng First Nation into piecemeal intervention strategies at the individual, family, community and institutional level. Evaluations of the Peer Counsellor program, the Sagkeeng School adolescent education, and the Pine Falls Health Complex inservice only looked at a portion of the activity that was ongoing within the community. It was an attempt to quantify outcomes, with the full realization that a synergistic effect between these and less formal "interventions" was occurring within Sagkeeng. This chapter is an attempt to bring the "spokes" of the individual interventions together to enable us to look at the whole wheel, and the ongoing fluid effect of change and forward motion. "Coming full circle" means just that - putting the pieces together in such a way as to enable a holistic view of Sagkeeng's community health promotion strategy, which reflects the holistic frameworks of McKinlay and the Medicine Wheel discussed in Chapter Two.

7.2. The purpose

To evaluate the effect of multi-faceted community initiatives, Sagkeeng Health Centre collected information on breastfeeding initiation and duration rates from 1992 to 1997. The historical trends were interpreted with additional qualitative and quantitative information about community breastfeeding promotion initiatives during this time period.

7.3. Sagkeeng community strategies for breastfeeding promotion: background and description

A detailed description of the breastfeeding promotion strategies of Sagkeeng First Nation was included in Chapter 1 (see Section 7), including information about my Masters research, the production of a video and booklet, the Peer Counsellor pilot project and training sessions, and the educational interventions in the school and hospital. Further descriptions of the three formally evaluated strategies are included in Chapters 4, 5 and 6.

Although the information in Chapter 4 describes The Peer Counsellor (PC) program of Sagkeeng Health Centre, information on the prenatal education provided by the community health nurse (CHN) was not included. All prenatal education from 1992 to 1997 was provided by the same CHN, during individual visits in women's homes or at a prenatal clinic appointment. The CHN was interested in the promotion of breastfeeding since the start of her job in 1992. In her own words:

> "...in order to cut down the cost of formula and to eliminate the Pacific {evaporated milk}, we thought it would be interesting to try and get them to do more breastfeeding.... and I myself didn't know that much about it either. I just knew that there had to be more, because of the cost and the children being put on Pacific so early, or not at all."

The CHN was instrumental in encouraging the production of the video and booklet, <u>So You Want a Healthy Baby</u>. It was originally envisioned as a prenatal teaching video, but because of the results of my Masters research and because of the CHN's interest in promoting breastfeeding, about half of the video includes breastfeeding information. In 1996 and 1997, the CHN was interested in updating her own information to be able to assist breastfeeding women, so she attended two conferences. She learned of the evaluation research[1] of the "Best Start" program (Hartley and O'Connor, 1996) in the USA, and began to incorporate different teaching strategies prenatally. During the Peer Counsellor training sessions, the CHN also took part in the communication skills workshops along with the trainees.

7.4. Evaluation of the Sagkeeng community strategies: design and methods

7.4.1. Research design

Information on infant feeding was collected for each child born between January 1, 1992 and December 31, 1997. Since 1993, I have kept detailed notes about community breastfeeding initiatives. This diary, along with health centre and community input, was used to interpret time trends. The research design is a quasi-experimental time series design (Campbell and Stanley, 1963):

$$O\ O\ O\ X_1\ O\ O\ O\ X_2\ O\ O\ O\ X_3\ O\ O\ O$$

The "O"s represent data on breastfeeding initiation or duration, and the "X"s represent the time of occurrence of various community intervention strategies.

1

An evaluation of a WIC programfor low-income women (Hartley and O'Connor, 1996) looked at the difference in the way prenatal education was provided. A historical control group was used. In the first year the women were asked prenatally, "How are you going to feed your baby", and subsequent teaching resulted from their answer. The following year, women were asked at their first prenatal visit, "What do you know about breastfeeding?" On subsequent visits, the health care provider would elicit a woman's concerns about breastfeeding and offer appropriate information. Breastfeeding initiation rates rose from 15% to 31% ($p<0.03$), with mothers less than 20 years old showing the most marked difference (11% to 37%).

Table 7.1. **Time line of breastfeeding promotion initiatives and related information in Sagkeeng First Nation†**

Year	Month	Event
1992		Sagkeeng hired the CHN who did most of the prenatal and postpartum contacts until her December 1997 retirement
1993	J	
	F	contacted Sagkeeng for Masters research
	M	
	A	
	M	Sagkeeng approved Masters research
	J	Ethical approval for Masters research
	J	Qualitative interviews done by PJM in Sagkeeng
	A	"
	S	", pretesting of prospective survey in Sagkeeng
	O	results of qualitative interviews sent to participants, interviewers trained
	N	prospective (and retrospective) survey data collection for Masters research
	D	"
1994	J	"
	F	"
	M	"
	A	"
	M	"
	J	"
	J	"
	A	Sagkeeng health centre discussing idea of video
	S	Masters thesis finished
	O	first part of video filmed in Sagkeeng, Masters results sent to participants
	N	filming of video continued
	D	"
1995	J	"
	F	"
	M	video completed
	A	poster to accompany film produced
	M	writing of breastfeeding booklet to accompany video is begun
	J	Sagkeeng artist hired for booklet drawings
	J	CHN suggests peer counsellor program; nurse suggests hospital inservicing
	A	PC Trainer (PCT) contacted and agrees to work on PC program for Sagkeeng
	S	first meeting of PCT, possible PC
	O	PJM and nurse met with CEO of Pine Falls Hospital regarding inservice (bad timing
	N	right then due to layoffs within hospital, postponed)
	D	PCT and potential PC begin to compile a training manual during PC training

Table 7.1. (Cont'd)

Year	Month	Event
1996	J	writing of breastfeeding booklet continued
	F	"
	M	breastfeeding booklet finished and ready for distribution
	A	PC training sessions with potential PC and other community women
	M	"
	J	"
	J	"
	A	"
	S	"
	O	PCT, potential PC, CHN attend breastfeeding conference in Winnipeg
	N	information session with PCT, potential PC, CHN, nurse: breastfeeding class for junior high or high school suggested as part of community strategy;
	D	PJM met with CEO of hospital regarding inservice and research design
1997	J	potential PC has more training sessions
	F	potential PC gives birth to baby; PJM meets with PF Hospital Board
	M	more PC training sessions; first PC is accredited (finished her training)
	A	PC pilot program begins, no clients until May; PF and A hospital permissions
	M	Ethics approval; Sagkeeng Health Board and School Board approve research
	J	CHN begins chart audits; PC session in Junior High, PJM collects data on pre- and post-test, 2 wk retention PJM does inservice session in PF Hospital, with pretest at PF and at A
	J	PJM begins qualitative interviews with women initiating bf, babies 4-7 months old
	A	Permissions obtained from Junior High students; guardians by telephone
	S	Qualitative interviews continued
	O	"; doctor at A site no longer practicing maternity, so no data from this site
	N	"; end of PC pilot program
	D	"; CHN retires

†Note: PC = Peer Counsellor; PCT = Peer Counsellor Trainer; CHN = Community Health Nurse; PF = Pine Falls Hospital; A = Arborg Hospital; PJM = Patricia J. Martens

7.4.2. Statistical design

To determine trends in the initiation and duration of breastfeeding from 1992 to 1997, logistic regression and Cox's Proportional Hazards regression modelling were used (see Chapter 3 for more detailed statistical information). When using multivariate techniques, a minimum of 5 to 10 persons are required per explanatory variable in the model (Tabachnick and Fidell, 1989:129; Norman and Streiner, 1994:127). So for a model incorporating explanatory variables for "year" (six years from 1992-97), "birth weight", "parity" and "PC program inclusion", the minimum sample size was 40 to 80. For comparison of duration of breastfeeding trends over several years, assuming two-tailed testing, Type I error of 0.05 and an 80% power, the sample size required[2] per year ranged from 15 to 21, or a minimum of 90 over six years. There were 283 charts for initiation rate data, and 117 for duration data, so the sample size assured at least 80% power.

7.4.3. Instrumentation

The Sagkeeng Health Centre personnel (the CHN and a community health resource worker) collected information on breastfeeding initiation and duration for children born 1992-1997 inclusive. This included a chart audit, and if necessary, telephone calls or personal contacts to obtain missing information. The charts included

2

The log rank calculations are taken from Glantz, 1997:398-399. A sample size of 15 is required if there is a difference of proportions breastfeeding at the "end", ie, three months, of 5% in one group and 20% in another group. A sample size of 21 is required if, at three months, there are 20% breastfeeding in one group and 40% in another group.

postpartum information collected by the hospital of birth and the community health nurse, including data on initiation of breastfeeding or bottle feeding, and type of feeding noted at immunization visits, well-baby clinic visits, or home visits. The researcher did not have access to the charts, and was given the date of birth, parity, birth weight, and infant feeding status, with no other identifiers included (see Appendix 13).

The postpartum chart information demonstrated a high degree (99%) of validity and reliability in previous research (Martens, 1994) as to date of birth, birth weight, type of delivery, parity, hospital of discharge, and infant feeding (breastfeeding or not), when compared with maternal reports. Chapter 3 includes a discussion of the reliability and validity of breastfeeding information derived from maternal recall - total duration to weaning is considered reliable and valid, but duration of "full" breastfeeding to the onset of supplementation is not.

Infant feeding information was collected during previous research (Martens, 1994). This provided a check on the number of charts, as well as the reliability and validity of the chart audits. The 1994 data included 32 Sagkeeng women giving birth between November 30, 1993 and June 30, 1994. The 1997 chart audit included 28 charts for the same time interval. Linking by date of birth and birth weight, 26 charts matched[3], with 2 unique clients in the 1997 audit, and 6 unique clients in the 1994 research. The breastfeeding initiation rates of the two data sets were compared and showed no statistically significant difference ($\chi^2 = 0.23$, 1 df, p=0.63, NS), with the Masters research

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3

In four of the 26 "matching" charts, either the day or month of birth was different by 1 unit, but the birth weight and the other two date digits matched.

(n=32) initiation rate of 56% ± 17%, and the community chart audit (n=28) of 50% ± 19%. The duration of breastfeeding in the two data sets was also compared. A Cox's proportional hazards regression model demonstrated a non-significant difference in relative hazard of weaning (p=0.73) between the two sets of data, with 40% of those *initiating* breastfeeding still breastfeeding at 2 months and 0% still breastfeeding at six months. It was concluded that the chart audit data was reliable and valid.

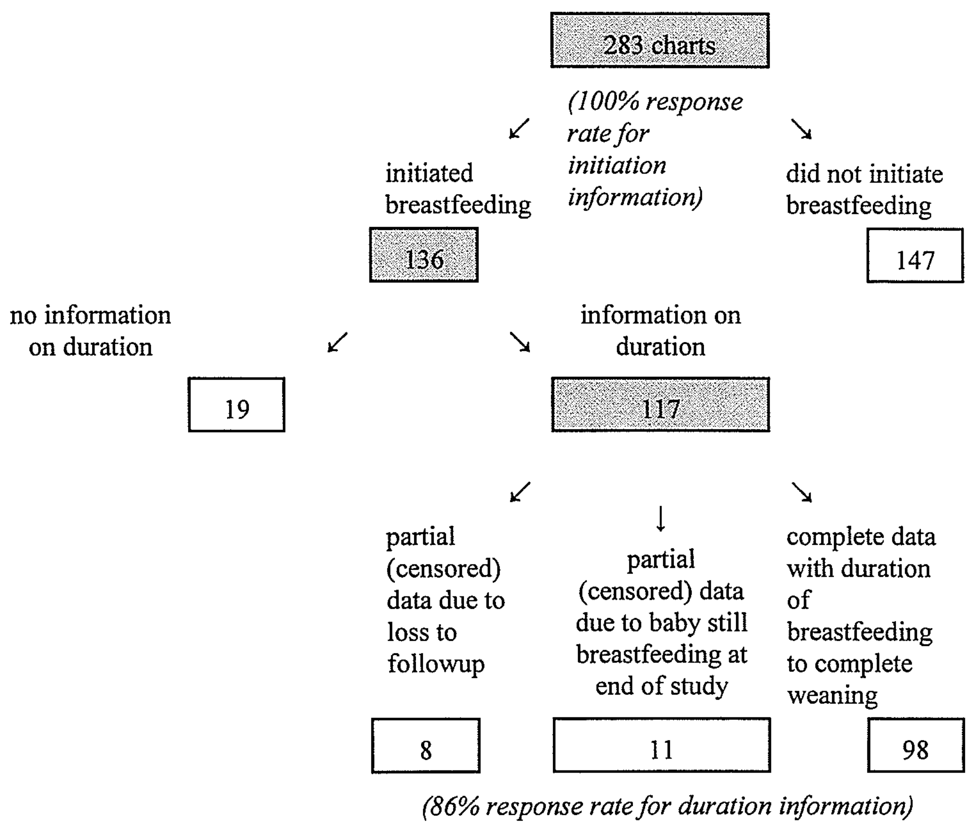
7.4.4. Population and sample considerations

The target population was all infants whose mothers lived in Sagkeeng at the time of birth. The sample included all infants who were born in 1992-1997, and had a chart at the Sagkeeng Health Centre for the years 1992 to 1997 inclusive, the baby being alive for 3 months thereafter and being in the care of the mother. Data for the 1997 period was linked by date of birth and birth weight to identify those babies whose mothers were included in the PC pilot program.

Out of the 283 charts of newborns in the Sagkeeng Health Centre files from January 1, 1992 to December 31, 1997, 100% recorded the type of feeding initiated. Information was collected by personal contact in 115 of the chart audits, to verify the information available from the records. Of 283 charts, 136 (48%) indicated that breastfeeding was initiated. Duration of breastfeeding was recorded for 117 (86%) of the 136 breastfed babies (see Figure 7.1.). Thirty-eight of the 136 charts were censored data (the baby was breastfeeding at a certain date, with no information as to wean date). Censoring was due to: (a) no chart information other than at hospital discharge (n=19);

(b) loss to follow-up after a period of contact (n=8); or (c) the research ended while the baby was still breastfeeding (n=11). Of the 19 charts missing any information on duration, this was spread throughout the 1992-97 years[4], with successively more detailed information on "duration" from 1992 to 1997.

Figure 7.1. Response rate of health centre chart information



4

From the years 1992 to 1997 inclusive, the following percentages (number missing/total number for that year) indicate the percentage of charts where the infant was breastfed in hospital, but no further community information was available on the duration of breastfeeding: 25% (4/16); 21% (4/19); 19% (5/27), 11% (2/19); 9% (2/22); 6% (2/33).

7.5. Results

7.5.1. Community trends in initiation rates from 1992-1997

Figure 7.2. shows the trend in breastfeeding initiation rates from 1992 to 1997.

Table 7.2. details initiation rates by year and parity.

Figure 7.2. Graph of breastfeeding initiation rates by year 1992-1997 (n=283)

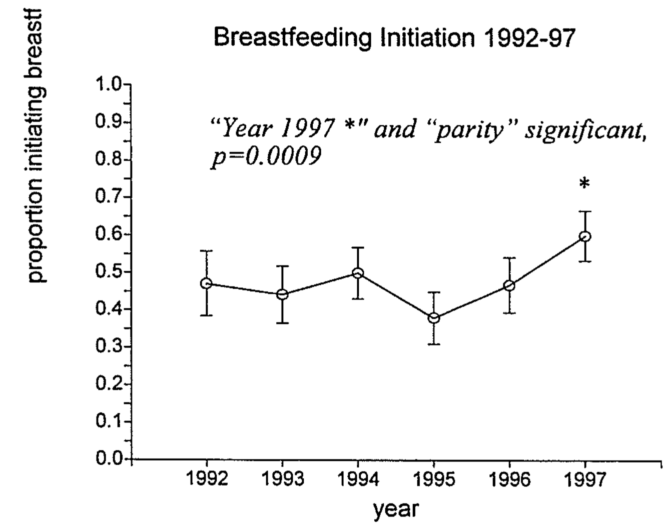


Table 7.2. Breastfeeding initiation rates by year, and by parity (n=283, with 2 records missing "parity" information)

Year	Overall percent initiating breastfeeding (n=283)	Initiation rate for firstborn children (primiparous women) (n=83)	Initiation rate for non-firstborn children (multiparous women) (n=198)
1992	**47%**	41%	53%
1993	**44%**	69%	35%
1994	**50%**	67%	45%
1995	**38%**	58%	32%
1996	**47%**	62%	41%
1997	**60%**	69%	57%
overall 1992-97	**48% ± 6%**	60% ± 11%	43% ± 7%

A logistic regression modelling, with "initiation of any breastfeeding" as the outcome, and with "year", "parity", "birth weight", and the interaction of "parity and year" as explanatory variables, was performed using both step-up and step-down models. Because 10 records were missing "birth weight", 1 was missing "parity", and 1 was missing both "birth weight" and "parity", only 271 of the 283 records were used in the logistic regression modelling. The model was statistically significant ($\chi^2 = 13.98$, 2 df, p=0.0009), classifying 61% of the infant feeding status correctly and identifying "year" (1997 compared to all other years) and "parity" as significant predictors of initiation (See Equation 7.1.). Tables 7.3. and 7.4. give further information regarding odds ratios and probabilities.

Equation 7.1. *ln odds "any breastfeeding initiated" = -0.496 + 0.817(firstborn) + 0.783(year)*

where "firstborn" = 1 if the baby was the firstborn child, and 0 if the baby was not;
"year" = 1 if the year was 1997, and 0 if the year was 1992 to 1996.
Model adjusted for birth weight. p=0.0009

Table 7.3. Logistic regression model for "initiating any breastfeeding" (n=271)

Parameter	β (SE of β)	OR = odds ratio, the exponent of β	95% CI for OR = exp($\beta \pm 2$SE)	χ^2	"p", the significance level of χ^2
intercept	-0.496 (0.166)	0.609	0.44 to 0.85	8.98	0.002
"year" 1=1997, 0=not	0.783 (0.317)	2.19	1.16 to 4.12	6.08	0.01
"parity" 1=firstborn, 0=not	0.817 (0.275)	2.26	1.31 to 3.88	8.8	0.003

Table 7.4. Logistic regression model calculations for the probability of initiating any breastfeeding, for "year" and "parity" scenarios (n=271)

Scenario by parity and year	log odds (calculated using equation 7.1.)	Odds = exponent of "log odds"	Probability of Initiating Any Breastfeeding = odds/1+odds
before 1997, multiparous woman	-0.496	0.609	0.38
before 1997, primiparous woman	0.321	1.38	0.58
during 1997, multiparous woman	0.287	1.33	0.57
during 1997, primiparous woman	1.104	3.01	0.75

Before 1997, the relative risk of initiating any breastfeeding by parity was 1.5, with primiparous women *more* likely to *initiate* breastfeeding (58% versus 38%). During 1997, the relative risk was 1.3, with primiparous women again more likely to initiate breastfeeding (75% versus 57%). Comparing by year, multiparous women were *1.5 times* as likely to initiate breastfeeding in the year 1997 as compared to previous years (57% versus 38%). Primiparous women were *1.3 times* as likely to initiate breastfeeding in the year 1997 as compared to previous years (75% versus 58%).

7.5.2. Community trends in duration rates from 1992-1997

For comparing duration rates from 1992 to 1997, a Cox's Proportional Hazards regression model included "duration of breastfeeding in days" as the outcome variable, with the explanatory variables of "birth weight", "parity" and "year" in a step-wise modelling. The model was not significant even after adjusting for birth weight and parity

($\chi^2 = 7.14$, 3 df, p=0.07), so duration rates did not differ during the years 1992-1997. A second model included "PC program inclusion", and relevant interactions. This was presumably less biased than the analysis in Chapter 4, which only used data from women who agreed to face-to-face interviews and who were not lost to followup. The analysis here includes chart audit data for all women, regardless of participation in the survey. Only 115 of the 117 charts were used, due to difficulties with PC program classification[5]. The model was statistically significant ($\chi^2 = 9.16$, 2 df, p=0.01), including "parity" and "PC program inclusion". Equation 7.2. and Table 7.5. further describes the results. Table 7.6. outlines various scenarios of parity and PC client status.

Equation 7.2. *ln "α" = -0.694(PC) + 0.458(firstborn)*

$$\ln \text{“}\alpha\text{”} = -0.694(PC) + 0.458(firstborn)$$

where "α" is the relative hazard of weaning at any given point
" firstborn" = 1 if the baby was the firstborn child, and 0 if the baby was not;
"PC" = 1 if the woman was a client of the Peer Counsellor pilot program, and 0 if not a client

Model is adjusted for "year" and "birth weight". p=0.01

Table 7.5. Cox's Proportional Hazards regression modelling for the relative hazard of weaning (n=115)

Parameter	β, regression coefficient (SE of β)	exponent of β	95% CI for exponent of β	Z-value	"p", the significance level of χ^2
"PC" 1=PC client, 0=not	-0.694 (0.337)	0.5	0.25 to 0.98	-2.06	0.04
"parity" 1=firstborn, 0=not	0.458 (0.219)	1.58	1.02 to 2.45	2.09	0.037

5 The PC herself gave birth during 1997, and was not considered either "PC client" or "non-client". Another woman who was training to be a PC, and who gave birth in the latter part of 1996, was also excluded.

Table 7.6. Cox's Proportional Hazards regression model calculations for the relative hazard of weaning†, for "PC client" and "parity" scenarios (n=115), using Equation 7.2.

Scenario by parity and PC program inclusion	ln α	Exponent of α (relative hazard of weaning)
multiparous woman, PC client	-0.694	0.5
primiparous woman, not a PC client	0.458	1.58
primiparous woman, PC client	-0.236	0.79
Baseline: multiparous, not a PC client	**0**	**1**

† in a proportional hazards model, only a "relative hazard" of weaning can be calculated, not an actual probability. This is calculated relative to a baseline, which in the case of the model, the scenario when all explanatory variables have a value of 0. For the relative hazard, the baseline is "multiparous woman" and "not a PC client".

Breastfeeding women who were *not clients* of the PC program were 2.0 times *more* likely to wean at any given point compared to PC clients, regardless of parity. Independent of PC program inclusion, primiparous breastfeeding women were 1.6 times *more* likely to wean at any given point compared with multiparous breastfeeding women. Figure 7.3. illustrates the overall pattern of breastfeeding for the years 1992 to 1997. Figure 7.4. further details the pattern of breastfeeding duration by selected time periods: 1992-93 combined; 1994-95 combined; 1996; and 1997. Similar patterns were evident in the first three time periods, with initiation rates around 45%, halving by 2 months to around 22%, and a further halving at 6 months postpartum to around 11%. The pattern was quite different for the 1997 period, with initiation higher at 60%, halving to 30% by 2 months, but sustained to 6 months at 24%. These proportions have 95% confidence limits of about 12%, so "year" was not found to be a statistically significant predictor of differences in breastfeeding duration patterns.

Figure 7.3. Pattern of breastfeeding over the first six months, cumulative data from 1992 to 1997 (n=283)

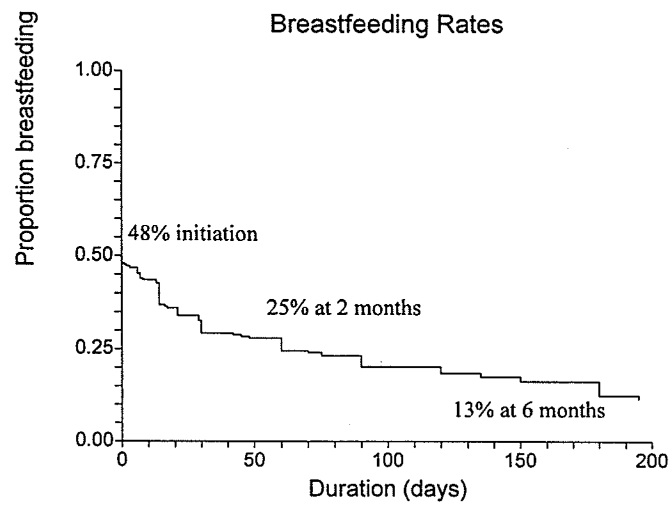


Figure 7.4. Breastfeeding duration patterns of four time periods (sample size): 1992-1993 (n=77); 1994-1995 (n=104); 1996 (n=47); 1997 (n=55)

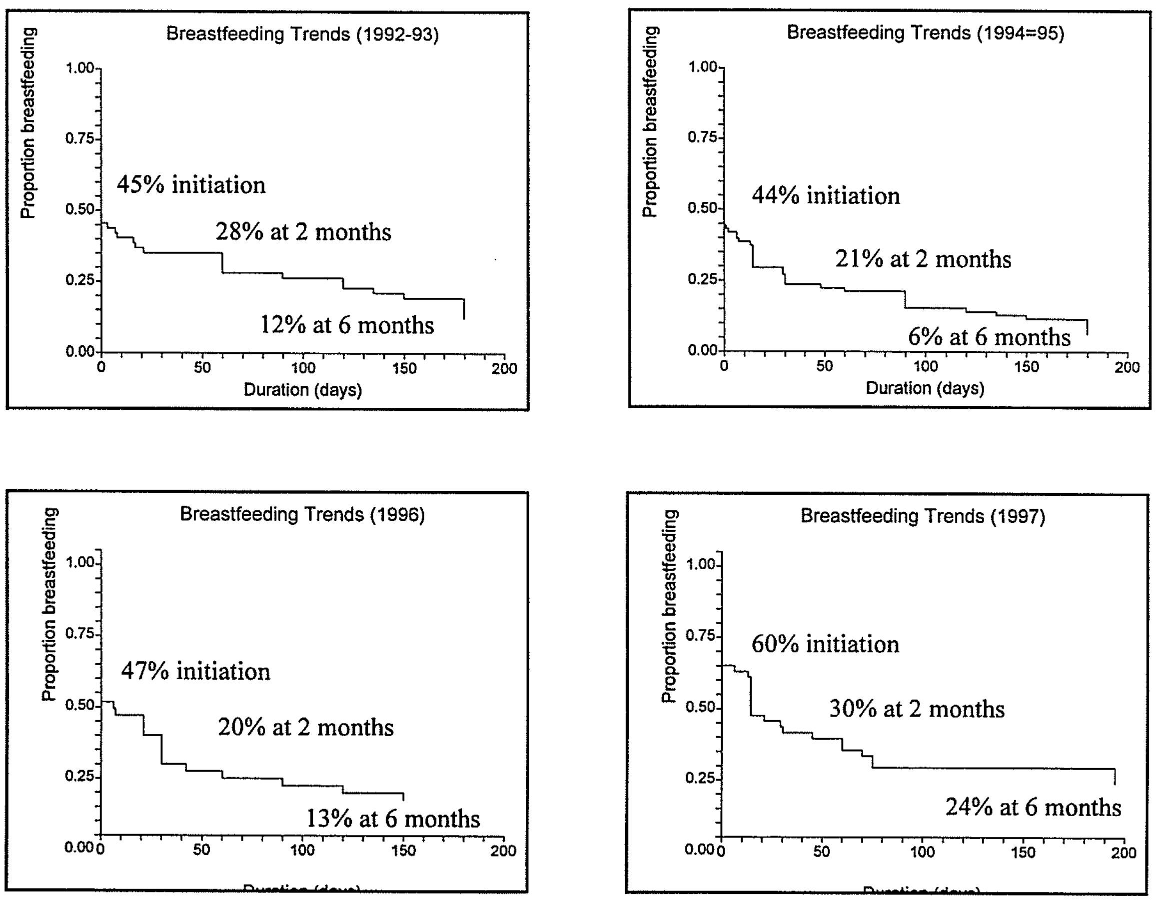


Figure 7.5. illustrates the breastfeeding patterns from 1992 to 1997 separated out by parity. As previously noted, primiparous women were more likely to initiate breastfeeding, but also more likely to wean. The graph illustrates the gap in initiation rates - 60% for primiparous women and 43% for multiparous women. But a greater risk of weaning for primiparas in the first two months produced similar proportions of women breastfeeding at 2 months and 6 months, regardless of parity.

Figures 7.6., 7.7., and 7.8. illustrate the effect of parity, the PC program, and a combination of parity/PC program on breastfeeding duration for those women initiating breastfeeding from 1992 to 1997. Figure 7.6. shows that more primiparous women wean at any given time, with a gap of about 15% consistently. Figure 7.7. shows that over half of the PC clients were still breastfeeding 6 months later (56%), compared with only about one-fifth (19%) of the non-PC clients. And Figure 7.8. illustrates the effect of parity and PC inclusion as four separate groupings. The group at most risk was primiparous women who were not PC clients, and the group at least risk was multiparas who were PC clients. Table 7.7. details the effect of year, parity and PC program inclusion on breastfeeding duration.

Figure 7.5. **Pattern of breastfeeding over the first six months, cumulative data from 1992 to 1997, by parity (n=281; 83 primiparas, 198 multiparas)**

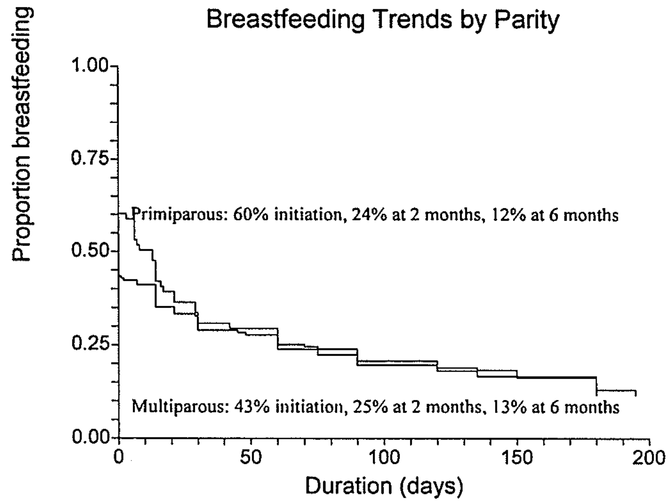


Figure 7.6. **Effect of parity on breastfeeding duration 1992-1997, including only those initiating breastfeeding (n=136; 50 primiparas, 86 multiparas)**

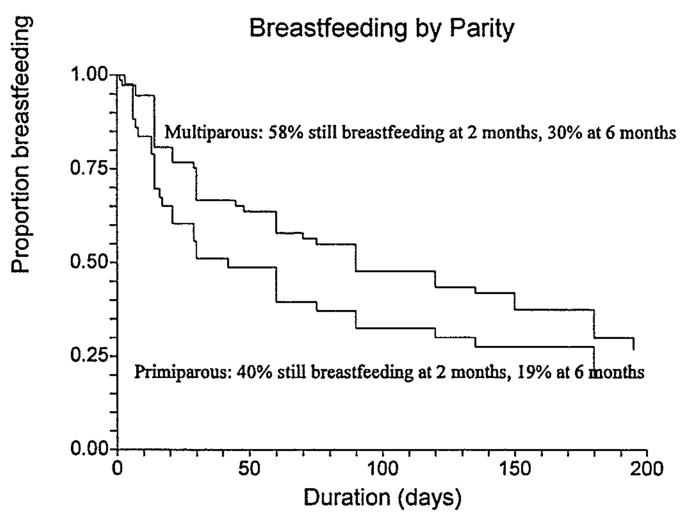


Figure 7.7. **Effect of inclusion in the Peer Counsellor pilot program on breastfeeding duration from 1992 to 1997, including only those initiating breastfeeding (n=134; 116 non-clients, 18 clients)**

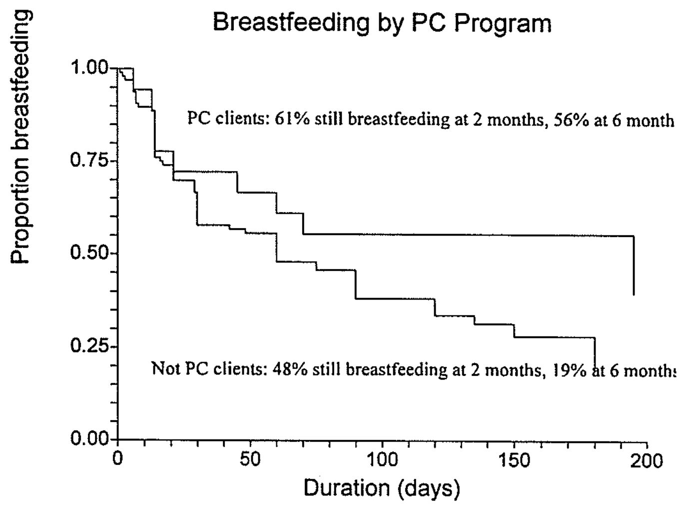


Figure 7.8. **Effect of a combination of parity and PC program inclusion on breastfeeding duration, including only those initiating breastfeeding (n=134; 74 multiparous not client, 42 primiparous not client, 11 multiparous PC client, 7 primiparous PC client)**

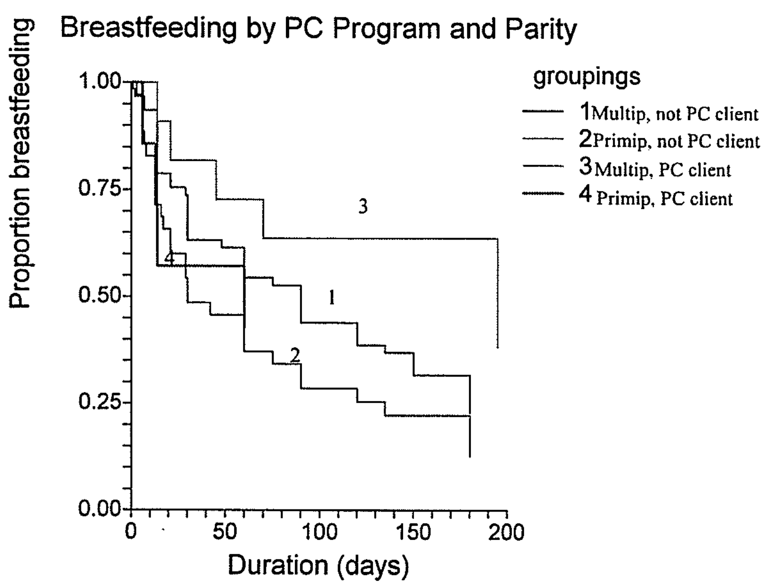


Table 7.7. Initiation, 2-month, and 6-month breastfeeding rates by year, parity, PC program inclusion, and parity/PC program (n=283)

Explanatory Variable	Categories (sample size)	Proportion initiating breastfeeding (SE)	Proportion breastfeeding at 2 months (SE)	Proportion breastfeeding at 6 months (SE)
Year	1992 to 1997 (n=283)	0.48 (0.03)	0.25 (0.03)	0.13 (0.02)
	1992 and 1993 (n=77)	0.45 (0.06)	0.28 (0.05)	0.12 (0.04)
	1994 and 1995 (n=104)	0.44 (0.05)	0.21 (0.04)	0.06 (0.02)
	1996 (n=47)	0.47 (0.07)	0.20 (0.06)	0.13 (0.05)
	1997 (n=55)	0.60 (0.07)	0.30 (0.06)	0.24 (0.06)
Parity	primiparous (n=83)	0.60 (0.05)	0.24 (0.05)	0.12 (0.04)
	multiparous (n=198)	0.43 (0.04)	0.25 (0.03)	0.13 (0.02)
PC program (only those initiating breastfeeding)	non-clients (n=116)	1	0.48 (0.05)	0.19 (0.04)
	PC clients (n=18)	1	0.61 (0.11)	0.56 (0.12)
Parity (only those initiating breastfeeding)	primiparous (n=50)	1	0.40 (0.07)	0.19 (0.06)
	multiparous (n=86)	1	0.58 (0.06)	0.30 (0.06)
PC program and Parity (only those initiating breastfeeding)	multiparous, not PC client (n=74)	1	0.54 (0.07)	0.23 (0.06)
	primiparous, not PC client (n=42)	1	0.37 (0.08)	0.13 (0.06)
	multiparous, PC client (n=11)	1	0.73 (0.13)	0.64 (0.15)
	primiparous, PC client (n=7)	1	0.43 (0.19)	0.43 (0.19)

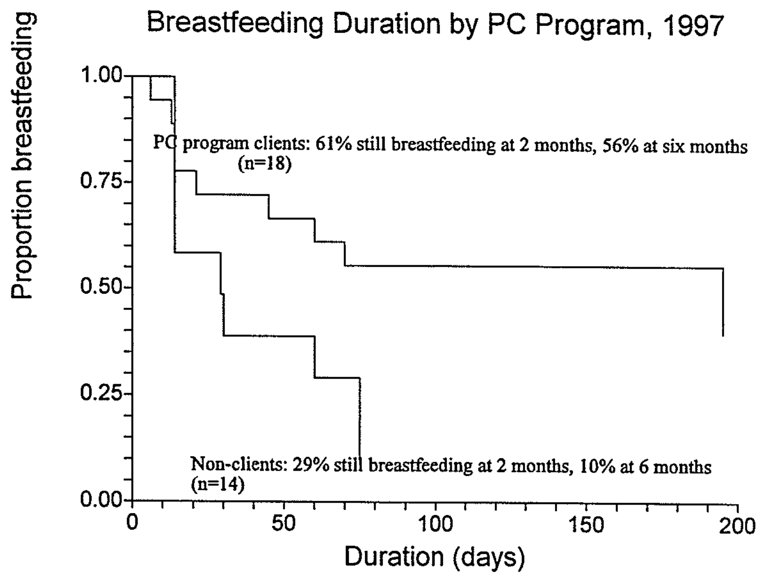
7.5.3. Community trends in breastfeeding for 1996 and 1997

The previous section examined predictors of breastfeeding duration, during the six-year time span from 1992 to 1997. To avoid dilution of an effect through community changes over a six-year period, an analysis will now be included which isolates the years closest to the PC pilot program. This data would presumably be the least susceptible to bias, since fewer records were missing "duration" information. Using the chart audit information for 1997, the sample size was 32, with 18 PC clients and 14 non-clients. A Cox's Proportional Hazards regression modelling (Equation 7.3.) found a significant association between duration and PC program inclusion ($\chi^2 = 4.07$, 1 df, p=0.044).

Equation 7.3.	*$ln\ \alpha = -0.917\ (PC)$*
	where α is the relative hazard of weaning PC = 1 if a client of the Peer Counsellor program, 0 if not Standard Error is 0.451 *Model is adjusted for birth weight and parity. Data is from 1997 only. p=0.044*

The relative hazard of weaning for PC clients was 0.40 (95% CI 0.16 to 0.98), adjusted for parity and birth weight. In other words, non-clients were more than twice (2.5 times) as likely to wean at any given point. Figure 7.9. shows that twice as many women in the PC program were still breastfeeding at 2 months as compared to the non-clients (61% versus 29%). The pattern after two months and up to six months showed a sustained breastfeeding rate for PC clients, but a distinct drop for non-clients (56% versus 11%).

Figure 7.9. **Breastfeeding duration by PC program inclusion, 1997 data (n=32; 18 PC clients, 14 non-clients)**

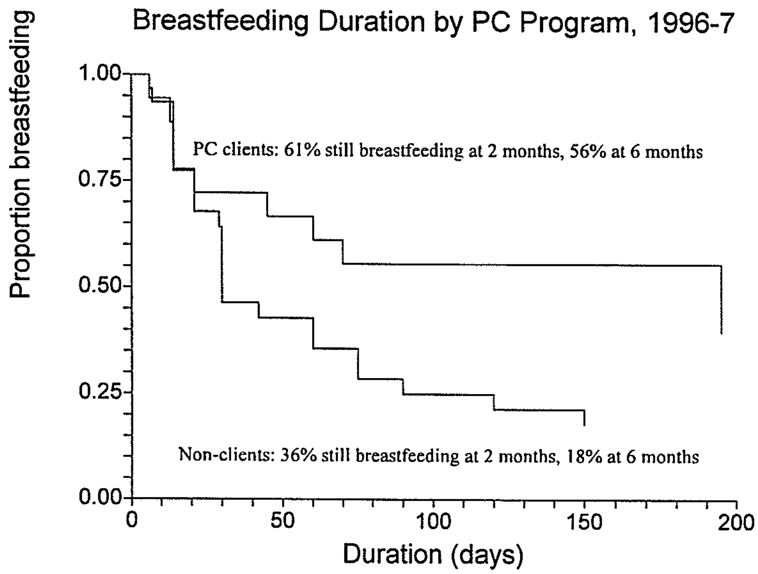


Repeating the analysis with cumulative data from both 1996 and 1997, PC program inclusion was verified as a significant predictor of duration, as illustrated in Equation 7.4. ($\chi^2 = 4.41$, 1 df, p=0.036, n=53; 18 PC clients and 35 non-clients).

Equation 7.4.	*ln α = -0.755(PC)* where α is the relative hazard of weaning PC = 1 if a client of the Peer Counsellor pilot program, 0 if not Standard Error is 0.376. *Model adjusted for birth weight and parity. Data is from 1996 and 1997.* *p=0.036*

The relative hazard of weaning of PC clients was 0.47 (95% CI 0.22 to 0.99), meaning that PC clients were about half as likely to wean as non-clients at any given time. Figure 7.10. illustrates the breastfeeding duration patterns.

Figure 7.10. Breastfeeding duration by PC program inclusion, 1996 and 1997 data (n=53; 18 PC clients, 35 non-clients)



7.5.4. Comparison of current research results with other "benchmarks"

7.5.4.1. Comparison of 1983 and 1992-1997 breastfeeding rates

The only additional historical information available on Sagkeeng breastfeeding rates is in the 1983 national breastfeeding survey of First Nations communities (Stewart, 1985). This survey provided community-specific information, unlike the 1988 First Nations survey (Langner, 1988) which only provided regional rates. In 1983, 26% ± 18% (n=23) initiated breastfeeding, and 5%[6] continued to breastfeed for six months. Percentages based upon small numbers have large confidence intervals. Comparing the

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6

Binomial data, such as "breastfeeding or not", can be assumed normally distributed if $np>5$ and $nq>5$, where n is the sample size, p is the probability of breastfeeding, and q is the probability of not breastfeeding. In this situation, n=23, p=0.05 (or 5%), and q=0.95. So this data does not satisfy the requirement for normality, and 95% CI cannot be calculated as p ± 1.96 SE. (Hassard, 1991)

1983 initiation rate with the current research average of 48% ± 6%, there was no evidence that the rates differed. Only the year 1997 was associated with a significantly higher initiation rate of 60% ± 14%, when compared with the 1983 data. Similarly the 5% six-month duration rate in 1983 was comparable to the six-month rates before the onset of the PC program in 1997. According to Table 7.7., only the 1997 six-month duration rate (24% ± 12%) was significantly higher than in 1983.

7.5.4.2. Comparison of current research results with 1994 research on constructs of the Breastfeeding Decision-Making Model

To investigate community trends, survey scores were compared from 1994 and 1997. One problem was the timing of the measures. In 1994, the survey was given to women in their last trimester of pregnancy. Only "Referent Support"[7] was repeated at two weeks postpartum, along with measures of "Satisfaction with Breastfeeding" and "Number of Verbalized Problems with Breastfeeding". In the 1997 research, all measures were taken at 4 to 8 months postpartum, and only included those women who initiated breastfeeding. As to concerns about selection bias, response rates (numbers in the research divided by total births of that period of time recorded in Sagkeeng) were similar in both studies - 63% (22/35) in 1997 and 63% (20/32)[8] in 1994.

7

It has been demonstrated (Martens, 1994) that Referent Support scores were reliable from prepartum to early postpartum (n=35, 5.2 vs 4.6; paired t-test, t=0.92, p=0.4, NS).

8

The response rate recorded for the 1994 research was 98% (Martens and Young, 1997). But this included those who completed a prospective survey including the Breastfeeding Decision-Making Model constructs, and a retrospective survey for those missed prenatally, which only included demographic and breastfeeding information.

Table 7.8. indicates that on a community level, two measures increased over time - "Breastfeeding Beliefs" (p=0.001) and "Referent Support" (p=0.0002). "Satisfaction with Breastfeeding", "Breastfeeding Confidence" and "Bottle Feeding Beliefs" also showed small, but non-significant changes over time.

Table 7.8. Comparison of 1994 (Martens, 1994) and 1997 results of those initiating any breastfeeding

Latent Variable	Results of those *initiating any breastfeeding*: 1994 research mean (SD)		Results of those *initiating any breastfeeding*: 1997 research mean (SD)			Statistical comparison of columns (a) and (b): unpaired t-test unless indicated
	Overall four communities, n=22	**(a) Sagkeeng First Nation only, n=12**	**PC clients, n=13**	**non-clients, n=9**	**(b) Overall n=23**	
Breastfeeding Beliefs	40.9 (5.4)	38.4 (3.1)	43.4 (4.1)	42.7 (4.8)	43.2 (4.2)	t=3.47, 33 df, p=0.001*
Breastfeeding Confidence	54.9 (12.1)	54.3 (11.5)	58.9 (9.3)	57.3 (6.5)	58.5 (8.1)	t=1.26, 33 df, p=0.22
Referent Support (postpartum)	5.8 (2.7)	5.3 (2.9)	10.7 (4.6)	11.0 (2.9)	10.7 (3.9)	t=4.2, 33 df, p=0.0002*
	[referent support measured at 2 weeks]		[referent support measured at 4 to 8 months]			
Bottle Feeding Beliefs	24.0 (5.8)	24.9 (4.9)	22.5 (5.7)	26.2 (7.7)	23.9 (6.6)	t=0.48, 33 df, p=0.63
Satisfaction with breastfeeding		Median 4	Median 5	Median 4	Median 4.25	Mann Whitney U test, 32 df, p=0.06
Number of verbalized problems		Median 2	Median 1	Median 2	Median 2	Mann Whitney U test, 33 df, p=0.73

7.6. Discussion

Looking at the breastfeeding rates in the past two decades, the "loss" of breastfeeding could be construed as one facet of the deep sense of loss of culture in First Nations communities. In one analysis of the discourse of First Nations women, an idiom of loss was presented as three themes - grief, feelings of deprivation, and sadness (Willms et al., 1992). Women expressed grief over lost traditions, dreams and hopes. Feelings of deprivation, including a culture of poverty, and neglect by medical professionals and undertrained, overbusy community health workers, led to feelings of emptiness and depression. Feelings of sadness were created by the irresponsibility and pollution around them.

Current problems of First Nations women in Canada underscore the interaction between health and social issues. Aboriginal women have identified many threats to their mental and physical health, and a loss of the traditional and spiritual values resulting from poverty and a residential school "syndrome" which severed the bonds of family and community (The Federal/Provincial/Territorial Working Group on Women's Health, 1993). The residential school experience (see Chapter 1) was an attempt of the dominant culture to eradicate the First Nations culture. In the physical separation of child from family and community, there was a "severing of the artery of culture that ran between generations and was the profound connection between parent and child sustaining family and community". This resulted in people with poor self-images, problems with depression, and poor parenting skills (Royal Commission 1996:365, 376, 379).

Sagkeeng women associated low breastfeeding rates to lost tradition. As one

Sagkeeng woman said:

> "the way I saw it, there weren't very many people breastfeeding ... out here. And the way I look at it, too, is because of the residential school ... it seemed that they had to lose most of their traditional ways" (line M1959-62).

And the loss of the culture of breastfeeding produced a community decidedly unsupportive of breastfeeding women:

> "People look at you like you're weird. You can't really socialize 'cause people think {breastfeeding} is dirty or something, or strange ... They think it's wrong. But I don't see no wrong in it - for the child you're doing that" (line M1306-11).

So there was a feeling of the "lost art of breastfeeding" in Sagkeeng. In the Report of the Royal Commission on Aboriginal Peoples Volume 1 (1996:663), a quote by an elder puts this idiom of "loss" into a new perspective of something *forgotten*, not lost:

> "When I hear people say 'We've lost this; we've lost that', I do not believe that. We have not lost anything, we have just forgotten ... we are coming out of a big sleep ... We are waking up, and it's a beautiful thing, to wake up and see we are alive, we are still here."

This *act of remembering* requires culturally appropriate teaching. Aboriginal culture is predominantly an oral culture, in contrast with the predominant reliance on the written word in the non-Aboriginal societies. And an oral culture requires, for the most part, personal contact in a context shared by speaker and listener. It is important how something is said, not just what is said (Royal Commission on Aboriginal Peoples, 1996).

The Sagkeeng breastfeeding promotion strategies were multi-level, yet also had similarities. There was a heavy reliance on the oral tradition - the use of a video, the individual teaching of the community health nurse, the Peer Counsellor and the hospital nurses, the "telling of stories" to adolescents by a breastfeeding woman. There was also an emphasis on how something was said, not just what was said, in terms of role-modelling - the breastfeeding women of the community being role models to other women, the hospital environment role-modelling breastfeeding as the norm, the video role-modelling breastfeeding as the way in which to feed babies. There was also a 'sense of remembering', like the Peer Counsellor herself points out:

> "{an author} said how to get back to our culturalness. We have to volunteer and show the old ways of living. And for me that just reinforces my attitude about this breastfeeding Peer Counsellor program, eh? I'm doing my part by teaching culturally appropriate methods of feeding, which is breastfeeding. And the way to reinforce that is to volunteer, teach people what you know, and that's what I'm doing. And I really, really like that concept ... to get back to that, we all have to get back to do our part and teach" (lines 5865-76)

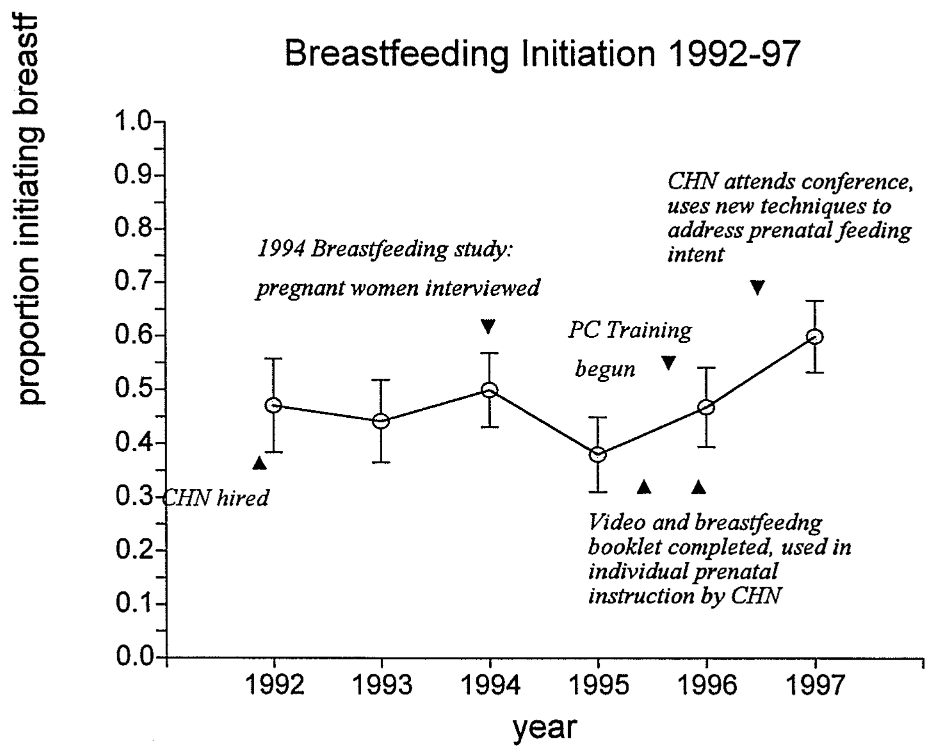
The emphasis on 'remembering' breastfeeding and returning to a culture of breastfeeding as the cultural norm requires changing the culture of a community and society.
As detailed in Chapter 2, the social feminist approach to breastfeeding encourages an examination in the way which societal structures and institutions affect breastfeeding. The outcome of a social feminist analysis of breastfeeding would be the creation of conditions "that make breastfeeding possible, successful and valued in a given society" (Van Esterik 1989:211).

But for that outcome to occur, there is a complex interaction of interventions at all levels of that society - at the individual, family, community, institutional and national levels. The frameworks of McKinlay (1993), and of the Medicine Wheel (Bartlett, 1995), reinforce the need for change at all levels simultaneously in order to see change occurring within society. Focussing on each piece of the wheel, so to speak, may elicit limited change but may not create the synergistic effect needed for macro-change at societal levels. reflected the return to the traditions of First Nations peoples. But the question foremost in this discussion is this - did it work? Did Sagkeeng's individual intervention strategies work? Did the synergistic effect work? Was there change in the way in which breastfeeding was perceived within Sagkeeng? Was there an increase in breastfeeding rates? And the answer is probably not definitive. Yes, there was evidence of change. Yes there was evidence of a change in perception, a change in the community breastfeeding rates, and positive change for specific interventions. Time will tell if these changes were reactions to being "researched", or truly changes which will be self-sustaining and ongoing, moving forward as a synergism of the wheel and not as individual spokes. Details of the observed changes in breastfeeding rates will now be discussed, in context of a community interaction.

7.6.1. Community trends in breastfeeding initiation rates, 1992-1997

The interpretation of the community trend data was facilitated by qualitative information (see Table 7.1.) on breastfeeding initiatives within Sagkeeng First Nation from 1992 to 1997, in the context of qualitative information. Figure 7.11 illustrates the trends in the initiation rates from 1992 to 1997. Women were about 1.5 times more likely to initiate breastfeeding in 1997 compared to previous years (see Table 7.4). The trend in rising breastfeeding rates from 38% in 1995 to 60% in 1997 followed the breastfeeding promotion strategies of producing a community video and booklet, using this booklet for prenatal education by the CHN, and subsequent refinement of prenatal educational teaching strategies by the CHN in 1996.

Figure 7.11. **Breastfeeding initiation trends from 1992-1997, with breastfeeding promotion activities noted**



Although breastfeeding rates showed a downward, but not significantly different, trend from 1992 to 1995, the relationship of the 1994 research with an "upward blip" in the trend seems intuitively correct. Research is known to be reactive (Campbell and Stanley, 1963), so the rise in breastfeeding during 1994 may have been a result of the prospective prenatal survey influencing postnatal infant feeding decisions. During the research intervention period of seven months (December 1993 to June 1994), the Sagkeeng initiation rate was 57% - higher than any year except 1997.

Producing a video and breastfeeding booklet would directly affect women who were *given* the resources. In Chapter 4, about half of the interviewed women mentioned printed/video resources and 1/3 of the women viewed these as useful. One randomized experiment on the effectiveness of printed material (Hauck and Dimmock, 1994) found that breastfeeding pamphlets were very effective for women who intended to breastfeed less than 6 months. Because the majority of women in Sagkeeng breastfeed for less than 6 months, they could probably benefit from video and booklet resources.

The pamphlet and video may also have *indirectly* affected breastfeeding initiation rates by helping the CHN "do a better job" of conveying the breastfeeding information prenatally. This idea was reinforced by the CHN herself: "The booklet has been a great resource for myself and as a teaching tool for the moms when I do the prenatal". The CHN had attended two breastfeeding conferences, and began to incorporate different teaching strategies into her individual prenatal teaching sessions. She noted a change in her own attitudes about the importance of breastfeeding, and this increased interest in prenatal educational efforts possibly affected breastfeeding initiation rates from 1995 to 1997. As noted by the CHN:

> "I can basically say I knew nothing when I started and that's why I thought, 'breastfeeding study'? ... there's so much more involved in it than I would have dreamed of. I thought it would be boring but it certainly wasn't."

The video and booklet may also have had an indirect community effect. Inclusion of several community members - women, men, elders - may have created extended family and peer interest in breastfeeding. The Sagkeeng School intervention (see Chapter 5) also exposed Grades 7 and 8 students to the video and booklet.

Because PC clients only included women *who had initiated breastfeeding*, the PC program was not a direct factor in increasing initiation rates in 1997. But the program could have increased the role-modelling to pregnant women and the diffusion of information indirectly through PC trainees and through clients of the PC program.

These synergistic effects could create a community awareness of the importance of breastfeeding, with a subsequent rise in initiation rates. The possibility of a community effect was supported by a comparison of the 1994 and 1997 survey results. In the Masters research (Martens, 1994), predictors of intent/initiation of breastfeeding were "Breastfeeding Beliefs", "Breastfeeding Confidence", "Referent Support", and "Informational Support" (see Chapter 1 and Appendix 1). The community overall scores for "Breastfeeding Beliefs" and "Referent Support" both increased from 1994 to 1997, which could have a community effect of increasing initiation rates. Although "informational support" (Hughes, 1984) was not measured in the 1997 research, the awareness of the video and booklet as well as the other information given during prenatal instruction, could presumably have increased the support available to prenatal clients.

Breastfeeding in Sagkeeng is not just an individual choice. A woman's choice is made in the context of a family and a community, and reflects whether or not she is supported by her society. In contrast to the comments of unsupportiveness for breastfeeding in 1994, some women in the 1997 research told about support from family and friends. Here is one woman's experience:

> "[What was breastfeeding like for your family ... what did they think about this?] Oh, my grandmother just loved it. She just bragged about it. Yah, she really bragged about it ... She'd phone her friends on the phone and say, 'Oh, she's giving the baby Tutu Shabu'. Tutu Shabu means your breast, the breast. ... She said it in Indian, eh, talking to her friends on the phone. She was so proud of me ...besides {my cousin}, I'm the only other one that really breastfeeds ... {My husband} liked it. Like, you know, it didn't bother him. .. He knew it was the best thing for the baby. He wasn't ashamed of me when I'd go somewhere. Like it didn't bother me to breastfeed my baby in public, or in front of other family members." (lines 765-784)

7.6.2. Community trends in breastfeeding duration rates, 1992-1997

Breastfeeding patterns from 1992 to 1997, showed an average initiation rate of 48%, halving to 25% at 2 months, and halving again to 13% at 6 months postpartum. First-time mothers were about 1.5 times more likely to wean compared to multiparous women. But in 1997, the initiation rate was increased to 60%, and most women breastfeeding at 2 months continued until 6 months or beyond (30% at 2 months, 24% at six months). Further analysis indicated that the 1997 effect was associated with the PC program. Clients of the PC program were only half as likely to wean at any given point when compared to non-clients, regardless of parity. So in terms of Health Centre initiatives from 1992-1997, the CHN's prenatal educational strategy was associated with an increased initiation, and the PC program was associated with an increased duration. This is probably the most *direct* explanation of changes in breastfeeding patterns.

But synergistic effects with community intervention strategies may have also contributed to the increased duration on a community level. The hospital education strategy in Pine Falls Health Complex resulted in greater Baby-Friendly Hospital Initiative Compliance (see Chapter 5). BFHI policies have been associated with an increase in duration of full breastfeeding (Saadeh and Akre, 1996; Powers et al., 1994; Wright et al., 1996; Enyingi et al., 1993), although causation is debated. As well, the PC training program may have been be effective in increasing the social support for breastfeeding, thereby increasing breastfeeding rates. Beyond direct PC contact with postnatal clients, the program provided training for several women who did not become Peer Counsellors. As the PC trainer describes these women:

> "I have confidence that they'll still reap the benefits for the community, because they'll still help their sisters or their nieces or their cousins or their daughters. And so the whole community wins." (lines 5027-30)

Community surveys from 1994 and 1997 also indicated an increase in "Referent Support". The Breastfeeding Decision-Making Model (Martens and Young, 1997) found that breastfeeding duration was associated with beliefs, confidence and social support - Referent Support being one of the best predictors. So the societal conditions favoured an increase in breastfeeding duration. "Breastfeeding Beliefs" and "Referent Support" can be considered "community" concepts, that is, changes in the cultural beliefs of Sagkeeng which enabled the community to value breastfeeding and support the breastfeeding woman. These constructs were hypothesized as "changeable" through the community video, booklet, prenatal instruction, the PC program, and adolescent education. The 1997 Sagkeeng Referent Support score of 10.8 showed a dramatic change from the 1994 result of 5.3. A score of 10.8 could be interpreted like this: on average, those people with whom a woman complied most of the time (rated 5 out of 7, where 7 is "all of the time") were also very supportive of breastfeeding (rated 2, with possible responses from -3 to +3, with +3 being definitely breastfeed).

Qualitative data verifies the beginning of a possible cultural shift within Sagkeeng. There were comments about the shared experience of breastfeeding with friends or relatives:

> "Yah, my boyfriend's sister, we had our babies {a few} months apart and we talked about breastfeeding 'cause she never breastfed before. So I talked to her about breastfeeding and how it's cheaper to breastfeed, too. So she's breastfeeding, too."

> "My sister, well she wants to breastfeed her baby when she has a baby now that she's seen me breastfeeding."

There were comments about breastfeeding women being defended from criticism:

> "...but my brothers have this, like they said, 'I don't mind when a woman breastfeeds a baby. It's just that, like in a mall for instance, they can go to the bathroom.'. Or he says 'they can go somewhere else, but not like in a cafeteria or like where people eat.' And like my mom would say, 'Like, well are you going to go eat in a bathroom, do you want to eat in a bathroom?' [So your mom really defends it?] Ya, she believes that like if you're breastfeeding, that's your baby's meal, right? So why should you have to take your baby somewhere else to feed your baby ... she's doing the same thing you're doing."

Even though males were perceived at times as not supportive of breastfeeding, there were comments about male partners and their collective "sharing of information":

> "My husband, he has friends. Like their wives breastfed, and he come back and give me a little tip 'well this is what so and so said to do if this happens'. [that's neat] It, it was just something that I thought guys wouldn't talk about, eh?

And there were comments about women receiving breastfeeding information and support, and being able to "pass along" the "remembered art" of breastfeeding:

> "A couple of my friends came in and I told them I was going to breastfed. And they said 'Well try him'. And I said, 'well what do I do?'. She said 'just put him there, put him by your breast'. So I put him by my breast and he started sucking right away. So then that was it. I just put him by my breast every time I felt that he wanted to eat. [So, it was your friends that helped you start?] Yah."

> "I felt more confident about breastfeeding {when the PC phoned me}, about breastfeeding everywhere. ... But my sister-in-law breastfed too ... When {we} go play baseball or something, I give {my baby} a little breast, yah. So there was both of us."

> "Oh, my grandmother just loved it. She just bragged about it. Yah, she really bragged about it ... She'd phone her friends on the phone and say 'Oh, she's .. giving {the baby} Tutu Shabu, the breast ..."

So even though there was evidence of a bottle feeding culture in Sagkeeng (see Chapter 4), there is also evidence of a possible shift to the creation of conditions that make breastfeeding possible, successful and valued.

7.6.3. Limitations and strengths of the initiation and duration trend data

Initiation and duration rates were both examined over time, superimposing information obtained from qualitative observations. This "time trend" analysis could have internal validity problems in the form of "history", that is, events other than the interventions could have been the cause of the observed outcomes. One argument for validity lies in the triangulation of qualitative and quantitative data. The chronology of community breastfeeding promotion initiatives was documented independent of, and "a priori" to, the chart audit. The direct correspondence to observed quantitative trends in both initiation and duration tends to strengthen the internal validity of the associations.

Another "strength" of the data lies in the fact that the same CHN did the prenatal and postnatal visits from1992 to 1997. So the decreasing initiation rates from 1992 to 1995, and increasing rates from 1995 to 1997, occurred during one person's influence. This would strengthen the argument that change in the CHN's prenatal education approach was associated with, and possibly causally related to, change in initiation rates. The CHN's self-reported lack of training in breastfeeding information, and lack of time to help postnatal women other than at the initial visit, makes the lack of association between breastfeeding duration and "year" plausible Similarly, direct chronological association of the PC program with increased duration also strengthens its claims for causality.

The effect of the reactivity of testing as an alternative hypothesis explaining observed trends of initiation and duration may be somewhat discounted because of the inclusion of the Masters research year, 1994. No statistical difference in initiation or duration rates was found between 1994 and the years 1992 to1996. So the increase in 1997 initiation and duration rates was due to an effect beyond simple reactivity to testing.

Another major limitation of the data lies in the fact that the CHN, PC and myself were all aware of the evaluation research. This could presumably affect the efforts of the CHN and PC so that the program results could be influenced by "over-achievement" due to the fact that they knew it was being evaluated. So, too, I collected the data from the face-to-face interviews, and I may have subtly affected the outcomes. Presumably the quantitative survey tool, administered in a standard way, would be less susceptible to researcher bias, but the possibility of bias cannot be totally discounted.

Another competing hypothesis in this study is a type of "maturation" bias.

Knowing that if a woman decides to breastfeed her first child, she is more likely to breastfeed successive children, and knowing that the CHN began more proactive breastfeeding teaching around 1995, the snowball effect of those original primiparas receiving breastfeeding education prenatally would begin to show an effect as they had successive children. Therefore, one would hypothesize an increase in community initiation rates as the primiparas became multiparas. This would have nothing to do with the community interventions, other than the CHN *prenatal* input over time. A rebuttal to this argument may be found in reference to Table 7.2., where the initiation rates for multiparous women from 1992 to 1997 stayed around 40% from 1993 to 1996, with a statistically significant jump to 57% in 1997. Assuming that women often give birth within two year intervals or less, one would expect to see a gradual climb much sooner than 1997. Instead, a "steady state" effect was observed, with one dramatic jump in 1997. This would concur with the primary hypothesis that the CHN's prenatal education and resources after 1995 was the intervention which caused the observed increased initiation rates. With duration rates, no observable differences between "year" occurred either for primiparas or multiparas, until the onset of the PC pilot program. There did not seem to be any cumulative effect of "maturation" on duration rates.

7.6.4. Comparison to literature

Increases in breastfeeding initiation rates have been associated with prenatal instruction by both health care providers and peer counsellor (see Chapter 3 and Appendix 3). In experiments involving randomized trials, quasi-experimental designs, and historical controls, the effects have ranged from 17% to 32% increase in low-income and recent immigrant populations. First Nations studies have had increases from 9% in a community-based intervention not involving direct prenatal instruction (Wright, 1998) to 14% in a peer counsellor prenatal program (Long et al., 1995), and inconsistent results in a study by Glor (1987). In comparison, from the low initiation rate of 38% in 1995 to the high of 60% in 1997, the "treatment effect" of Sagkeeng's prenatal education would be 22%. From an average initiation rate (1992 to 1995) of 45%, the "high" in 1997 showed an increase of 15%. So the results correspond with effects in the literature, where health care provider or PC prenatal teaching interventions demonstrated 14% to 32% increases for low-income women. At a community level, Wright et al. (1998) found that increased awareness through health promotion campaigns and education for health care providers was associated with an increase of 9% in the Navajo community's breastfeeding initiation rates. So despite competing hypotheses of community awareness in the Sagkeeng research, the large observed effects (15% to 22% increases) would probably not be completely explained by indirect community awareness.

A consistent association of PC program inclusion with increased duration of breastfeeding was found, with the risk of weaning at 0.4 to 0.5 that of non-clients (depending on the comparison group used). Sagkeeng trends indicated that the CHN's prenatal teaching and regular postpartum contacts were not associated with statistically significant increases in duration rates. This may be similar to the findings of Rossiter (1994), where prepartum health care provider education for Vietnamese immigrant women in Australia was associated with a large increase in initiation, but no effect on duration for those women initiating breastfeeding. Looking at the association between PC program inclusion and duration rates, the minimum treatment effect noted (when all six years' data were combined) was an increase of 13% at two months (ranging up to 32% in 1997) and an increase of 37% at six months. In the year 1997 alone, duration rates were 32% higher at two months, and 46% higher at six months, for PC clients compared to non-clients. This is similar to programs for WIC low-income women in the USA (Brent et al., 1995; Kistin et al., 1994; Sciacca et al., 1995) where breastfeeding rates increased of about 30% at months 2, 3 or 6 for women receiving postpartum help either through PC or health care provider. A Canadian study (Lynch et al., 1986) involving health care provider visits up to 6 months found an increase of 21% in six-month duration for those women who only made an infant feeding decision after the first trimester of pregnancy. This may generalize to Sagkeeng, where over one-third of the women in their third trimester of pregnancy had not made an infant feeding decision (Martens, 1997).

7.7. Summary and policy recommendations

In the community of Sagkeeng First Nation, breastfeeding initiation rates reached a statistically significant high of 60% in 1997, with women 1.5 times more likely to initiate breastfeeding in 1997 compared to the previous five years. Primiparous women were about 1.5 times more likely to initiate breastfeeding in any given year from 1992 to 1997, but were also 1.6 times more likely to wean compared to multiparas. The increase in community initiation rates was associated with promotion efforts by the people of Sagkeeng, including the production of resource materials, the PC program, and changes in the CHN's prenatal breastfeeding education. PC clients were half as likely to wean at any given time compared to those not in the PC program, independent of parity.[9]

Recommendations:

- that the CHN continue the prenatal breastfeeding education, using the Sagkeeng video and booklet and incorporating the approach based on the research of Hartley et al. (1996).
- that the prenatal education by the CHN be extended from the primary focus of primiparous women to include multiparous women with no breastfeeding experience, and eventually to include all pregnant women if time permits
- that the PC program of postnatal contacts continue to include all women who initiate breastfeeding, regardless of parity.
- that the PC should consider primiparous women as "high risk" for weaning in the early weeks
- that Sagkeeng First Nation Health Centre continue to keep records on initiation and duration of breastfeeding, so trends can be documented and programs can be evaluated for effectiveness

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After the results of the PC pilot program evaluation were shared with the Board of Directors in April 1998, the Sagkeeng Health Centre Board voted to fund the Peer Counsellor program. A CHN was hired in May 1998 to replace the CHN who retired in December 1997. This CHN was given the mandate of overseeing the PC program as part of her perinatal education work.

7.8. Conclusion: Coming Full Circle

A community intervention strategy is not a neat-and-tidy setting for an evaluation researcher. It is not a tightly controlled experiment. It is only visible as separate spokes, yet only understandable as the entire but unmeasurable wheel. The symbolism of the Medicine Wheel (Royal Commission on Aboriginal Peoples, 1996:647) speaks to the dilemma of breaking down constituent parts, yet striving for a holistic view:

> "The lines intersecting at the centre of the circle signify order and balance. They help people examine experience by breaking down complex situations into constituent parts, while reminding them not to forget the whole. The centre of the wheel is the balance point where apparent opposites meet. The flags at the ends of the intersecting lines signify the four winds whose movement is a reminder that nothing is fixed or stagnant, that change is the normal experience and transformation is always possible."

A program evaluation is an evaluation of real life - the life of a group of people that want their community to change and grow, knowing that nothing is stagnant and that transformation is always possible. Despite the inevitable growing pains that come with change and growth, there was a sense of excitement and a sense of empowerment in the collective "remembering" of Sagkeeng:

> "I've learned a lot. It's opened a lot of doors. It's made me learn more about health ... It's been a positive experience, this breastfeeding knowledge of being a counsellor. And my husband is very proud of me, yah, very proud of me."

> "I always come away feeling so energized, and the counsellors have felt the same. They really have felt very motivated after we've had meetings. And it's just being together."

A breastfeeding promotion strategy requires incorporating the upstream, midstream and downstream framework of McKinlay (1992) - the individual, family, community, institutional levels of the Sagkeeng strategy. It requires addressing the political as well as the personal, in social action which makes breastfeeding "possible, successful and valued in a given society"(Van Esterik, 1989:211). It requires the holistic approach of the Medicine Wheel (Bartlett, 1995), including all ages, all dimensions of "knowing" (mental, physical, emotional, spiritual), and all aspects of community life (political, economic, social, cultural). But most important of all, it requires commitment, especially by the women of the community, as they make the journey from forgotten traditions to remembered, shared experiences.

> "I said, 'the history's all written by men mostly, you know, the priest, historians.' And the elder kind of laughed, and she said, 'They think they make the world, but they don't make the world. It's us women that make the world, because we give life. And we maintain that life by breastfeeding.'"

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Appendices

Appendix 1. The Breastfeeding Decision-Making Model

The Breastfeeding Decision-Making Model (Martens and Young, 1997) was based upon previous decision-making models of Ajzen and Fishbein (1980), Liska (1984), Fieldhouse (1982), and Bandura (1986). This model was tested in my Masters research (Martens, 1994; Martens and Young, 1997). Women were interviewed prospectively seven times, from the last trimester of pregnancy to three months postpartum. Outcome measures included whether or not they initiated breastfeeding, and if so, how long they continued to breastfeed. Explanatory variables included operationalized constructs of the Breastfeeding Decision-Making Model, as well as selected items such as a measure of resources, satisfaction with breastfeeding, and number of breastfeeding problems the women experienced. The figure illustrates the generic model, and models for breastfeeding initiation and duration.

The model demonstrated strong construct validity and criterion-related predictive validity for choices of breastfeeding initiation and duration. The three constructs of "maternal beliefs", "maternal confidence" and "referent support"[1] were all highly significantly associated with a woman's *intent* to breastfeed, which in turn was highly associated with the actual choice to *initiate* breastfeeding. Similarly, all three constructs were highly associated with actual *duration* of breastfeeding.

The best unique predictors were determined through appropriate multivariate

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1

"Maternal beliefs" was a measure of a woman's beliefs in the benefits of breastfeeding. It was operationalized using a sum of 10 questions rated on a 5-point Likert scale, representing health and economic benefits of breastfeeding. For example: rated from strongly disagree to strongly agree, "Breastfeeding would provide the best food for the baby".

"Maternal confidence" was a measure of how confident a woman was in her ability to breastfeed. This is sometimes referred to as a "self-efficacy" measure (Bandura, 1986). It was operationalized using a sum of 17 questions rated on a 5-point Likert scale, representing the confidence a woman feels about performing the task of breastfeeding given different circumstances. For example, rated from "very unsure" to "very sure", "Would you feel confident about a woman breastfeeding if she is in a public place?"

"Referent support" was a measure of social support for breastfeeding. It was operationalized using the product of two scales, one the breastfeeding-supportiveness of a list of 7 people involved with the mother, and the other the maternal compliance rating with the wishes of these people. For example, the breastfeeding supportiveness of, and maternal compliance with, her own mother or her male partner.

analyses. Best predictors of *intent* to breastfeed were "maternal confidence" and "previous breastfeeding experience". Best predictors of breastfeeding *initiation* were "maternal confidence" and "breastfeeding intent".

The best predictors of breastfeeding *duration* included "referent support" and "satisfaction with breastfeeding". "Satisfaction" was measured at two weeks postpartum, using a five-point Likert scale (very unsatisfied to very satisfied). Satisfaction was also highly correlated with the number of breastfeeding problems a woman verbalized at the two-week postpartum interview.

The only measure of "resources" which was statistically associated with initiation was "informational support"[2], which measured a woman's access to breastfeeding information. Most hospital policy and practice variables were not statistically associated with duration, but post-hoc analysis did demonstrate a two-fold risk of weaning by one month when women received gifts of pacifiers, formula, or both upon hospital discharge. Contrary to World Health Organization recommendations (WHO, 1981; WHO, 1986), 78% of the breastfeeding women received these inappropriate gifts.

Demographic and lifestyle indicators which were associated with maternal beliefs, confidence and referent support included whether or not a woman had previously breastfed, and in which community the woman resided. "Previous breastfeeding experience" elevated the maternal confidence scores. The social support for breastfeeding (measured by "referent support") was significantly different for the four communities in the study, and low perceived social support was associated with low community breastfeeding rates.

2

The construct, "informational resource" (adapted from Matich and Sims, 1992), was a measure of the breastfeeding information available to the woman. It was operationalized using a five-point Likert scale rating of five statements preceded by the phrase, "I have somebody who ...". These five statements were (a) gives me information, suggestions and guidance about feeding baby; (b) tells me where I can go to get help for a problem; (c) tells me what I can expect in situations that are about to happen; (d) teaches me how to do some things like feeding baby; and (e) tells me what they did in a situation similar to mine.

Appendix 2a. The effect of breastfeeding on infant health in industrialized nations, from the last decade of research

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Respiratory infections, diarrhoea, wheezing, otitis media, hospitalizations					
Wilson et al. (1998)	Dundee, Scotland n=545/674 mean age = 7.3 years	respiratory illness (RI), systolic blood pressure, wheezing	adj. For SES, family history of allergy, gender, smoking. BP data adjusted for BMI, gender, maternal blood pressure. diagnosis by infant feeding: excl. bf*for 4 months / partial bf / ff* ever having RI: 17% / 31% / 32% mean systolic bp: 90.3mm / 90.9mm / 94.2mm wheezing associated with introduction of solids before 15 weeks; 21% if solids introduced vs. 10% if not dose-response of amount of bf with proportion ever having RI ($p<0.01$) or currently having RI ($p<0.05$)	follow-up study using demographic data collected at ages 0-2 years prospectively	Protective to exclusively breastfeed for at least 4 months. Authors note that the association of respiratory illness disappears when controlled for early solid introduction. However this could be confounded, since heavy smoking may cause a decrease in milk supply and increase likelihood of early solids.

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Beaudry et al. (1995)	Canada New Brunswick n=776/864 primiparas only "Any bf" versus no breastfeeding recorded weekly	Respiratory infection, gastroenteritis, hospital admissions	adjusted for birth weight, month of birth, day care use, maternal age, smoking, SES, maternal education Crude incidence density ratio (IDR): bf versus not bf respiratory infection: 0.66 (95% CI 0.52-0.83) gastroenteritis: 0.53 (0.27-1.04, NS) all illness: 0.67 (0.54-0.82) adjusted IDR: respiratory infection: 0.78 (0.61 to 1.00) hospital admissions: 0.32 (0.14-0.72)	Retrospective study, with mother completing questionnaire at 6 months	Any amount of bf associated with protection. Breastfeeding rates noted for the population: 56% initiation, 31% at 3 months, 16% at 6 months. Half had received juice or solids before 3 months. By six months, all babies had received complements or supplements.
Duncan et al. (1993)	USA Arizona n=1013/1246 Children's Respiratory Study	acute otitis media (AOM) and recurrent otitis media (ROM)	adjusted for gender, day care use, siblings, maternal smoking, parental hay fever ROM rate: not breastfed 20.1% bf ≤ 4 months 20.7% bf exclusively ≥ 6 months 10.0 % increased protection from ROM and non-ROM as duration of bf increases, and exclusivity of bf increases. OR p<0.05 ROM vs. no AOM / non ROM vs. no AOM ff or bf ≤4 month 1.0 / 1.0 bf ≥ 4 m, suppl. < 4 m 0.73 / 0.85 bf ≥ 4 m, suppl 4-6 m 0.54 / 0.72 Exclusive bf ≥ 6 m 0.39 / 0.61	Prospective cohort study, with newborns enrolled at birth and followed for 3 years, including health care provider visit information	Most protection for exclusive bf at least 6 months. Protection associated with longer duration and later introduction of solids, especially delaying solids for at least 4 months. Well defined definitions of breastfeeding, including information about supplements (other liquids and solids)

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Dewey et al. (1995)	USA affluent California population n=87, with 46 breastfed at least one year, 41 formula fed children, matched for birth weight and SES (Part of the Darling Study)	respiratory infection, diarrhoea, otitis media (OM)	adjusted for day care use, gender, birth weight, maternal education, maternal age, parity, smoking, SES, siblings NS difference in respiratory infection. $p<0.05$ for diarrhoea and OM: adjusted incidence and prevalence for 0 to 12 months: bf ff diarrhoea incidence 0.14 0.31 prev (day/yr) 2.6 6.3 OM incidence 0.45 0.53 prev 10 15.8 % with one or more episodes of OM in first year: bf 19% decrease % with prolonged OM: bf 80% decrease	prospective study, with weekly monitoring for two years.	Protection if bf for one year, compared to ff. Although the study was careful to monitor the children often, there may have been a bias by feeding group, with more day care enrollment in the formula fed group
Wright et al. (1995)	USA Arizona Health Maintenance Organization n=988/1246, assessed at age 6 years	recurrent wheeze	logistic regression adjusted for parental history, ethnicity, gender, maternal allergy, maternal education, wheezing (LRTI) in first 6 months bf associated with decrease in wheeze at 6 years old (3.1% versus 9.7%, $p<0.01$), both in those experiencing wheeze in first 6 months of life and those not. 11% of the recurrent wheeze among non-atopic children was attributed to "not bf". Non-atopic children: OR = 3.03 (95% CI 1.05 - 8.69) if not bf (3.1% vs. 9.7%, $p<0.01$) Atopic children: bf NS different (11.3% vs. 16.7%, $p=0.3$)	Prospective study, follow-up at 6 years old. Data on infant feeding status taken from health clinic visits and from parental survey (high concordance of information at >90%). Wheeze status in past year was retrospective recall of parents.	Any bf for at least one month protective. Non-atopic infants breastfed for only one month had the same protection as those breastfed for 6 months in risk of recurrent wheeze, with no evidence of any dose-response relationship. But definition of "bf" was limited - any bf was considered "bf", although stratified by months.

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Nafstad et al. (1996)	Norway (Oslo) n=3754/4973 cohort born in 1992	respiratory infection during first year of life (LRTI), including pneumonia, bronchitis, bronchiolitis)	logistic regression adjusted for gender, birth weight, season, maternal age, maternal marital status, SES, maternal ecuation, ethnicity, parental asthma, distance to public traffic, crowdedness, siblings, smoking habits of parents cumulative incidence of LRTI by cigarettes per day and length of breastfeeding: cig/day: none occ 1-14 >15 bf months 0-6 20% 19% 23% 32% >6 16% 15% 16% 15% p-value 0.03 0.39 0.09 0.02 RR>2 for LRTI in children breastfed 6 months or less, compared to more than 6 months, in homes of high (>15 cig/day) smoking. If children bf >6 months, parental smoking was not significantly associated with an increase in the RR of LRTI.	Prospective cohort study, with questionnaires at 6 and 12 months	Protective effect of breastfeeding at least six months on LRTI in first year of life. Breastfeeding lowered the RR of LRTI to the same as non-smoking households if child bf > 6 months. The median length of breastfeeding in Norway is 7 months, with a high proportion initiating breastfeeding (99%).

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Howie et al. (1990)	Scotland, Dundee n=618/750	gastroenteritis, respiratory infections	adjusted for social class, maternal age, parental smoking bf at least 13 weeks associated with less gastroenteritis: 6.6% to 16.8% reductions ($p<0.01$) Adjusted rate of gastroenteritis: ff 16% partial bf 4% full bf 4% breastfeeding at least 13 weeks associated with less respiratory infection, with 2.7% to 21.1% reduction, $p<0.05$. Adjusted rate of RI: ff 37% partial bf 24% full bf 26%	Prospective study, with children followed for two years. Observations made at 2 weeks, 1, 2, 3, 4, 5, 6, 9, 12, 15, 18, 21, 24 months by health professionals	Protection if bf at least 13 weeks. Careful observations throughout make the conclusions more valid and reliable.
Cohen et al. (1995)	USA n=101, with 59 infants bf, 42 formula) - employees of two large companies, mothers returning to work "bf" = exclusively fed breastmilk or not greater than 2 bottles of formula per day	illness episodes resulting in time off work of mother (URI, gastroenteritis, otitis media, hospitalizations of any kind)	not adjusted in analysis, but demographics of groups were NS different n=28 children had no illness; of these, 86% were bf and 14% were formula ($p<0.005$) bf : 41% were "well babies". formula: 10% were "well babies" "Illness episode" was used (could be more than one per child). There were 205 illness episodes in 73 children who were sick; 88 in 35 bf babies (2.5/child), and 117 in 38 ff babies (3.1 per child). One day absence from work due to infant illness was recorded by 25% bf mothers, 75% ff mothers. Days absent from work 0 / 1 / 2-4 / >4 bf 74% / 11% / 12% / 2% ff 57% / 26% / 13% / 4% $p<0.05$	Quasi-experimental design, with convenience samples. Longitudinal study followed to 1 year or age of weaning	Women exclusively or partially (up to two bottles of formula per day) were less likely to be absent from work because of baby-related illness, and less likely to have long absences when babies were sick. The self-selected nature of this experiment may cause biased results. Authors also comment on different ethnicity of the groups, but did not record this.

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Scariati et al. (1997)	USA n=1803/2615 mail-in surveys	Diarrhoea, ear infection	adjusted for age, gender, other solid and liquid intake, maternal education, maternal occupation, smoking, household size, income, day care use diarrhoea: adjusted OR=1.8 (p<0.05) for ff compared to exclusive bf for 6 months ear infection: exclusive bf vs. low mixed feeds: OR=1.6 (p=0.02) exclusive bf vs. ff: OR=1.7 (p<0.001) dose-response outcomes, with increasing breastmilk intake associated with decreasing probability of diarrhoea and ear infection	prospective study with questionnaires at 2, 3, 4, 5, 6, 7 months	Protective to breastfeed exclusively for at least 6 months; as amount of breastmilk increases (low, medium, high mixed feeds), so does benefit

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Cognitive and neurological developmental indicators					
Fergusson et al. (1982)	New Zealand n=954/1037 age 7 years (Note: see later study also)	cognitive development, language development, articulation	adj. for maternal intelligence, maternal education, maternal training in child care, SES, birth weight, gestational age bf > 4 months associated with increases in cognitive development tests from 2-5 points unadjusted, and from .8 to 2.7 points adjusted, when compared with ff. ($p<0.01$) Test measures all scored to have a mean of 100 and SD of 10.	prospective study, with follow-up of original cohort at ages 3, 5 and 7 years	Protective to breastfeed for at least 4 months, with dose-response as to exclusive or partial breastfeeding when compared to ff.
Morrow-Tlucak et al. (1988)	USA (Cleveland) n=275/359 disadvantaged women	cognitive development	adj. for maternal intelligence, authoritarian ideology, cigarette use, maternal age, home environment, birthweight, maternal education Scores have a SD of about 18: bf <4 months vs. ff: point advantage at age 6 months: 2.2 NS 1 year 3.3 p=0.04 2 years 3.9 p=0.025 bf>4 months vs. ff: point advantage at age 6 months 3.7 NS 1 year 8.2 p=0.04 2 years 9.1 p=0.025	prospective study with contacts at 6 months, 1 year, 2 years	Protective to breastfeed compared to ff, and even more protective to bf for at least 4 months. No definition of amounts of breastmilk (ie, partial, full)

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Doyle et al. (letter) (1992)	Australia n=181/209 premature infants	cognitive development	adj. for SES, maternal education, birth weight, gestational age, maternal age, gender, duration of assisted ventilation There was an advantage in unadjusted scores of bf after receiving breastmilk by tube, compared to just receiving breastmilk by tube and ff after, or ff by tube and after. But NS if adjusted.	Prospective study, with testing at ages 2, 5, and 8 years	Authors claim that subsequent breastfeeding after breast milk feeds is the reason for seeing differences in cognitive development of premies fed breastmilk by tube. However, Lucas et al. (1992) controlled for this
Lucas et al. (1992) comment-ary by Lawrence (1992)	England n=300/313 7 ½ to 8 year olds, of an original cohort of permature infants	cognitive development	adj. for SES, social class, maternal education, birth weight, gestational age, birth rank, days of ventilation, gender, maternal age. Adjusted advantage of receiving breastmilk (either by nasogastric tube only, or by tube and then breastfeeding): verbal scale 8.9 performance scale 8.1 overall IQ 8.3 $p<0.001$, SD 15 to 16 A dose-response was noted, by volume of breastmilk received.	Follow-up of an original study done at 18 months, but now children are 7½ to 8 years old	Feeding premies breastmilk by tube, and either weaning or going on to breastfeed, was associated with protection. All infants were given breastmilk by nasogastric tube. Some went on to breastfeeding from the breast. In a second analysis, authors excluded breastfed children as a confounder of effects. Only receiving breastmilk via tube was still associated with a 7.5 ($p<0.001$) advantage over formula only.

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Niemela and Jarvenpaa (1996)	Finland n=726, age 4 ½ years old matched pairs (maternal education, gender of child) by breastfeeding status, with n=363 with less than 5 months bf, n=363 with 5 months or more of breastfeeding. Term infants (37 wks) with no chronic disease or anomaly	cognitive development (Visuomotor, language development)	multiple regression adjusted for maternal education, parental status, number siblings, maternal smoking in pregnancy, type of delivery, gender Breastfeeding status > 5 months of feeding was correlated with general cognitive ability and visual motor integration. general cognitive ability increase of 2.4 (SD 11), p=0.009 visuomotor increase of 0.4 (SD 2), p=0.018 language development NS difference	Prospective cohort, follow-up study	Protection associated with breastfeeding at least 5 months. Smoking twice as common in mothers bf <5 months compared to mothers bf longer (p<0.001) Authors note that breastfeeding conferred benefit, but probably less than that of many biological and lifestyle factors.
Horwood and Fergusson (1998)	New Zealand n=1000 children followed over time for 18 years	cognitive development (IQ, school performance, reading comprehension, mathematics, scholastic ability, pass rates)	adjusted for maternal age, education, SES, two-parent families, smoking during pregnancy, living standard, birth weight, birth order In IQ, reading comprehension and mathematics: children breastfed at least 8 months or longer had mean crude test scores 0.35 to 0.59 SD units higher than formula fed children. When adjusted, the advantage was 0.11 to 0.30SD units.	Follow-up study of a prospective cohort study, with first follow-up at 8 years, and now this study at 18 years	Protection associated with bf at least 8 months. Pervasive and long-term effects were reflected in a variety of measures of cognitive development

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Koopman-Esseboom et al. (1996)	The Netherlands n=207, with 105 breastfed and 102 formula fed prenatal PCB exposure estimated by levels in maternal plasma in 9th month of pregnancy. Postnatal PCB exposure estimated by level in breastmilk and duration of breastfeeding	cognitive development: effect of utero and lactational exposure to PCB's and dioxins	adjusted for education, smoking and alcohol use, parity, gestational age, birth weight, Apgar rating, gender Perinatal exposure to PCB's and dioxins did not influence the fact that breastfeeding was related to cognitive development at 7 months. Once adjusted, the positive effects of breastfeeding on mental and psychomotor development at 7 months was equivalent to formula fed children. No differential effects by 18 months.	Prospective study, with infants evaluated at 3, 7 and 18 months	No apparent damage via breastmilk transmission of contaminants. Volunteers were recruited for the study, so bias could have occurred - but possibly biased for both bf and ff children. The essence of the study indicates that exposure to contaminants through breastmilk may "at least do no harm"
Huisman et al. (1995)	The Netherlands n=418 (209 bf, 209 ff, recruited sequentially)	neurological development and PCB/dioxin exposure	Adjusted for parental education, parity, gender, obstetrical optimality socre, birth weight, maternal weight, parental smoking, alcohol consumption during pregnancy No effect of lactation exposure to PCB/s and dioxins at 18 months, but possible beneficial effect of breastfeeding.	Prospective study, from prenatally to 18 months postpartum	Any bf associated with no harm from contaminants, and possible benefits.

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Lanting et al. (1994)	The Netherlands n=526/804 (66 "abnormal" at newborn assessment, 213 random of slight abnormality, 247 matched by gender but normal) children re-examined at age 9 years, with recall data on feeding type	neurological development	adjusted for neonatal neurological diagnosis, gender, maternal education, length at birth, type of delivery a unique effect of feeding group (bf at least 3 weeks versus not) on neurological development at age 9 years, OR=0.54 (95% CI 0.3-0.97), $p<0.05$ OR=0.32 for severity of minor disformation in non-normal group, with bf protective	Follow-up study of a prospective cohort, using retrospective data collected at age 9to supplement earlier data	Breastfeeding for at least 3 weeks was associated with benefit. The definition of feeding groups in the study was very crude, with any breastfeeding for at least three weeks called "bf". The feeding type was also recorded through recall data only, 9 years after the birth.

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Other illnesses and chronic conditions (SIDS, cancer, diabetes)					
Ford et al. (1993)	New Zealand (Cot Death Study sample) n=356/485 SIDS death registry n=1529/1800 random controls	SIDS	adjusting for relevant demographic, maternal and infant factors reduced risk in breastfed infants during the first 6 months of life: OR = 0.52 (95% CI 0.35 to 0.71) for exclusively bf at hospital discharge versus not breastfed OR=0.65 (0.46 to 0.91) for bf during last two days of life, versus not breastfed More controls were breastfeeding initially (92% versus 86%), at 13 weeks (67% versus 49%).	Re-analysis of original New Zealand Cot Death Study case-control study, using only those infants with complete data sets	Any breastfeeding was associated with protection against SIDS, with greater proportion of controls breastfeeding at any given time during first 6 months
Davis et al. (1988)	USA - enver, Colorado n=201/236 children having cancer diagnosis at 1.5 to 15 yrs old, compared to n=181 controls, matched for age, gender and residence	any childhood cancer up to age 15 years	logistic regression, adjusted for gnder, birth year, birth order, daycare use, maternal age, maternal education, maternal ethnicity, SES, maternal smoking in pregnancy RR = 1.8 (1.08 to2.83) for any cancer, comparing formula /bf < 6 months with children bf > 6 months lymphoma: OR was 5.6 (p<0.023) for formula versus bf > 6 months. NS difference between formula only, and bf < 6 months	case-control study design	Breastfeeding at least six months associated with protection. Because of the relatively small sample size, and the possibility of biased recall for those experiencing cancer, this study may be open to criticism

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Shu et al. (1995)	China n=82/87 lymphoma patients n=159/167 controls matched by age and gender	lymphoma cancer, leukemia	adjusted for maternal age at birth, maternal working status, occupational exposure, birth weight NS association of bf with cancers: lymphoma: OR=0.69 (0.3-1.7) for any bf versus none; OR=0.82 (0.2 to 2.9) for less than 6 months bf versus more; OR=0.66 (0.3 to 1.7) for greater than six months bf versus other.	Case-control study Definition of bf crude, with "bf" defined as ever having any breastmilk. Interviews were retrospective, requesting feeding status	Any breastfeeding may confer benefit, but the longer the bf, the greater the effect. With small numbers and retrospective data collection on infant feeding status, the results may be biased. Note that all the OR were <1, indicating protection of bf, but the confidence limits were crossing 1, indicating NS results possibly due to Type II error. There was also a trend of dose-response to increased protection with increased bf.
Virtanen et al. (1991)	Finland n=103 newly diagnosed IDDM cases (<7 yr old) n=103 controls matched by age and gender	childhood IDDM	adjusted for parental education adjusted OR=0.48 (0.25-0.92) for IDDM before age 7, comparing bf at least 7 months versus other adjusted OR=0.36 (0.14-0.93) for children exclusively bf for at least 3 months, and OR=0.41 (0.21 -0.83) for children exclusively bf for at least 4 months verus others.	Case-control study, using retrospective data collection by parental questionnaire	Breastfeeding at least seven months, and exclusive bf for at least 3 or 4 months, was associated with optimal protection against IDDM. The bias of maternal recall must be considered.

Appendix 2b. The effect of breastfeeding on infant health for First Nations peoples of North America

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Amount of Breastfeeding
Diabetes					
Pettitt et al. (1997) comment by Huang et al. (1997) and by Simmons (1997)	USA (Arizona) Pima Indians n=720/933 ages 10-39 years old	type II diabetes (NIDDM)	adj. For age, sex, birth date, parental diabetes, birth weight; OR=0.41 (0.18-0.93) % with diagnosed NIDDM by infant feeding: excl. bf*for 2 m / partial bf / ff* age10-19: 0% / 5% / 4% 20-29: 10% / 14% / 17% 30-39: 15% / 23% / 26% relative body weight of normal <120: 6% / 10% / 12% 120-139: 10% / 14% / 17% >139: 15% / 23% / 26%	follow-up of prospective study in 1978; included children born 1950 to 1978 and data on feeding status taken before any were diagnosed with NIDDM -used WHO criteria for diagnosing NIDDM in 1989	Exclusively bf for 2 months was protective. Authors note that bf rates declined from 65% in 1962 to 40% in 1977, concurrent with a rise in NIDDM of 50% since 1965 to 1989. Critics point to possible confounding with stress levels and with acculturation.
Pettitt and Knowler (1998)	USA Pima Indians n=1536	effects of a diabetic pregnancy on offspring	adjusted for age, gender, birth weight, birth date, presence of parental diabetes diabetes was less common among breast-fed children: non-diabetic mother / diabetic mother breastfed child: 6.9% / 30.1% bottle-fed child: 11.9% / 43.6% non-diabetic mother (n=551): OR 0.56 (0.41-0.76) if bf at least 2 months diabetic mother (n=21): difference NS, but tendency for reduction in diabetes.	Prospective cohort study: modified oral glucose tolerance test administered to all women during each pregnancy, and children followed biennially from age 5 years for diabetes	Any bf may be protective for infants in not having diabetes later in life, and not developing childhood type II NIDDM diabetes. If bf as a child, a woman was less likely to have diabetes during child-bearing years. Small sample size for children of a diabetic mother.

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Infections (respiratory including otitis media, diarrhea) and hospitalizations					
Forman et al. (1984a)	USA Arizona, Pima Indians n=571	respiratory infection (URI), first year of life, including otitis media	adjusted for seasonality, birth weight, SES rates of URI and OM: ff 82/100 mixed feeds 84/100 bf ≥ 4 months 75/100 adjusted OR of URI episodes in first year: exclusive bf ≥4 months versus ff: 0.64 (benefit of exclusive bf for at least four months evident in incidence of URI for first four months, OR=0.61, 95% CI 0.38 to 1, and for second four months of life, OR=0.48, 95% CI 0.26 to 0.88).	Follow-up study of a cohort used in the Pima Infant Feeding Study, using medical charts of infants and linking these to feeding information collected retrospectively earlier	Exclusive bf for at least four months, with greater protection the longer one bf, associated with benefit. This contains a more careful classification of infant feeding status, including exclusively breastfed or mixed feeds. The retrospective data collection may have introduced bias in the earlier study, but the chart auditor was unaware of feeding status.
Forman et al. (1984b)	USA Arizona, Pima Indians n=257	diarrhoea, first year of life	adjusted for seasonality, SES Approximate RR of gastro was always less than 1 among infants with any amount of bf compared to exclusively ff. adjusted OR=0.51 (0.34 to 0.77) for exclusively bf infants for at least four months, compared to ff infants. Adjusted OR = 0.83 (0.57-1.2, NS) for mixed feed infants in first four months versus ff infants.	Follow-up study of a cohort used in the Pima Infant Feeding Study, feeding, linking information collected retrospectively earlier	Protection if bf at least 4 months. A dose-response was noted - greater protection against diarrhoea as exclusivity and duration of bf increase. Possible bias due to retrospective collection of infant feeding status from earlier study.

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Timmer-mans and Gerson (1980)	Canada Labrador Inuit n=285/315 successive children examined in a clinic	Chronic granulomatous otitis media	not adjusted for confounding variables: Percentage having diagnosis of chronic granulomatous OM: (p,0.001) ff 42% bf < 6 months 16% bf ≥ 6 months 0%	Retrospective study; with questionnaire administered to mother by interviewer blind to the OM status of the child	Protection associated with any bf, with dose-response for longer bf. Bias could be from recall data of infant feeding status, and from no other demographics to control for confounding factors
Ellestad-Sayed et al. (1979)	Canada two northen Manitoba First Nations communities - Cross Lake and Garden Hill n=158	childhood infections, hospitalizations in first year of life	Not statistically adjusted, but NS difference in groups by birth weight, birth rank, maternal age, parity, number in household, household conditions, maternal education, employment status of father, smoking during pregnancy, water source, refrigeration. Marital status different ($p<0.025$). Hospitalizations in first year ($p<0.05$): fully breastfed: 11% initially bf, then ff: 38% only ff: 53% Mean # hospital admissions/feeding year ($p<0.001$): breastfed: 0.27 bottle fed: 0.87 Mean # days in hospital/feeding year ($p<0.001$): breastfed: 2.5 days bottle fed: 7.8 days Mean # diagnoses/examination (URI, OM, Gastroenteritis, dermatitis, other), $p<0.05$: breastfed: 0.26 bottle fed: 0.42	Retrospective study, using diagnoses by physician, hospital and health centre records, and survey of mothers	Any bf associated with protection, with a dose-response of greater protection for fully bf infants. Small n, so several infections were greatly reduced numerically, but found to be NS statistically unless summed to give a "mean # diagnoses per examination". There were higher rates of bf in *lower* SES groups and in more crowded conditions, which may have minimized the protective effect of bf - effects may be greater if analysis had included confounders.

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Carson et al. (1984)	Canada Northwest Territories cohort of the Perinatal and Infant Morbidity and Mortality Survey n=260/289 children age 8 years	lower respiratory tract infections (LRTI)	not adjusted in analysis, but birth weight, gender, adoption, siblings, maternal smoking, and current weight/height were not associated with hospitalization for LRTI bf associated with reduction in hospitalization ($p<0.05$) Of those hospitalized, 67% ff, 15% bf less than 3 months, 18% bf at least 3 months. Of those not hospitalized: 38% ff, 19% bf less than 3 months, 43% bf three or more months.	Follow-up of prospective study cohort of births in 1973-74, at age 8 years, including a retrospective medical chart audit	Any bf protective, with dose-response for bf longer than 3 months compared to less than 3 months. This study focussed more on prevalence than on infant feeding status. RR was not included in the article
Thomson (1994)	Canada Saskatchewan (n=5255 FN, 58,072 other), Ontario (n=96 FN, 295others), BC (n=1098 FN, 36,398 others) First Nations children 0 to 4 years old, identified as FN through Registered Indian status	hospitalizations for otitis media and respiratory infection (URI)	BC data adjusted for "small cities/towns". Hospitalization relative risks: for otitis media: RR of FN children (95% CI) boys 1-4 years 6.1 (5.1 to 7.3) Girls 1-4 years 6.7 (5.4 to 8.2) Ontario children 0-1 year 6.1 (0.6-67.0, NS) for upper respiratory infection: Saskatchewan Boys 0-1 year 5.7 (4.8-6.7) Girls 0-1 year 8.9 (7.4 to 10.6) Boys 1-4 years 4.7 (4.3-5.1) Girls 1-4 years 6.1 (5.6 to 6.7) Ontario children 0-1 year 7.7 (1.5-38.9) BC 0-4 yr, small towns 4.7 (3.8-5.9) Physician visits (Saskatchewan) boys 0-1 year 0.9 (0.8-1.0, NS) girls 0-1 year 1.2 (1.1-1.4) boys 1-4 years 0.9 (0.8-0.9) girls 1-4 years 0.9 (0.9-1.0, NS)	Population-based study using claims data for physician visits 1990-91, and hospitalizations 1978-79.	Even though physician visits with otitis media diagnosis were similar for FN and other children, the hospitalization rates were from 5 to 9 times greater for FN children. This may indicate more severe otitis media, or possibly FN children were more readily put into hospital but the latter has no evidence. Author did not adjust for SES, but claims no associations found with SES and otitis media.

Article	Place and Sample Size (n=#persons/ # total eligible sample)	Condition	OR (95% CI), RR or magnitude of effect *bf=breastfed *ff=bottle fed exclusively (formula fed)	Study Design	Comments and Protective Duration and Type of Breastfeeding
Wright et al. (1998)	USA Arizona Navajo historical control with n=977 before intervention, n=858 after intervention	respiratory infection, diarrhea	after intervention to increase exclusive bf rates: pneumonia: 32% decline gastroenteritis: 15% decline Increase in croup and bronchiolitis after intervention, in those never exclusively bf.	Population-based cohort study, using historical control of the year before the intervention	Exclusive bf associated with protection from viral disease. Feeding group specific rates unchanged over time, so decline in numbers most likely due to increase in breastfeeding rates. Bias due to use of historical control.
Gessner et al. (1995)	USA Alaska Native Americans n=29 cases <2 yr old, n=85 controls matched for ethnicity, residence, and date of birth.	Streptococcus pneumonia	logistic regression adjusted for history of pneumonia, prior hospitalization, day care use, household smoking, tobacco chewing breastfeeding protective, OR=0.1 (95% CI 0.0 to 1.0) Day care attendance (OR=99, CI 5 to 1921) and tobacco chewer in household (OR=21, CI 1.4 to 295) were both significantly associated with increase in disease.	Case-control study, with review of medical records and retrospective data through telephone interviews.	Any bf associated with protection. No adjustment for SES indicators. Bias may be introduced in retrospective recall information, plus limited definition of "bf".

Appendix 3. Summary of Prenatal Class Interventions, and Effect Sizes

Prenatal Intervention		Effect: Initiation	Effect: Duration	Limitations	Studies
Health Workers					
prenatal class	R	very large (32%) increase in initiation	large (24%) increase in 4 wk duration, small (10%, NS) in 6 month duration	immigrant Vietnamese women, Australia	Rossiter (1994)
prenatal class & individual instruction	R	large (22-27%) increase in initiation	medium (14-18%) 2 wk duration, NS 6 wk and 3 month duration, except class instruction -small (11%) 3 months	low-income urban WIC	Kistin et al (1990)
prenatal bf class plus regular class	R		very large (60%) increase in 1 month duration	investigator was intervener, all intended to bf 4-6 months	Wiles (1984)
prenatal lecture (postnatal visits)	Q		small increase in exclusive bf at 1 month (10%), but not sustained after program finished (2%) very large increase in exclusive bf at 6 months (44%), mostly sustained after program (31%)	Chile: postnatal visits were intensive, so most of this could be attributed to postnatal rather than prenatal component	Burkhalter and Marin (1991)
prenatal bf skills class	R		very large increase (35%) for 6 month exclusive bf duration, comparing whole intervention to none. Very large (37%) increase in 6 month exclusive bf duration for prim with extra bf class compared to other 5 interventions; medium (15%) increase for multips	Chile: no definition of "fully bf" as the outcome, but assume it means "exclusive" bf. No data given on weaning	Pugin et al (1996)
individual prenatal (postnatal visits)	R	large (29%) increase in initiation	large (28-29%) increase in 2 wk and 2 month duration, NS for 6 month duration (7%, NS)	low-income, WIC urban women	Brent et al (1995)

Prenatal Intervention		**Effect**		**Limitations**	**Studies**
		Initiation	**Duration**		
Peer Counsellors					
prenatal program by Native women	P	NS (-2%) initiation, but varied by peer counsellor		Aboriginal women in Regina: (20% increase in initiation rates for one peer counsellor)	Glor (1987)
Prenatal individual peer counsellor visit	Q	small (14%) increase in initiation	small or NS effect on duration, 8% -13% at 2 wks and 3 months, NS at 6 months	Aboriginal women	Long et al (1995)
prenatal class (postpartum support)	Q	large (26%) increase in initiation	small (13%) increase in 3-6 wk duration	immigrant (Hmong) WIC clients	Tuttle and Dewey (1995)

Appendix 4a. Summary of Postpartum Health Care Provider Support, and Effect Sizes

Health Care Provider (hcp) support postpartum	*	Effect		Description and Limitations	Studies
		Initiation	Duration		
WIC nutritionist in hospital, 4 days post, group class at 2 wks	Q		small NS increases on 4 wk (9%) and 4 month (3%) duration	WIC (New Mexico), only those who initiated breastfeeding	Saunders and Carroll (1988)
Hospital and phone contact to 3 wks	R		small NS differences in duration up to 6 months (-9 to 14%)	low-income, initiated bf. C higher educated and more likely to have been in prenatal class	Grossman et al (1990)
LC visits weekly first month, up to 6 months	R		no effect (0%) on 6 month duration *large effect (21%) on those mothers who made decision after first trimester.	-(Prince George, BC) PHN also visited regularly, posthoc analysis re timing of decision. X: more primips and more returning to work	Lynch et al (1986)
In hospital and for first 2 wks, same nurse	R		small (8-12%) increase for 4 wk to 6 month duration	mothers initiating breastfeeding (Wales)	Jones and West (1985)
in hospital, biweekly visits until weaning	Q		large (20-25%) increases at 3 months and 6 months duration	British women in late 1970s those who left hospital breastfeeding	Houston et al (1981)
postpartum weekly phone calls, one nurse	R		medium (1 week) increase in duration at 6 wks		Bloom et al (1982)
prenatal lecture (postnatal visits)	Q	no results on initiation	small increase in exclusive bf at 1 month (10%), but not sustained after program finished (2%) very large increase in exclusive bf at 6 months (44%), mostly sustained after program (31%)	postnatal visits were intensive, so most of this could be attributed to postnatal rather than prenatal component, in Chile	Burkhalter and Marin (1991)
individual prenatal teaching (postnatal visits)	R	large 29% increase in initiation	large (28-29%) increase in 2 wk and 2 month duration, NS for 6 month duration (7%, NS); large (25-33%) increase if comparing only those who initiated bf	low-income, WIC urban women	Brent et al (1995)
pre and postpartum	Q		very large (36%) increase in 4 month duration rates	WIC compares who did/did not request LC	Auerbach (1985)

Hcp support postpartum	*	**Effect**		**Description and Limitations**	Studies
		Initiation	**Duration**		
teaching unit and nursing support	R		large (30%) increase in 6 wk duration for teaching unit +nursing support, compared to NS difference between routine care and routine care + teaching unit	nursing support means being with the mother at least once during a breastfeed in hospital, a call 1-2 days post-discharge, call at one week	Hall (1978)
health care provider prepartum support to pregnant Vietnamese immigrants to Australia	R	large (32%) increase in initiation between X and C (70% versus 38%, $p<0.001$)	no effect on duration, if one considers the percentages relating to only those who began breastfeeding in both groups to eliminate the gap in initiation rates. If one considers a population base, with greater initiation rates in X, greater actual numbers of women were bf at 4 weeks and 6 months even though the drop-off rates were almost identical in both groups. At 4 weeks: 71% of those initiating bf in X, and 68% of those initiating bf in C, were still breastfeeding. At 6 months, 37% of those initiating bf in X, and 43% of those initiating bf in C, were still breastfeeding.	prenatal instruction included watching a 25 minute video, and attending 3 two-hour discussion groups on the benefits and barriers to breastfeeding (n=194; 108 in X and 86 in C) limitation: this was a convenience sample of prenatal attenders, but the sample was also later randomized to receive normal prenatal education or the additional classes	Rossiter (1994)
postpartum peer counsellor and health care provider support	R	medium (17%) increase in initiation rate (X 100%, C 83%)	For those initiating breastfeeding in X and C, there were large to very large increases in % breastfeeding at given points: 2 wk / 6 wk / 3 mon X: 96% / 81% / 62% C: 67% / 37% / 29% difference: 29% / 44% / 33%	incentives to attend bf class for prenatal attenders in X, along with their male partners; encouragement to utilize the peer counsellor support program, with contacts at 2 days, 2 weeks and 2 months. In X , automatic assignment to a PC, but mother had to initiate the call to the PC. In C, mention of the PC program, but mothers could still access it if they desired. Low-income (WIC) primiparas.	Sciacca et al. (1995)
postpartum discharge visits by health care provider	R		NS difference in breastfeeding rates at 1 month between X and C (OR=1.25, 95% CI 0.88 to 1.75, NS), when adjusted for prenatal intent, birth weight, immigrant status, parity	early postpartum discharge breastfeeding women randomly assigned either standard practice (one visit at 48-72 hr postpartum, regular public health visits) or an intervention with nurse visit at 2, 3, 5, 10 days postpartum visits. N=78/183 X, 97/177C. Limitation of poor response rate.	Gagnon et al. (1997)

* Q = quasi-experimental design, R = randomized, P = pre-experimental (Campbell and Stanley, 1963)

Appendix 4b. Summary of Postpartum Peer Counsellor Support, and Effect Sizes

Postpartum peer counsellor support	*	**Effect**		**Limitations**	**Studies**
		Initiation	**Duration**		
prenatal visit and twice a week after birth, telephone calls after bf established	R	large (23%) increase in initiation	very large (32%) increase in 3 month duration for all in X and C; large (29-30%) increase up to 3 months for those initiating breastfeeding in X and C.	low-income, minority urban women	Kistin et al (1994)
prenatal and up to six weeks postpartum individual visits	Q	small (14%) increase in initiation	small (8 to 13%) increases in 2 wk and 3 month duration, NS at 6 months, but based on overall rates; rates of those initiating breastfeeding, very small or NS (-6 to +7%) up to 3 months	First Nations women in USA historical controls	Long et al (1995)
prenatal class, immediate postpartum support, one 3-6 wk	Q	large (26%) increase in initiation	small (13%) increase in duration of 3-6 wks, but based on overall rates, not rates of those initiating breastfeeding	Hmong immigrant WIC clients in California historical control	Tuttle and Dewey (1995)
postpartum peer counsellor and health care provider support	R	medium (17%) increase in initiation rate (X 100%, C 83%)	For those initiating breastfeeding in X and C, there were large to very large increases in % breastfeeding at given points: 2 wk 6 wk 3 mon X 96% 81% 62% C 67% 37% 29% difference 29% 44% 33%	incentives to attend bf class for prenatal attenders in X, along with their male partners; encouragement to utilize the peer counsellor support program, with contacts at 2 days, 2 weeks and 2 months. In X , automatic assignment to a PC, but mother had to initiate the call to the PC. In C, mention of the PC program, but mothers could still access it if they desired. Low-income (WIC) primiparas.	Sciacca et al. (1995)
only prenatal program ?	P	NS difference in initiation, but differed by year of theprogram. First year: large (20%) increase second year: large (-20%) decrease		First Nations women in Canada	Glor (1987)

* Q = quasi-experimental design, R = randomized, P = pre-experimental (Campbell and Stanley, 1963)

Appendix 5. Dimensions of adolescent breastfeeding knowledge and attitudes tests

Word or Phrase (could refer to breastfeeding or bottlefeeding)	References*
healthy	G,B,E,F, M, P
natural, female instinct	G,J,B,E,M, P
convenient	G,J,B,C,F,M, P
modern or fashionable	G,J,B, P
embarrassment	G,F,M
private	G,E,M
makes you feel important	J
better than formula	J,M
less infection	F
get more sleep	J
love babies more	J
babies love mothers more	J
easier to start	J
less mess	J
"good" or desirable	B, P
has advantages for baby or for mother	C
equivalent, same, better or worse than the alternative	C, F, J,M
bonding	B,F,M, P
size of breasts makes difference	E
ties you down	F,M
makes you feel important, you matter, feel good about self	J,M
cost	B,M, P
does not disturb work and freedom of mother	B,F,M, P
improves appearance of breasts, or less attractive	F
baby enjoys it	F
sanitary, "safe"	F,G
disturbs family life	B, P

weakens mother	B, P
spoils figure, leads to obesity	B,F,M, P
saves time	M
requires special skills	F
acceptable places: home alone at home with family at home with female visitors at home with male and female visitors bus restaurant park shopping mall church	G,E,M
barriers: if baby born by C-Section, premature, if breasts hurt, if baby has a hard time learning how to breastfeed, if in public place, if you or baby gets sick, if baby is fussy, if you go back to work or school, if you smoke, if you drink alcohol, if you eat a lot of snack foods, if you have diabetes	M
Other questions asked: Would you consider breastfeeding your children? Breastfeeding should be discussed in schools. Have you seen anyone breastfeed? Were you breastfed? Have you seen breastfeeding in movies? Have you read books about breastfeeding? I have spoken to friends about breastfeeding.	C,E,F,G,B, P

* References are as follows:

G = Gregg JEM. Attitudes of teenagers in Liverpool to breast feeding. BMJ 1989;299:147-148.

J = Joffe A, Radius SM. Breast versus bottle: Correlates of adolescent mothers' infant-feeding practices. Pediatrics 1987;79(5):689-695.

E = Ellis DJ. Secondary school students' attitudes and beliefs about breastfeeding. J Sch Health (JOSH) 1983;53(1):600-604.

B = Berger A, Winter ST. Attitudes and knowledge of secondary school girls concerning breast feeding. Clin Pediatr 1980;19(12):825-826.

C = Cusson RM. Attitudes toward breast-feeding among female high-school students. Pediatric Nursing 1985;11:189-191.

F = Friel JK, Hudson NI, Banoub S, Ross A. The effect of a promotion campaign on attitudes of adolescent females towards breastfeeding. Can J Public Health 1989;80:195-199.

M = Martens PJ. Breastfeeding choice and duration: a prospective study of women and infants in four southern Manitoba First Nations communities. Unpublished Master's Thesis, University of Manitoba, 1994.
and
Martens PJ, Young TK. Determinants of breastfeeding in four Canadian Ojibwa communities: A decision-making model. Am J Hum Biol 1997;9:579-593.

P= Pascoe JM, Berger A. Attitudes of high school girls in Israel and the United States toward breast feeding. J Adolescent Health Care 1985;6:28-30.

Appendix 6a. Summary of Hospital Interventions of Protocol, and Effect Sizes

Hospital Intervention	*	Effect: Initiation	Effect: Duration	Limitations	Studies
Labour and delivery					
labour companion	R		small (10%) for bf, large (22%) excl. bf at 6 weeks	single mothers, low income	Hofmeyr et al (1991)
pethidine	-	very large (38%) re correct suck		self-selected	Righard et al (1990)
gastric suction	R	large (15 min)		temporary effect	Widstrom et al (1987)
early interruption by bathing+	Q	large (42%) re correct suck		self-selected by midwife	Righard et al (1990)
early contact *no control for suckle *with suckle	 R R		-NS except if suckled, then very large (43%) at 2 months -large (2 months extra duration) for 10 min. vs 4 hr NS small (15% at 6 months but NS)	older data, no rooming in most babies did not suckle in the time limits recorded	Taylor et al (1985) Salariya et al (1978) Widstrom et al (1990)
Early Postpartum					
feeding frequency	R		large (about a month or more in duration for 2 vs 4 hr)	dated, so hospital would seldom have 4 hr routines	Salariya et al (1978)
treatment for engorgement (cabbage leaves)	R		-medium difference (18% but NS) in 6 wk duration	small sample size, routine massage taught in hospital (S. Africa)	Nikodem et al (1993)
supplements	Q		-NS but slightly negative (3% at 4 wk)	problem with definition of supplement	Gray-Donald et al (1985)
rooming-in *rooming in vs nursery, *rooming-in vs nursery for jaundice vs healthy	Q R Q R		-NS (9% at 4 wk) unless coupled with bf guidance, then very large (32% excl. Bf at 3 months) -very large (40%) difference in 4 wk and 3 month duration for rooming-in vs nursery jaundiced, but NS (5-7%)between rooming in jaundiced and healthy newborns	Mexican women, low income	Perez-Escamilla et al (1992) Elander and Lindberg (1986)

Cont'd: Hospital Intervention	**Q R**	**Effect**		**Limitations**	**Studies**
		Initiation	**Duration**		
*bf guidance within hospital *AV, and AV+support	R R		large (20%) difference in excl. Bf at 3 months, with both rooming-in groups -NS effect for AV only (0% 6 wk duration) -very large (30%) effect of extra support+ AV	Mexican women, low income disassociated with AV, would support be effective ?	Perez-Escamilla et al (1992) Hall (1978)
Hospital Discharge					
correcting the suck at hospital discharge	Q R		very large (30%) at 1 month and 4 months	good comparison of Q with R results	Righard and Alade (1992)
early discharge *involuntary vs voluntary	Q R		-medium negative (-15%) effect at 2 months if voluntary discharge -large (22%) increase in bf duration at 6 months for multip, NS for primip. -very large (-70%) decrease in supplementation first week if discharged early	self-selection likely a factor	Waldenstrom (1989) Waldenstrom et al (1987)

Cont'd: Hospital Intervention	Q R	Effect		Limitations	Studies
		Initiation	Duration		
Receipt of formula gift pack	R		NS except small (10-12%) on less educated and primip	Montreal, middle-class	Bergevin (1983)
	R		small (13%) effect on exclusive bf rates at 2 months	stronger design, research and commercial packs	Dungy (1992)
	R		small (14%) effect on bf duration at 3 weeks	low-income Hispanic women	Snell et al (1992)
	R		NS effect on duration at 4 months	both groups received bottles of water, one formula	Feinstein et al (1986)
	R		NS or small (9-12%) effect on 2 wk and 8 month duration	Philippines, no blinding	Guthrie et al (1985)
	R		small (8-9%) on 2 and 3 month duration, but medium to large if combined with LC services (14-23%)	commercial and research gift packs, LC vs routine care	Frank et al (1987)
	R		small but NS negative effect on duration at 6 wks (10%)	commercial and research pack; small n (N=95), exclusion due to no telephone; lack of power	Evans et al (1986)

* Q = quasi-experimental design, R = randomized, P = pre-experimental (Campbell and Stanley, 1963)

Appendix 6b. Summary of Hospital Policy Interventions at the Institutional Level, and Effect Sizes

Hospital Intervention	*	Effect		Limitations	Studies
		Initiation	Duration		
Hospital education and training for policy /protocol					
Educational program for staff	P	NS (0%) change in supplemented bf in hospital			Iker and Mogan (1992)
breastfeeding advisor and policy changes	P	NS initiation rates (-5%)	NS (6%) 6 wk duration NS (7%) 6 wk duration for those initiating bf		Bruce and Griffioen (1995)
staff education and policy	Q	- large (41% X vs 13% C) increase in bf initiation rate - small (15% X vs 2% C) decrease in supplementation		good quasi-experimental design, with control hospital	Winikoff et al (1987)
staff training for several hospitals	P	large (22%) decrease in routine supplementation by glucose medium (16%, NS) decrease in routine supplementation by formula		self-reports from attenders at 3 day course, no validity check	Valdes et al (1995)
staff training for 8 hospitals	R	no statistical evidence, but authors state that for the paired hospitals (each pair contained an X and a C hospital), there was evidence of substantial increase in compliance with the Ten Steps for 3 pairs, and about the same in the fourth pair. At the individual staff level, all post-intervention scores were greater than pre-intervention scores		Although lacking in statistical evidence, the researchers used focus groups in conjunction with the X to determine why not all of the Ten Steps were implemented. Authors comment that it was easier to implement something new than to change previously established routines (domain theory)	Westphal et al (1995)

cont'd: **Hospital Intervention**	*	**Effect**		**Limitations**	**Studies**
		Initiation	**Duration**		
Hospital education and training for policy /protocol cont'd					
hospital infant feeding policy revision	P	two cohorts (1990, 1993) were measured, with X=revision of policy in line with Ten Steps taking place between the cohorts. Significant increase in (all p<0.05) bf in first hour : very large (38%) increase supplemented bf babies: medium (19%) decrease bf guidance from staff: large (21%) increase time to 1st feed: very large (2.6 hr) decrease	there were also significant associations with duration: women given pacifiers in hospital were more likely to wean (6.5 vs 8.9 wks, p<0.01) women given formula, coupons or neither: weaned at 6.2, 7.9 and 10.4 wks (p<0.005)	pre-experimental design, with no control for history or competing hypotheses (ie, no control hospital for comparison of historical trends) (Note: the authors comment that the easily implemented policies were: early bf, decreased provision of formula, and assistance to bf mothers. The hard to change policies were: rooming in 24 hr, hospital discharge packs, and lack of cooperation with the obstetrics department. Authors conclude that support from high-level administration, both medical and nursing staff, is required for change)	Wright et al (1996)
Wellstart program in 15 SE Asia hospitals	P	No statistical significance reported In the 15 hospitals: bottlefeeding decreased from 79% to 14% time of first feed decreased from 8 to 1.2 hr exclusive bf rates increased from 63% to 91%		no explanation of statistical significance of results, no comparison of different hospital results	Wilmoth and Elder (1995)

* Q = quasi-experimental design, R = randomized, P = pre-experimental (Campbell and Stanley, 1963)

Appendix 7. Summary of the Ten Steps to Successful Breastfeeding and the International Code of Marketing of Breast-milk Substitutes

SUMMARY OF INTERNATIONAL CODE OF MARKETING OF BREAST-MILK SUBSTITUTES (WHO, 1981; WHA, 1986)

No advertising of artificial feeding products to public.
No free samples to mothers.
No promotion of artificial feeding products in health care facilities.
No company mothercraft nurses advising mothers.
No gifts or personal samples to health workers.
No words or pictures idealizing artificial feeding, including pictures of infants on labels of products.
Information to health workers should be scientific and factual.
All information on artificial feeding, including labels, should explain benefits of breastfeeding and costs and hazards associated with artificial feeding.
Unsuitable products, such as sweetened condensed milk, should not be promoted for babies.
All products should be of high quality and take account of climatic and storage conditions of the country where they are used.

TEN STEPS TO SUCCESSFUL BREASTFEEDING

from the Joint WHO/UNICEF Statement, July 1989

Every facility providing maternity services and care for newborn infants should:

1. Have a written breastfeeding policy that is routinely communicated to all health care staff
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within a half-hour of birth.
5. Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breastmilk, unless medically indicated.
7. Practice rooming-in - - allow mothers and infants to remain together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

Appendix 8. Overview of results from the Canada and Manitoba surveys of maternity hospitals (Levitt et al., 1995; Breastfeeding Promotion Steering Committee of Manitoba, 1997)

Questions	Canada Survey 1993: Manitoba hospital data	Manitoba Survey 1996: overall weighted responses			Manitoba Survey 1996: Hospital Size Category of 0-50 births/year		
		adminis-tration	mothers	staff	adminis-tration	mothers	staff
1. Written breastfeeding policy	33%	63%			52%		
2. Staff training							
a. On breastfeeding policy	-	96%	-	86%	100%	-	80%
b. Policy available to staff	-	100%	-	92%	100%	-	91%
c. Policy based on Ten Steps	9%	52%	-	45%	36%	-	22%
d. Newly hired staff trained	-	63%	-	-	32%	-	-
e. Paid breastfeeding management ed.	-	50f,40%p	-	50%paid	35f,13%p	-	35%paid
f. Specialized bf training for some	-	32%	-	23a,35%s	0%	-	6a,19%s
g. Consistent information	-	-	75%	-	-	72%	-
3. WHO Code							
a. Funding from formula companies	76%	40%			24%		
b. Subsidized formula supplies		83%			75%		
c. Give formula gift packs to bf mothers	30% routinely	-	12%	11a,10%s	-	16%	27a,18%s
4. Initiate breastfeeding within first hour			50%	63% vag		47%	62%vag
5. Show how to breastfeed							
a. Show positioning and latching			66%	84%		58%	72%
b. Show how to express milk			23%	39%		32%	39%
c. Advantages of bf and management			49%			58%	

Appendix 8 Questions continued:	Canada Survey 1993: Manitoba hospital data	Manitoba Survey 1996: overall weighted responses			Manitoba Survey 1996: Hospital Size Category of 0-50 births/year		
		adminis-tration	mothers	staff	adminis-tration	mothers	staff
6. No supplements: Breastfed babies are given supplements (always or sometimes)	79% other drinks		form 60% gluc 56% water75%	1a,74%s		form 71% gluc 28% water87%	1a,90%s
7. Rooming in > 16 hours per day			32%	50%		31%	41%
8. Breastfeeding on demand a. Encouraged to wait at least 2 hr (a/s) b. Encouraged to time limit feeds	65% determined by the mother		demand feeds 87% timed24%	15a,44%s 19a,33%s		demand feeds 89% timed21%	25a,48%s 42a,36%s
9. Pacifiers used for breastfed babies	65%		46%	2a,69%s		63%	<1a,75%s
10. Refer to breastfeeding support groups	79% (a, usually)		47%	37a,43%s		16%	12a,49%s

Appendix 9. Classification of Evaluation Designs and Threats to Validity (Campbell and Stanley, 1963)

How to Classify Designs:

X = exposure of a group to an experimental variable or event, the effects of which are to be measured

O = some process of observation or measurement

R = random assignment to separate treatment groups

In a given row: the Xs and Os in a given row are applied to the same specific persons

Temporal order: the left-to-right dimension indicates the temporal order

Vertical order: Xs and Os vertical to one another are simultaneous

Parallel rows: unseparated by a dashed line: comparison groups equated by

Separated by a dashed line: comparison groups **not equated by random** assignment

The problem of bias: internal and external validity:

Campbell and Stanley (1963) document the 16 experimental designs, with threats to validity from 12 sources:

Internal validity is the basic minimum without which any experiment is uninterpretable - did in fact the experimental treatments make a difference in this specific?

External validity asks the question of generalizeability - to what populations, settings, treatment variables, and measurement variables can this effect be generalized?

Factors affecting internal validity:

1. **History** - what occurs between the first and second measurement, besides X
2. **Maturation** - processes within the respondents that act as a function of time, and not specific to particular events (growing older, hungrier, more tired etc.)
3. **Testing** - the effects of taking a test upon the scores of a second test.
4. **Instrumentation** - changes in the calibration of a measuring instrument or in observers or scorers may change the obtained measurements.
5. **Statistical regression** - operates when groups have been selected on the basis of their extreme scores.
6. **Selection bias** - differential selection of respondents for the comparison groups
7. **Experimental mortality** - the differential loss of respondents from the comparison groups.
8. **Selection-maturation interaction**, and other interactions of the above - certain quasi-experimental designs, the design may be mistaken for the effect of X (example: a non-equivalent control group design)
9. **Ambiguity about the direction of causal influence** - a case where it is not clear whether A causes B or B causes A. (example: does a decrease in church attendance cause demoralization of the ministerial, or does the demoralization of the ministerial cause a decrease in church attendance?) This is often a problem in correlational cross-sectional studies.

10. **Diffusion or imitation of treatment** - when treatments involve informational programs and when the various experimental (and control) groups can communicate with each other, respondents in one treatment group may learn the information intended for others. Therefore there may be no difference between experimental and control groups.
11. **Compensatory equalization of treatments** - when the experimental treatment provides goods or services generally believed to be desirable, there may emerge administrative and constituency reluctance to tolerate the inequality that results.
12. **Compensatory rivalry by respondents receiving less desirable treatments** - where the assignment of persons or organizational units to experimental and control conditions is made public, conditions of social competition may be generated. The control group, as the natural underdog, may be motivated to reduce or reverse the expected difference.
13. **Resentful demoralization of respondents receiving less desirable treatments** - when an experiment is obtrusive, the reaction of a no-treatment control group or groups receiving less desirable treatments can be associated with resentment and demoralization. This may produce differences in the posttest, not due to X, but rather due to the poorer performance of the control group through demoralization.
14. **Placebo effect** - when the act of taking something, or doing something, results in positive change, despite the fact that this is supposedly an inactive treatment. For example, taking bitter pills or colourful pills, even if they are inactive, may result in changes of outcome measures.
15. **Blinding** - this may be an effect of instrumentation, or of compensation. In a randomized trial, the assessors should be made blind to the treatment allocation of the subjects, to avoid possible bias in their assessment. A single-blind study means that the patient is blind to the treatment allocation, like in the placebo versus drug trial. A double-blind study means that both the patient and the doctor or assessor is blind to the treatment allocation.

Factors affecting external validity (representativeness, generalizeability):

1. **The reactive, or interactive, effect of testing** - a pretest might increase or decrease the despondent's sensitivity or responsiveness to the X, so the result is unrepresentative of the effects of X on an unpretested population
2. **The interaction effects of selection biases and the experimental variable, X** - for example, volunteer bias inherent in asking for people to partake in an experiment
3. **Reactive effects of experimental arrangements** - those in an experimental setting and exposed to X react differently that those being exposed to X in a non-experimental setting.
4. **Multiple-treatment interference** - occurs whenever multiple treatments are applied to the same respondents, because the effects of prior treatments are not usually erasable

Appendix 10. Peer Counsellor Program Evaluation study surveys

Consent Forms:

Title of research project: ***Evaluating the Effectiveness of a Breastfeeding Promotion Community Strategy in Sagkeeng First Nation***

Researcher: Patricia J. Martens Cert.Ed., IBCLC, M.Sc.
Doctoral Student, Department of Community Health Sciences
University of Manitoba
Telephone (home): ( )
Address:

Supervisor: Dr. Patricia Kaufert, Professor
Department of Community Health Sciences
University of Manitoba

Description of Research:

As part of a study about infant feeding programs in the community of Sagkeeng First Nation, I am asking your permission to interview you. You have recently had a baby. The health centre contacted you to ask if you would allow me to talk to you about your experiences.

I am going to evaluate some of the ways in which women are given information after the birth of their babies.

If you agree to be part of the research, you will be asked some questions. I will be asking you questions about the birth, about how you fed your children, and about who helped you in the first few months. Our conversation will be taped. It will take about 20 to 30 minutes.

Then I will ask you some survey questions about your attitudes and beliefs about breastfeeding and bottlefeeding. This will take about 15 minutes.

All the information you give me will be confidential, so that your name will not be known to anyone except me. Only group data will be reported. The tape recording of our interview will be destroyed after it is used to type out the interview.

After the analysis is complete, Sagkeeng Health Centre will be sent a report about the overall results of the research. You will also have the report sent to you directly if you want.

How would this research benefit you? The results will benefit Sagkeeng Health Centre in planning how to help women who have babies.

Evaluating the Effectiveness of a Breastfeeding Promotion Community Strategy in Sagkeeng First Nation

I am willing to be a participant in a study about infant feeding in my community. The Band Council has given permission for this study. I will be asked questions about my experiences after the birth of my children, and how they were fed after birth. Part of the interview will be taped.

Interview schedule:one in-person visit with the researcher, taking about 45 minutes, taped

All information I give will be kept confidential, so my name will not be known to anyone except the researchers. Only group data will be shared with the health centre and community, with no individual names identified. The tape recording of the interview will be destroyed after it is used to type out the interview.

This research will be used to find out about programs to help mothers with infant feeding.

During the research, I can choose not to answer a question if I do not wish to give that information. I can ask to leave the study at any time with no problem to me.

Signed: ______________________________
Please print name here: ______________________________
Date: ______________________________
Telephone number: ______________________________
Address: ______________________________

I agree to participate in the study: ❑ yes ❑ no
I wish to receive a summary sheet about the research: ❑ yes ❑ no

****

I am the investigator of this study. I am evaluating several community intervention strategies, one at the individual level, one at a community level (school), and one at an institutional level (hospital). I want to see which of these strategies is effective in promoting breastfeeding.

Thank you for taking the time to do this study. I will try to use this information to help communities and hospitals decide their own breastfeeding promotion strategies.

Your health centre will receive a report once the entire study is completed. You have the option of receiving a summary sheet if you wish. Please telephone me collect at (   )   if you have any further questions.

Patricia Martens, Doctoral Student
Department of Community Health Sciences, University of Manitoba

Demographics CODE NUMBER: ________

INFANT: name of infant ____

Date of Birth: _____ _______ _______
(YR) (MON) (DAY)

Current age of infant: Date of interview ___________; Age of infant _______ months

Birthweight: _________ grams (Or ____ lb, ___ oz) (BWT)

Was breastfeeding initiated? (ANYBF) (1) ❑ yes
(0) ❑ no

If yes, then duration of breastfeeding in days: (BFDUR) ______ days until complete weaning.

Parity: (1) ❑ firstborn child
(0) ❑ not firstborn child (FIRSTBN)

MOTHER: name ____

Maternal Age at Birth of this child: ______ (MOTHAGE) years

Comments:

Qualitative Interview (taped)

MOTHERS: (will also do the confidence, referent, and beliefs tests from the Masters program, and the "breastfeeding success" tool)

1. In which hospital did you give birth?

2. In what ways did the hospital staff help you with breastfeeding?

3. How did you feel in the hospital? - anxious, relaxed, happy, afraid, confident??

4. Was your baby given supplements during the hospital stay? If so, what kind and how often? What was your opinion about your baby being given supplements?

5. When you got home, if I had been following you around for a typical day in the early weeks, what would I have seen you doing?

6. What is your opinion about the importance of breastfeeding to women, babies and families?

7. Describe the information about breastfeeding that helped you?

8. How did different people help you with breastfeeding?

(9). (Only for those women after the peer counselling program has begun) How did you feel during and after the peer counsellor phone calls?

10. In this community, what resources are available to women when they need help with breastfeeding?

11. What kind of community resources would you put into place if you wanted to help other breastfeeding mothers?

Mother's survey questions based on Martens (1994):

This survey will be used with in-person interviews of women who initiated breastfeeding. A sample of women will be interviewed before the start of the peer counselling telephone call intervention program, and a sample after. The mothers will be interviewed between 4 and 7 months postpartum.

1. How satisfied are (were) you with breastfeeding? (BFSAT)
   (1) very unsatisfied
   (2) unsatisfied
   (3) neither unsatisfied nor satisfied
   (4) satisfied
   (5) very satisfied

2. How many problems have you had with breastfeeding? ____ List them: (PROBBF)

Maternal Breastfeeding Beliefs

		strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
1.	Breastfeeding make you and your baby develop close feelings (CLOSE)	1	2	3	4	5
2.	Breastfeeding is the most natural way to feed your baby (NATURAL)	1	2	3	4	5
3.	Breastfeeding is convenient (CONVEN)	1	2	3	4	5
4.	Breastfeeding provides the best food for your baby (BESTFOOD)	1	2	3	4	5
5.	Breastfeeding saves time (SAVETIME)	1	2	3	4	5
6.	Breastfeeding makes you feel good about yourself (FEELGOOD)	1	2	3	4	5
7.	Breastfeeding helps you regain your figure (FIGURE)	1	2	3	4	5
8.	Breastfed babies are healthier (HEALTHY)	1	2	3	4	5
9.	Breastfeeding allows you to go places and do things outside the home easily (GOPLACES)	1	2	3	4	5
10.	Breastfeeding does not cost very much money (COST)	1	2	3	4	5

Maternal Breastfeeding Belief score = sum of the individual items (possible scores 10-50)

Maternal Bottlefeeding Beliefs

		strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
1.	Bottlefeeding helps you and your baby develop close feelings (BCLOSE)	1	2	3	4	5
2.	Bottlefeeding is the most natural way to feed a baby (BNATURAL)	1	2	3	4	5
3.	Bottlefeeding is convenient (BCONVEN)	1	2	3	4	5
4.	Bottlefeeding provides the best food for your baby (BBESTFOOD)	1	2	3	4	5
5.	Bottlefeeding saves time (BSAVETIME)	1	2	3	4	5
6.	Bottlefeeding makes you feel good about yourself (BFEELGOOD)	1	2	3	4	5
7.	Bottlefeeding helps you regain your figure (BFIGURE)	1	2	3	4	5
8.	Bottlefed babies are healthier (BHEALTHY)	1	2	3	4	5
9.	Bottlefeeding allows you to go places and do things outside the home easily (BGOPLACES)	1	2	3	4	5
10.	Bottlefeeding does not cost very much money (BCOST)	1	2	3	4	5

Maternal Bottlefeeding Beliefs score = sum of the individual items (possible scores 10-50)

Maternal Breastfeeding Confidence Survey: answer this section generally, that is, how you feel about most women in these situations ...

Would you feel confident about a woman being able to breastfeed in the following situations? (How sure are you that a woman can breastfeed in these situations)	very unsure	a little unsure	don't know	fairly sure	very sure
1. During the hospital stay?	1	2	3	4	5
2. During the first week at home?	1	2	3	4	5
3. For six weeks after the birth?	1	2	3	4	5
4. If baby is born by a C-Section (Caesarian)?	1	2	3	4	5
5. If baby is premature and has to stay in the hospital?	1	2	3	4	5
6. If a woman's breasts hurt?	1	2	3	4	5
7. If the baby has a hard time learning how to breastfeed?	1	2	3	4	5
8. If a woman is in a public place?	1	2	3	4	5
9. If a woman or her baby gets sick?	1	2	3	4	5
10. If the baby seems fussy a lot of the time?	1	2	3	4	5
11. If the woman goes back to school or work?	1	2	3	4	5
12. If the woman smokes?	1	2	3	4	5
13. If the woman drinks alcohol?	1	2	3	4	5
14. If the woman eats a lot of snack foods?	1	2	3	4	5
15. If there are other women in the room?	1	2	3	4	5
16. If there are men in the room?	1	2	3	4	5
17. If the woman has diabetes?	1	2	3	4	5

Maternal Breastfeeding Confidence Score = sum of the individual items (possible scores 17 to 85)

Maternal Referent Score

A. What do these support people think about how you should be feeding your baby? Circle the number which best describes what they think you should do. IF NOT APPLICABLE, put NA beside the line.

	definitely bottlefeed			neutral			definitely breastfeed
male partner	-3	-2	-1	0	+1	+2	+3
your own mother	-3	-2	-1	0	+1	+2	+3
your own father	-3	-2	-1	0	+1	+2	+3
your mother-in-law	-3	-2	-1	0	+1	+2	+3
your sister(s)	-3	-2	-1	0	+1	+2	+3
your brother(s)	-3	-2	-1	0	+1	+2	+3
close friends	-3	-2	-1	0	+1	+2	+3
your doctor	-3	-2	-1	0	+1	+2	+3
the health nurse	-3	-2	-1	0	+1	+2	+3
people at work/school	-3	-2	-1	0	+1	+2	+3
peer counsellor or peer support group	-3	-2	-1	0	+1	+2	+3
hospital nurse	-3	-2	-1	0	+1	+2	+3

B. Do you comply with (go along with) the wishes of these people in other situations? (Do you go along with what these people tell you to do in other situations?)

	never						always
male partner	1	2	3	4	5	6	7
your own mother	1	2	3	4	5	6	7
your own father	1	2	3	4	5	6	7
your mother-in-law	1	2	3	4	5	6	7
your sister(s)	1	2	3	4	5	6	7
your brother(s)	1	2	3	4	5	6	7
close friends	1	2	3	4	5	6	7
your doctor	1	2	3	4	5	6	7
the health nurse	1	2	3	4	5	6	7
people at work/school	1	2	3	4	5	6	7
peer counsellor or peer support group	1	2	3	4	5	6	7
hospital nurse	1	2	3	4	5	6	7

Maternal Referent Score = $\sum(A*B)/n$ (Range -21 to +21)

<u>Maternal Breastfeeding Evaluation Scale</u> (revised from Leff et al., 1994)
(This tool has been used with permission of Ellen Leff, with the understanding that revisions would be made for cultural appropriateness.)
If you breastfed more than one baby, base your answers on the most recent experience.
Consider the overall breastfeeding experience.
For each sentence, circle the number which best tells how you feel about the sentence.

For example: For the first sentence, "With breastfeeding I felt a sense of calm", if you strongly agree with it, you would circle the "5". But if you disagree, you would circle the "2".

Statements about your breastfeeding experience		*how you feel about the statement*				
		strongly disagree	disagree	neither disagree nor agree, neutral	agree	strongly agree
1.	With breastfeeding I felt a sense of calm.	1	2	3	4	5
2.	Breastfeeding was a special time with my baby.	1	2	3	4	5
3.	My baby wasn't interested in breastfeeding.	1	2	3	4	5
4.	My baby loved to nurse.	1	2	3	4	5
5.	It was hard being my baby's main source of food.	1	2	3	4	5
6.	I felt extremely close to my baby when I breastfed.	1	2	3	4	5
7.	My baby was an eager breastfeeder.	1	2	3	4	5
8.	Breastfeeding was physically draining.	1	2	3	4	5
9.	It was important to me to be able to nurse.	1	2	3	4	5
10.	While breastfeeding, my baby's growth was good.	1	2	3	4	5
11.	My baby and I worked together to make breastfeeding go smoothly.	1	2	3	4	5
12.	Breastfeeding allowed me to be more tuned in to my baby.	1	2	3	4	5
13.	While breastfeeding, I felt self-conscious about my body.	1	2	3	4	5
14.	With breastfeeding, I felt too tied down all the time.	1	2	3	4	5

Statements about your breastfeeding experience (continued)		***how you feel about the statement***				
		strongly disagree	disagree	neither disagree nor agree, neutral	agree	strongly agree
15.	While breastfeeding, I worried about my baby gaining enough weight.	1	2	3	4	5
16.	Breastfeeding was soothing when my baby was upset or crying.	1	2	3	4	5
17.	When I was breastfeeding, I felt really good about life.	1	2	3	4	5
18.	The fact that I could produce the food to feed my own baby was very satisfying.	1	2	3	4	5
19.	In the beginning, my baby had trouble breastfeeding.	1	2	3	4	5
20.	Breastfeeding made me feel like a good mother.	1	2	3	4	5
21.	I really enjoyed nursing.	1	2	3	4	5
22.	While breastfeeding, I was anxious to have my body back.	1	2	3	4	5
23.	Breastfeeding made me feel more confident as a mother.	1	2	3	4	5
24.	My baby gained weight really well with breastmilk.	1	2	3	4	5
25.	Breastfeeding made my baby feel more secure.	1	2	3	4	5
26.	I could easily fit my baby's breastfeeding with my other activities.	1	2	3	4	5
27.	Breastfeeding made me feel over-touched.	1	2	3	4	5
28.	My baby did not relax while nursing.	1	2	3	4	5
29.	Breastfeeding was emotionally draining.	1	2	3	4	5
30.	Breastfeeding felt wonderful to me.	1	2	3	4	5

Appendix 11. Sagkeeng School adolescent education session evaluation tools

Description of Sagkeeng School Educational Program on Infant Feeding:

Title of research project: ***Evaluating the Effectiveness of a Breastfeeding Promotion Community Strategy in Sagkeeng First Nation***

Researcher: Patricia J. Martens Cert.Ed., IBCLC, M.Sc.
Doctoral Student, Department of Community Health Sciences
University of Manitoba
Telephone (home): ( )
Address:

Supervisor: Dr. Patricia Kaufert, Professor
Department of Community Health Sciences
University of Manitoba

Description of Research:

The students who are enrolled in the Native Studies course of Sagkeeng School will be giving their parents/guardians a letter of permission. The school will collect these letters. If a letter is not returned, a teacher will be telephoning you to receive permission.

As part of the Native Studies course, all of the students will be learning about two health issues. To see if one of these classes changes the students' attitudes or knowledge about breastfeeding and bottle feeding, the students will do two surveys. Each survey takes only about 5 minutes to do.

If your permission is given, then the surveys done by the student will be used by me to see if the session made a difference. If permission is not given, then the students will attend the special class and do the surveys, but the surveys will not be given to me.

The student surveys will be kept confidential, so that only the researcher (me) will see the results. Only the group scores will be shared with the school staff.

All the information the students give me will be confidential, so that their name will not be published. Only group data will be reported.

After the analysis is complete, Sagkeeng School will be sent a report about the overall results of the research. You will also have the report sent to you directly if you want.

How would this research benefit you? The results will benefit Sagkeeng School in planning educational programs which promote the health of the community of Sagkeeng First Nation.

Parent or Guardian Consent Form: School Program

Title: ***Evaluating the Effectiveness of a Breastfeeding Promotion Community Strategy in Sagkeeng First Nation***

As part of the Native Studies course, all of the enrolled students will be having a special class about infant feeding. To see if this information changes their attitudes or beliefs about infant feeding, we would like to give the students a pre-test and two post-tests. The results will be used in a research study. Therefore, I am asking permission to have your child/ward's test results to be used for research.

The student will fill out a survey (less than 5 minutes) before, after the class, and 1 week later. All information the student gives will be kept confidential, so her/his name will not be known to anyone except the researchers. During the research, the student can choose not to answer a question if he/she does not wish to give that information. The student can ask to withdraw their survey from the study at any time with no problem to them. Only group data will be shared with the school and community, with no individual names identified.

This research will be used to find out if a health educational session changes attitudes and knowledge about infant feeding. The Principal has given permission for this study.

******

I agree to allow my child/ward to participate in the pre- and post-tests for the infant feeding class. ❑ yes ❑ no

Signed: ______________________________

Please print student's name: ______________________________

Date: ______________________________

I wish to receive a summary sheet about the research: ❑ yes ❑ no

If yes, this should be sent to the following address:

____

****

My name is Pat Martens. I am the investigator of this study. I am evaluating several community intervention strategies for Sagkeeng First Nation, including an educational session for young people. I want to see which of these strategies is effective in promoting breastfeeding. Thank you for taking the time to allow your child/ward to do this study. I will try to use this information to help Sagkeeng decide about health promotion strategies. Your school and health centre will receive a report once the entire study is completed. You have the option of receiving a summary sheet if you wish. Please telephone me collect at ( ) if you have any further questions.

Patricia Martens, Doctoral Student

Department of Community Health Sciences, University of Manitoba

School Survey on Breastfeeding Beliefs and Attitudes
NOTE: The Beliefs section will be included in both pre- and posttest, but the Attitudes section will only be included in the posttest.

Gender:
Grade:
Age:
Name:

Breastfeeding Beliefs:

		strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
1.	Breastfeeding would make a mother and her baby develop close feelings (BFCLOSE)	1	2	3	4	5
2.	Breastfeeding is the most natural way to feed a baby (BFNATURAL)	1	2	3	4	5
3.	Breastfeeding is convenient (BFCONVEN)	1	2	3	4	5
4.	Breastfeeding provides the best food for a baby (BFBESTFD)	1	2	3	4	5
5.	Breastfeeding saves time for the mother (BFTIME)	1	2	3	4	5
6.	Breastfeeding makes a mother feel good about herself (BFFLGD)	1	2	3	4	5
7.	Breastfeeding helps a mother regain her figure (BFFIGURE)	1	2	3	4	5
8.	Breastfed babies are healthier (BFHEALTH)	1	2	3	4	5
9.	Breastfeeding allows a mother to go places and do things outside the home easily (BFGOPL)	1	2	3	4	5
10.	Breastfeeding would not cost very much money (BFCOST)	1	2	3	4	5
11.	Breastfeeding allows a mother to get more sleep (BFSLEEP)	1	2	3	4	5
12.	Babies enjoy breastfeeding (BFENJOY)	1	2	3	4	5

Breastfeeding knowledge score = sum of the individual items (possible scores 12 - 60)

Bottlefeeding Belief Survey cont'd:

		strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
1.	Bottlefeeding helps a mother and her baby develop close feelings (BCLOSE)	1	2	3	4	5
2.	Bottlefeeding is the most natural way to feed a baby (BNATURAL)	1	2	3	4	5
3.	Bottlefeeding is convenient (BCONVEN)	1	2	3	4	5
4.	Bottlefeeding provides the best food for a baby (BBESTFD)	1	2	3	4	5
5.	Bottlefeeding saves time for the mother (BTIME)	1	2	3	4	5
6.	Bottlefeeding makes a mother feel good about herself (BFLGD)	1	2	3	4	5
7.	Bottlefeeding helps a mother regain her figure (BFIGURE)	1	2	3	4	5
8.	Bottlefed babies are healthier (BHEALTH)	1	2	3	4	5
9.	Bottlefeeding allows a mother to go places and do things outside the home easily (BGOPL)	1	2	3	4	5
10.	Bottlefeeding would not cost very much money (BCOST)	1	2	3	4	5
11.	Bottlefeeding allows a mother to get more sleep (BSLEEP)	1	2	3	4	5
12.	Babies enjoy bottlefeeding (BENJOY)	1	2	3	4	5

Bottlefeeding belief score = sum of the individual items (possible scores 12 - 60)

Attitude Questions:

		strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
1.	Breastfeeding is a good thing for mothers	1	2	3	4	5
2.	Breastfeeding is a good thing for babies	1	2	3	4	5
3.	Breastfeeding the baby is a good thing for the male partner	1	2	3	4	5
4.	It's okay for women to breastfeed if there are other women in the room	1	2	3	4	5
5.	It's okay for women to breastfeed if there are men in the room	1	2	3	4	5
6.	It's okay for women to breastfeed in a public place	1	2	3	4	5
7.	Women should be encouraged to breastfeed their babies	1	2	3	4	5
8.	I would encourage my friends to breastfeed their babies	1	2	3	4	5
9.	I would be comfortable (not embarrassed) if I saw a woman breastfeeding her baby	1	2	3	4	5
10.	Our school should encourage teen mothers to breastfeed	1	2	3	4	5
11.	Breastfeeding is fashionable	1	2	3	4	5
12.	Breastfeeding information should be included in the school curriculum	1	2	3	4	5

Breastfeeding Attitude Score = sum of the individual items (possible scores 12 to 60)

Demographics of students:

1. ❑ male, Or ❑ female

2. Age in years: ______

3. Have you ever seen a woman breastfeeding a baby? ❑ yes
❑ no

4. Were you breastfed as a baby? ❑ yes
❑ no
❑ I don't know

5. Show how would you want your own children to be fed? ❑ breastfed
❑ bottlefed
❑ mix of breastfed/bottlefed
❑ I don't know

6. Do you think that breastfeeding is a topic that should be discussed in school?
❑ yes
❑ no

Appendix 12. **Hospital Policy and Practice Intervention evaluation tools**
(the hospital staff survey and the hospital chart audit information)

Client Consent Form: Hospital Maternity Staff of Pine Falls Health Complex
Title of research project:
Evaluating the Effectiveness of a Breastfeeding Promotion Community Strategy in Sagkeeng First Nation
I am willing to be a participant in a study of hospital policy/protocol and staff beliefs and attitudes about infant feeding. I will be asked questions about my hospital's policy, about my routine practice, and about my knowledge and attitudes regarding breastfeeding and bottle feeding.
Interview schedule: before the educational intervention: a written survey (10 minutes or less)
after the educational intervention (about 3 months later): a written survey
All information I give will be kept confidential, so my name will not be known to anyone except the researchers. Only group data will be shared with the hospital, with no individual names identified.

This research will be used to find out what effect educational sessions will have on hospital policy, protocol, and staff beliefs and attitudes.

During the research, I can choose not to answer a question if I do not wish to give that information. I can ask to leave the study at any time with no problem to me personally or to my hospital.

Signed: ______________________________
Please print name here: ______________________________
Date: ______________________________

I agree to participate in the study: ☐ yes ☐ no
I wish to receive a summary sheet about the research: ☐ yes ☐ no
If yes, this should be sent to the following address:

****

I am the investigator of this study. I am evaluating several community intervention strategies, one at the individual level, one at a community level (school), and one at an institutional level (hospital). I want to see which of these strategies is effective in promoting breastfeeding.

Thank you for taking the time to do this study. I will try to use this information to help communities and hospitals decide their own breastfeeding promotion strategies. Your hospital will receive a report once the entire study is completed. You have the option of receiving a summary sheet if you wish. Please telephone me collect at ( ) f you have any further questions.
Patricia Martens, Doctoral Student
Department of Community Health Sciences, University of Manitoba

Description of Arborg and Districts Health Centre Research Project:

Title of research project:	***Evaluating the Effectiveness of a Breastfeeding Promotion Community Strategy in Sagkeeng First Nation***
Researcher:	Patricia J. Martens Cert.Ed., IBCLC, M.Sc. Doctoral Student, Department of Community Health Sciences University of Manitoba Telephone (home): ( ) Address:
Supervisor:	Dr. Patricia Kaufert, Professor Department of Community Health Sciences University of Manitoba

Description of Research:

Your hospital has been asked to be part of a research evaluation study. This will focus on maternity facility recommendations of the World Health Organization and UNICEF. Two hospitals are involved, yours and Pine Falls Health Complex.

The 1½ hour educational session will be given some time in the fall of 1997. You will also be given a self-paced booklet to reinforce the educational concepts. This will be done during the month following the inservice.

I am going to evaluate the effectiveness of an educational package. You are not obligated to be part of the evaluation research.

If you agree to be part of the evaluation research, you will be asked to do a survey in late spring 1997. You will also be asked to complete a similar survey a few months later, just before the inservice. The surveys will measure hospital policy, hospital practices, staff attitudes, and staff beliefs about infant feeding. The surveys will take, at most, 10 minutes to complete.

There will be a code number on the survey form. You will link your name to the code number on a separate sheet. All forms will be kept completely confidential. No names or individual scores will be identified, or available to anyone other than myself. After the analysis is complete, your hospital will be sent a report about the overall results of the research. You will also have the option of receiving the report directly.

How would this research benefit you? Nursing has put emphasis on research-based practice. This research is designed to evaluate the effectiveness of an educational strategy. The results will benefit your hospital in future planning, will benefit you and other nurses in continuing education, and will benefit your clients in your pursuit of "best practice" nursing standards.

Client Consent Form: Hospital Maternity Staff of Arborg and Districts Health Centre

Title of research project:

Evaluating the Effectiveness of a Breastfeeding Promotion Community Strategy in Sagkeeng First Nation

I am willing to be a participant in a study of hospital policy/protocol and staff beliefs and attitudes about infant feeding. I will be asked questions about my hospital's policy, about my routine practice, and about my knowledge and attitudes regarding breastfeeding and bottle feeding.

Interview schedule: a written survey (10 minutes or less)
about 3 months later: a similar written survey

All information I give will be kept confidential, so my name will not be known to anyone except the researchers. Only group data will be shared with the hospital, with no individual names identified.

This research will be used to find out what effect educational sessions will have on hospital policy, protocol, and staff beliefs and attitudes: the hospital will be offered an educational session after both surveys have been completed.

During the research, I can choose not to answer a question if I do not wish to give that information. I can ask to leave the study at any time with no problem to me personally or to my hospital.

Signed: ____________________
Please print name here: ____________________
Date: ____________________

I agree to participate in the study: ❑ yes ❑ no
I wish to receive a summary sheet about the research: ❑ yes ❑ no
If yes, this should be sent to the following address:

****

I am the investigator of this study. I am evaluating several community intervention strategies, one at the individual level, one at a community level (school), and one at an institutional level (hospital). I want to see which of these strategies is effective in promoting breastfeeding.

Thank you for taking the time to do this study. I will try to use this information to help communities and hospitals decide their own breastfeeding promotion strategies. Your hospital will receive a report once the entire study is completed. You have the option of receiving a summary sheet if you wish. Please telephone me collect at ( )
you have any further questions.

Patricia Martens, Doctoral Student
Department of Community Health Sciences, University of Manitoba

BFHI (Baby-Friendly Hospital Initiative) Compliance Survey CODE #___
Hospital Policy and Practice Survey:

	YES (2)	NO (0)	DON'T KNOW (0)	(step)
1. Does your facility have a written policy on breastfeeding? (WRPOL)	❑	❑	❑	step 1
2. Have you been oriented to the breastfeeding policy of the hospital? (ORPOL)	❑	❑	❑	step 1
3. Is the policy based on the WHO/UNICEF "Ten Steps to Successful Breastfeeding"? (TENPOL)	❑	❑	❑	step 1
4. My facility gives me the necessary skills to work with breastfeeding mothers (SKILLS)	❑	❑	❑	step 2
"Always or most of the time" means at least 90% of the time. "Rarely or never" means 10% of the time or less.	ALWAYS or MOST OF THE TIME (2)	SOME-TIMES (1)	RARELY OR NEVER (0)	
5. Do you take into account a woman's intention to breastfeed when pain management is required during labour & delivery? (PAIN)	❑	❑	❑	step 2
6. Following an uncomplicated vaginal birth, do you ...				
6a. Give women their babies to hold within a half-hour of delivery? (HALFHR)	❑	❑	❑	step 4
6b. Allow babies to remain with their mothers for at least the first hour? (FIRSTHR)	❑	❑	❑	step 4
6c. Offer help to women to initiate breastfeeding during the first hour postpartum? (FIRSTBF)	❑	❑	❑	step 4
7. a. Do you show women how to correctly position and latch breastfed babies? (POSITION)	❑	❑	❑	step 5

	ALWAYS or MOST OF THE TIME (2)	SOME-TIMES (1)	RARELY OR NEVER (0)	
7. b. Do you document accurately the effectiveness of the positioning and latch of the breastfeeding couple in the medical records? (DOCUBF)	❑	❑	❑	step 5
8. Do you show women how to express their milk? (EXPRESS)	❑	❑	❑	step 5
9. Do you advise breastfeeding mothers to avoid using bottles during the time that breastfeeding is becoming established? (First 3 to 4 weeks) (ADVISE)	❑	❑	❑	step 9
10. Do you give information to mothers on how to contact breastfeeding support groups or breastfeeding counsellors? (SUPPGRP)	❑	❑	❑	step 10
11. Do breastfed babies in your facility stay with the mother during the daytime? (DAYH)	❑	❑	❑	step 7
12. Do breastfed babies in your facility stay with the mother during the nighttime? (NIGHTH)	❑	❑	❑	step 7
13. Has your facility encouraged the establishment of support groups or persons for breastfeeding mothers in the community? (FOSTER)	❑	❑	❑	step 10
14. Do you discuss the benefits of breastfeeding with women who intend to breastfeed? (BENBF)	❑	❑	❑	step 3
15. Do you discuss the benefits of breastfeeding with women who intend to bottlefeed? (BENBO)	❑	❑	❑	step 3

		ALWAYS or MOST OF THE TIME (0)	SOME-TIMES (1)	RARELY OR NEVER (2)	
16.	Do you encourage women to wait at least two hours between breastfeedings? (TWOHR)	❑	❑	❑	step 8
17.	Do you encourage women to limit the number of minutes of feeding at each breast? (LIMIT)	❑	❑	❑	step 8
18.	Does your facility routinely order healthy breastfed babies to receive another liquid other than breastmilk? (i.e. water, glucose, formula) (SUPPROUT)	❑	❑	❑	step 6
19.	Do you encourage mothers to give healthy full-term breastfed newborns supplements of glucose, water or formula during their hospital stay? (SUPPS)	❑	❑	❑	step 6
20.	Does your hospital give pacifiers to breastfed babies? (SOOTHERS)	❑	❑	❑	step 9
21.	Do you give a gift-pack containing a sample of formula to breastfeeding women? (GIFT)	❑	❑	❑	code
22.	Does your facility receive free or subsidized (less than 80% of cost) formula? ❑ no ❑ yes ❑ don't know				Code 2,0,0
23.	In the first two days after birth, how many wet diapers would you expect to see per day in a full-term healthy exclusively breastfed baby? (WETCOUNT) ❑ 1 or 2 wet diapers ❑ 3 or 4 wet diapers ❑ 5 or 6 wet diapers ❑ 7 or 8 wet diapers				

24. When supplements are given to breastfeeding babies, indicate the feeding methods used: (check all that apply):

- ❑ baby bottle (BOTTLE)
- ❑ syringe (SYRINGE)
- ❑ cup (CUP)
- ❑ spoon (SPOON)
- ❑ eye dropper (DROPPER)
- ❑ feeding tube into the stomach (GAVAGE)
- ❑ feeding tube at finger (FINGER)
- ❑ feeding tube at breast (SNS)
- ❑ other, please identify ______________________________ (OTHER)

Of the above methods of supplementing, which would you use the MOST often? (Check only one)
(MOSTMODE)

- ❑ baby bottle (1)
- ❑ syringe (2)
- ❑ cup (3)
- ❑ spoon (4)
- ❑ eye dropper (5)
- ❑ feeding tube into the stomach (6)
- ❑ feeding tube at finger (7)
- ❑ feeding tube at breast (8)
- ❑ other, please identify ______________________________ (9)

Comments you would like to add:

____

____

____

For the BFHI Compliance Score: Questions pertaining to each step are given a maximum score of 2 for compliance. In order to weight the steps equally, a weighted score for each step will be determined, so that each step is scored out of a possible 4 points. Most steps have 2 questions, 2 points each, making 4 points maximum score. However, steps 1, 4 and 5 have 3 questions, making a maximum score of 6 points. This score will be weighted (multiplied by 2/3) to achieve a maximum score of 4 points.

Therefore, the maximum compliance score for the Ten Steps and the WHO Code is 44.

Questions which are not specifically a measure of the Ten Steps or the Code (question 23 and 24) will be analysed separately.

Staff Belief Survey:

		strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
1.	Breastfeeding helps a mother and her baby develop close feelings (CLOSE)	1	2	3	4	5
2.	Breastfeeding is the most natural way to feed a baby (NATURAL)	1	2	3	4	5
3.	Breastfeeding is convenient (CONVEN)	1	2	3	4	5
4.	Breastfeeding provides the best food for a baby (BESTFOOD)	1	2	3	4	5
5.	Breastfeeding saves time for the mother (SAVETIME)	1	2	3	4	5
6.	Breastfeeding makes a mother feel good about herself (FEELGOOD)	1	2	3	4	5
7.	Breastfeeding helps a mother regain her figure (FIGURE)	1	2	3	4	5
8.	Breastfed babies are healthier (HEALTHY)	1	2	3	4	5
9.	Breastfeeding allows a mother to go places and do things outside the home easily (GOPLACES)	1	2	3	4	5
10.	Breastfeeding would not cost very much money (COST)	1	2	3	4	5
11.	It's good for women to breastfeed if they smoke.	1	2	3	4	5
12.	It's good for women to breastfeed if they drink alcohol once in a while.	1	2	3	4	5
13.	It's good for women to breastfeed if they have diabetes.	1	2	3	4	5

Breastfeeding knowledge score = sum of the individual items (possible scores 13 - 65)

Staff Belief Survey cont'd:

		strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
1.	Bottlefeeding helps a mother and her baby develop close feelings (BCLOSE)	1	2	3	4	5
2.	Bottlefeeding is the most natural way to feed a baby (BNATURAL)	1	2	3	4	5
3.	Bottlefeeding is convenient (BCONVEN)	1	2	3	4	5
4.	Bottlefeeding provides the best food for a baby (BBESTFOOD)	1	2	3	4	5
5.	Bottlefeeding saves time for the mother (BSAVETIME)	1	2	3	4	5
6.	Bottlefeeding makes a mother feel good about herself (BFEELGOOD)	1	2	3	4	5
7.	Bottlefeeding helps a mother regain her figure (BFIGURE)	1	2	3	4	5
8.	Bottlefed babies are healthier (BHEALTHY)	1	2	3	4	5
9.	Bottlefeeding allows a mother to go places and do things outside the home easily (BGOPLACES)	1	2	3	4	5
10.	Bottlefeeding would not cost very much money (BCOST)	1	2	3	4	5
11.	It's good for women to bottlefeed if they smoke.	1	2	3	4	5
12.	It's good for women to bottlefeed if they drink alcohol once in a while.	1	2	3	4	5
13.	It's good for women to bottlefeed if they have diabetes.	1	2	3	4	5

Bottlefeeding knowledge score = sum of the individual items (possible scores 13 - 65)

Staff Attitude Survey:

		strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
1.	Breastfeeding is a good thing for most mothers (GOODMOTH)	1	2	3	4	5
2.	Breastfeeding is a good thing for most babies (GOODBABY)	1	2	3	4	5
3.	Breastfeeding the baby is a good thing for the male partner (GOODFAM)	1	2	3	4	5
4.	It's okay for women to breastfeed if there are other women in the room (BFWOMEN)	1	2	3	4	5
5.	It's okay for women to breastfeed if there are men in the room (BFMEN)	1	2	3	4	5
6.	It's okay for women to breastfeed in a public place (BFPUBLIC)	1	2	3	4	5
7.	Women who are uncertain should be encouraged by our staff to breastfeed their babies (ENCBF)	1	2	3	4	5
8.	I would encourage my own friends to breastfeed their babies (ENCFR)	1	2	3	4	5
9.	I would be comfortable (not embarrassed) if I saw a woman breastfeeding her baby in a public place (COMFORT)	1	2	3	4	5
10.	Women who initially choose to bottlefeed should be informed about the benefits of breastfeeding (ENCBOT)	1	2	3	4	5
11.	There are real differences in health between babies who are breastfed and babies who are bottlefed (HEALTHDI)	1	2	3	4	5

Breastfeeding Attitude Score = sum of the individual items (possible scores 11 to 55)

Chart Audit Hospital Records information (to be abstracted by a staff member)

1. Day and hour of birth: day/month/year _____ ______ ______
   (BDAY) (BMON) (BYR)
   Hour ______ (BHOUR)

2. Day and hour of discharge: day/month/year _____ ______ ______
   (DDAY) (DMON) (DYR)
   Hour ______ (DHOUR)

3. Birth weight in grams: _____________ grams (BIRTHWT)

4. Infant gender: ❑ female (1) (GENDER)
   ❑ male (0)

5. Type of delivery: ❑ vaginal (0) (TYPEDEL)
   ❑ Caesarian section (1)

6. Medications during labour and delivery: ❑ no (0) (MEDDEL)
   ❑ yes (1)
   If yes, then which medications and when?
   ____
   ____
   ____
   ____

7. Type of feeding of infant: ❑ breastfeeding or breastmilk (completely or partially) (1)
   ❑ bottlefeeding with formula only (0)
   (AYBFH)

If the baby was breastfeeding, complete questions 8 and 9. If the baby was solely bottlefeeding, skip questions 8 to 10.

8. If breastfeeding: (1) ❑baby received only breastmilk, **at the breast**

   Or

   (0) ❑ baby was breastfed and supplemented with other liquids
   If yes, then record supplementation patterns:

Supplements received: (SUPPLNUH)

Liquid: W=water G=glucose F=formula (type)	Mode: bottle, syringe, cup, spoon, eye dropper gavage, finger-feed,SNS	Day:	Time:	Amount:
___	___	___	___	___
___	___	___	___	___
___	___	___	___	___
___	___	___	___	___
___	___	___	___	___
___	___	___	___	___

9. If the baby was breastfed, is there documentation of latch and positioning in the medical records? (DOCUPLH)
   - (0) ❑ no documentation
   - (1) ❑ minimal documentation (example: "good breastfeed")
   - (2) ❑ detailed documentation (example: assessment form or detailed account)

10. Show how many breastfeeds are recorded?
    - First 24 hours: _______ FREQBFH1
    - second 24 hours: _______FREQBFH2
    - third 24 hours: _______FREQBFH3
    - fourth 24 hours: _______FREQBFH4

11. Show how long after birth was the first breastfeed? _______ minutes (FIRSTH)

Directions given to the chart auditors were as follows: "Pull all charts from December 1, 1996 to June 3, 1997. These will be the 'before pretest' charts. Do all of these charts. Count the number of these charts where the baby initiated any breastfeeding. If there are at least 13 breastfed babies, then stop. If there are not at least 13, then get the hospital to pull an extra month of charts (November 1996) backward in time, ad do all the charts from that month. If there are still not 13 breastfed babies, then repeat this, going back another month, until such time as you have at least 13 breastfed babies' charts. Next, get the hospital to pull all newborn charts from June 4, 1997, up to the present day. Once again, do all the charts. Count to see if there are at least 13 breastfred babies within these charts. If there are not, we will have to continue to collect data on future births until such time as 13 breastfed babies have been included in the complete set of charts from June 4, 1997 to this future date."

Appendix 13. **Chart audit information for community breastfeeding trends**

For each child born January 1, 1992 or later, the community health nurse will abstract chart data. No names will be released to the researcher.

Date of Birth: _____ _______ _______
(YR) (MON) (DAY)

Birthweight: _________ grams (Or ____ lb, ___ oz) (BWT)

Was breastfeeding initiated? (ANYBF) (1) ❑ yes
(0) ❑ no

If yes, then duration of breastfeeding in days: (BFDUR) ______ days until complete weaning.
(Or if unable to contact mother, the last recorded day of breastfeeding in the medical records was ________ days (BFDUR, CENSORED DATA)

Parity: (1) ❑ firstborn child
(0) ❑ not firstborn child (FIRSTBN)

This information was obtained:
(1) ❑ completely from the health records
(2) ❑ from a telephone call to the mother
(3) ❑ this information was incomplete in the records, and the mother was unable to be contacted

Comments:

Appendix 14. Analysis of Variance Table and Tukey-Kramer tables for the Sagkeeng School intervention results

Split-unit analysis of variance table and Tukey-Kramer multiple comparison test for the Breastfeeding Belief Scores, pretest to post-test (n=45; pre/post/ret tests and pre/post-tests completed)

Split-Unit (Repeated Measures) Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	ProbLevel (Alpha=0.05)
A (intervention)	1	23.36673	23.36673	0.39	0.536460
B (gender)	1	0.943002	0.943002	0.02	0.900946
AB	1	17.9091	17.9091	0.30	0.588172
C(AB)	41	2464.997			
D (time)	1	160.0013	160.0013	10.27	0.002616*
AD	1	138.9843	138.9843	8.92	0.004737*
BD	1	49.83179	49.83179	3.20	0.081060
ABD	1	10.17078	10.17078	0.65	0.423710
S	41	638.6061	15.57576		
Total (Adjusted)	89	3524.722			
Total	90				

Tukey-Kramer's Multiple Comparison Test: Critical Value 3.79

Group	Count (n)	Breastfeeding Beliefs Score Mean (SD)	Different From Groups
(0,1) control, pretest	23	43.3 (5.3)	(1,2)
(0,2) control, post-test	23	43.5(5.3)	(1,2)
(1,1) intervention, pretest	22	41.9 (6.2)	(1,2)
(1,2) intervention, post-test	22	47.0 (7.3)	(1,1), (0,1), (0,2)

* statistically significant at the p<0.05 level

Split-unit analysis of variance table and Tukey-Kramer's multiple comparison test for the Breastfeeding Belief Scores analysis, all three time periods (n=34; pre/post/retention tests completed)

Split-Unit (Repeated Measures) Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	ProbLevel (Alpha=0.05)
A (intervention)	1	72.36397	72.36397	0.93	0.343217
B (gender)	1	1.444581	1.444581	0.02	0.892675
AB	1	41.64066	41.64066	0.53	0.470721
C(AB)	30	2340.662	78.02206		
D (time)	2	227.192	113.596	9.51	0.000259*
AD	2	98.9567	49.47835	4.14	0.020653*
BD	2	148.5379	74.26893	6.22	0.003517*
ABD	2	11.98883	5.994417	0.50	0.607954
S	60	716.7407	11.94568		
Total (Adjusted)	101	3663.843			
Total	102				

Group by Time interaction
Tukey-Kramer's Multiple Comparison Test: Critical Value 4.2

Group	Count (n)	Breastfeeding Beliefs Score Mean (SD)	Different From Groups
(0,1) control, pretest	18	43.7 (5.6)	(0,3)
(0,2) control, post-test	18	44.2 (5.2)	(0,3)
(0,3) control, retention test	18	47.6 (5.6)	(1,1), (0,1), (0,2)
(1,1) intervention, pretest	16	40.9 (5.7)	(1,2), (0,3)
(1,2) intervention post-test	16	45.3 (6.4)	(1,1)
(1,3) intervention, retention test	16	44.3 (6.5)	-

Gender by Time interaction
Tukey-Kramer's Multiple Comparison Test: Critical Value4.2

Group	Count (n)	Breastfeeding Beliefs Score Mean (SD)	Different From Groups
(0,1) male, pretest	17	43.6 (6.5)	(1,3)
(0,2) male, post-test	17	44.8 (6.1)	(1,1)
(0,3) male, retention test	17	44.3 (6.0)	-
(1,1) female, pretest	17	41.1 (4.8)	(1,2), (0,2), (1,3)
(1,2) female, post-test	17	44.7 (5.6)	(1,1)
(1,3) female, retention test	17	47.6 (6.0)	(1,1), (0,1)

* statistically significant at the p<0.05 level

Split-unit analysis of variance table and Tukey-Kramer multiple comparison test for the Bottle Feeding Belief Scores analysis, pre- to post-test (n=44; pre/post/retention tests and pre/post-tests completed)

Split-Unit (Repeated Measures) Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	ProbLevel (Alpha=0.05)
A (intervention)	1	0.8015152	0.8015152	0.01	0.937421
B (gender)	1	0.8727273	0.8727273	0.01	0.934706
AB	1	28.43788	28.43788	0.22	0.640477
C(AB)	40	5136.167	128.4042		
D (time).	1	92.43788	92.43788	4.06	0.050680
AD	1	1.024242	1.024242	0.04	0.833117
BD	1	8.074243	8.074243	0.35	0.554882
ABD	1	0.3878788	0.3878788	0.02	0.896814
S	40	910.8333	22.77083		
Total (Adjusted)	87	6185.898			
Total	88				

Tukey-Kramer's Multiple Comparison Test: Critical Value 3.79

Group	Count (n)	Bottle Feeding Beliefs Score Mean (SD)	Different From Groups
(0,1) control, pretest	22	32.7 (8.9)	-
(0,2) control, post-test	22	30.9 (8.2)	-
(1,1) intervention, pretest	22	32.8 (7.7)	-
(1,2) intervention, post-test	22	30.5 (9.2)	-

* statistically significant at the p<0.05 level

Split-unit analysis of variance table and Tukey-Kramer's multiple comparison test for the Bottle Feeding Belief Scores analysis, all three time periods (n=33; pre/post/retention tests completed)

Split-Unit (Repeated Measures) Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	ProbLevel (Alpha=0.05)
A (intervention)	1	366.2561	366.2561	2.72	0.109674
B (gender)	1	162.3894	162.3894	1.21	0.280863
AB	1	84.65608	84.65608	0.63	0.433983
C(AB)	29	3899.963	134.4815		
D (time)	2	161.7796	80.88982	3.57	0.034426*
AD	2	14.17963	7.089815	0.31	0.732394
BD	2	122.0606	61.03029	2.70	0.075976
ABD	2	60.62249	30.31124	1.34	0.270174
S	58	1313.287	22.64288		
Total (Adjusted)	98	6196.727			
Total	99				

Time
Tukey-Kramer's Multiple Comparison Test: Critical Value 3.4

Group	Count (n)	Bottle Feeding Beliefs Score Mean (SD)	Different From Groups
1 (pretest)	33	32.9 (7.7)	3
2 (post-test)	33	30.9 (7.7)	-
3 (retention test)	33	29.8 (8.4)	1

Gender by Time interaction
Tukey-Kramer's Multiple Comparison Test: Critical Value 4.17

Group	Count (n)	Bottle Feeding Beliefs Score Mean (SD)	Different From Groups
(0,1) male, pretest	16	30.9 (8.7)	-
(0,2) male, post-test	16	28.8 (8.0)	(1,1)
(0,3) male, retention test	16	30.1(9.3)	-
(1,1) female, pretest	17	34.9 (6.3)	(0,2), (1,3)
(1,2) female, post-test	17	33.1 (7.0)	-
(1,3) female, retention test	17	29.5 (7.7)	(1,1)

* statistically significant at the p<0.05 level

Multi-way analysis of variance table and Tukey-Kramer multiple comparison test for the Breastfeeding Attitude post-test scores analysis (n=46 post-tests completed, permission received)

Multi-way Analysis of Variance Table

Source Term	**DF**	**Sum of Squares**	**Mean Square**	**F-Ratio**	**ProbLevel (Alpha=0.05)**
A (intervention)	1	18.33651	18.33651	0.54	0.467640
B (gender)	1	80.25714	80.25714	2.35	0.132657
AB	1	16.00317	16.00317	0.47	0.497256
S	42	1433.433	34.12936		
Total (Adjusted)	45	1553.739			
Total	46				

Group
Tukey Kramer's Multiple Comparison Test: Critical Value 2.9

Group	**Count (n)**	**Breastfeeding Attitude Score Mean (SD)**	**Different From Groups**
control	24	43.7 (5.2)	-
intervention	22	45.0 (6.6)	-

* statistically significant at the p<0.05 level

Split-unit analysis of variance table and Tukey-Kramer's multiple comparison test for the Breastfeeding Attitude Score analysis over time post-test to retention test (n=33 post/retention tests completed, permission received)

Split-unit Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	ProbLevel (Alpha=0.05)
A (intervention)	1	187.843	187.843	3.25	0.081825
B (gender)	1	108.3573	108.3573	1.87	0.181441
AB	1	119.1716	119.1716	2.06	0.161724
C(AB)	29	1676.132	57.79765		
D (time)	1	14.57163	14.57163	0.88	0.355174
AD	1	108.3573	108.3573	6.57	0.015856*
BD	1	37.2002	37.2002	2.25	0.144086
ABD	1	74.07162	74.07162	4.49	0.042824*
S	29	478.632	16.50455		
Total (Adjusted)	65	2826.621			
Total	66				

Group by time
Tukey-Kramer's Multiple Comparison Test: Critical Value 3.85

Group	Count (n)	Breastfeeding Attitude Score Mean (SD)	Different From Groups
(0,2) control, post-test	17	44.1 (5.8)	-
(0,3) control, retention test	17	47.6 (7.6)	(1,3), (1,2)
(1,2) intervention, post-test	16	43.3 (5.2)	(0,3)
(1,3) intervention, retention test	16	41.6 (6.5)	(0,3)

Group by gender by time

Group	Count (n)	Breastfeeding Attitude Score Mean (SD)	Different From Groups
Males only:			
(0,2) control, male, post	8	41.1 (6.4)	-
(0,3) control, male, ret	8	45.3 (9.1)	-
(1,2) interv, male, post	8	45.1 (5.7)	-
(1,3) interv, male, ret	8	39.9 (7.4)	-
Females only:			
(0,2) control, female, post	9	47.0 (3.7)	(1,2), (1,3)
(0,3) control, female, ret	9	49.9 (5.6)	(1,3)
(1,2) interv, female, post	8	41.4 (4.1)	(0,2)
(1,3) interv, female, ret	8	43.4 (5.4)	(0,2), (0,3)

* statistically significant at the $p<0.05$ level

Appendix 15. Analysis of Variance and Tukey-Kramer tables for the Hospital Intervention scores

Split-unit analysis of variance table and Tukey-Kramer multiple comparison test for the BFHI Compliance Score analysis (including those who completed both pre- and post-test, n=31)

Split-Unit (Repeated Measures) Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level (Alpha=0.05)
A (site)	1	714.0744	714.0744	22.87	0.000046*
B(A)	29	905.4095	31.22102		
C (time)	1	370.3991	370.3991	32.55	0.000004*
AC	1	106.2988	106.2988	9.34	0.004776*
S	29	330.0095	11.37964		
Total (Adjusted)	61	2413.873			
Total	62				

Tukey-Kramer Multiple Comparisons Test: critical value 3.85

Group	n	BFHI Compliance Score mean value	Different from groups*...
(0,1) control, pretest	16	20.2	(1,1), (1,2)
(0,2) control, post-test	16	22.5	(1,2)
(1,1) intervention, pretest	15	24.4	(0,1), (1,2)
(1,2) intervention, post-test	15	31.9	(0,1), (0,2), (1,1)

* statistically significant at the p<0.05 level

Split-unit analysis of variance table and Tukey-Kramer multiple comparison test for the Breastfeeding Belief Scores analysis (includes only persons with complete data, n=28 persons)

Split-Unit (Repeated Measures) Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level (Alpha=0.05)
A (site)	1	28.57143	28.57143	0.42	0.524582
B(A)	26	1785.643	68.67857		
C (time)	1	82.57143	82.57143	5.81	0.023327*
AC	1	25.78572	25.78572	1.81	0.189696
S	26	369.6429	14.21703		
Total (Adjusted)	55	3455.273			
Total	56				

Duncan's Multiple Comparisons Test: (and Newman-Keuls Multiple-Comparison Test)

Group	n	Breastfeeding Beliefs Score mean value	Different from groups*...
(0,1) control, pretest	14	54.9	
(0,2) control, post-test	14	56.0	
(1,1) intervention, pretest	14	55.0	(1,2)
(1,2) intervention, post-test	14	58.8	(1,1)

* statistically significant at the p<0.05 level

Split-unit analysis of variance table and Tukey-Kramer multiple comparison test for the Bottle Feeding Belief Scores analysis (including only those completing both tests, n=30)

Split-Unit (Repeated Measures) Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level (Alpha=0.05)
A (site)	1	25.9003	25.9003	0.32	0.573508
B(A)	28	2235.433	79.83689		
C (time)	1	38.35744	38.35744	1.68	0.205605
AC	1	0.024107	0.024107	0.00	0.974314
S	28	639.5759	22.842		
Total (Adjusted)	59	2939.333			
Total	60				

Tukey-Kramer Multiple Comparisons Test: critical value 3.86

Group	n	Bottle Feeding Beliefs Score mean value	Different from groups*...
(0,1) control, pretest	16	40.1	-
(0,2) control, post-test	16	38.5	-
(1,1) intervention, pretest	14	38.8	-
(1,2) intervention, post-test	14	37.1	-

* statistically significant at the p<0.05 level

Split-unit analysis of variance table and Tukey-Kramer multiple comparison test for the Breastfeeding Attitude Scores analysis (including only those completing pre- and post-test, n=30)

Split-Unit (Repeated Measures) Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level (Alpha=0.05)
A (site)	1	0.042857	0.042857	0.00	0.977764
B(A)	28	1517.357	54.19133		
C (time)	1	12.87619	12.87619	0.01	0.941557
S	28	393.4538	14.05192		
Total (Adjusted)	59	1920.4			
Total	60				

Tukey-Kramer Multiple Comparisons Test: critical value 3.86

Group	n	Breastfeeding Attitude Score mean value	Different from groups*...
(0,1) control, pretest	16	43.9	-
(0,2) control, post-test	16	44.9	-
(1,1) intervention, pretest	14	44.0	-
(1,2) intervention, post-test	14	44.9	-

* statistically significant at the p<0.05 level