INDICATIONS FOR TRANSFER FOR CHILDBIRTH IN WOMEN SERVED BY THE INNUULISIVIK MATERNITY

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ABSTRACT

The Innuulisivik maternity is a northern based service in Povungnituk, Quebec which serves the Inuit women of the Hudson Coast. Although most women stay in the north for childbirth, others are transferred south. This thesis will describe the experience of the Innuulisivik maternity which uses committee based risk assessment for transfer decisions.

Data for the three year period 1989 -1991 were examined. Descriptive statistics were used to compare the observed differences in the distribution of several variables according to birthplace. Data were available for 411 women. 350 (85.2%) of the births occurred at Innuulisivik, 44 (10.7%) women were transferred and 17(4.1%) were nursing station births. In 4/5 of all transfers, clinical conditions were identified which in themselves usually require transfer. Premature labour was prevalent in the transfer group. The data demonstrates that risk scoring by consensus is a viable option for northern birthing units. Finally logistical and cultural factors should be included for meaningful risk assessment in the north.

RÉSUMÉ

La maternité Innuulisivik est un service établi dans le Nord du Québec, à Povungnituk, pour les femmes inuit de la côte d'Hudson. Bien que la plupart des femmes restent au Nord afin d'accoucher, certaines sont transférées au Sud. Cette thèse décrit l'expérience de la maternité Innuulisivik qui, pour décider des transferts, recourt à l'évaluation des risques par un comité.

Nous avons examiné les données d'une période de trois ans, de 1989 à 1991. Des statistiques descriptives ont été utilisées pour comparer les écarts observés dans la répartition de plusieurs variables en fonction du lieu de naissance. Les données disponibles portaient sur 411 femmes. 350 naissances (85.2%) ont lieu à Innuulisivik, 44 femmes (10.7%) on été transférées et 17 naissances (4.1 %) ont eu lieu dans des postes d'infirmiéres. Dans 4/5 de tous les transferts, des conditions cliques étaient indentifiées qui en elles-mêmes nécessitent habituellement un transfert. Le travail avant terme était répandu dans le groupe des transferts. Le données démontrent que la mesure des risques par consensus est une option qui a des chances de réussir dans le cas des centres de naissance du Nord. Enfin, des facteurs logistique et culturels devraient être inclus pour une évaluation des risques significative.

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Finally I wish to acknowledge the women of the Hudson coast and their families. Nakomik marialook.

Taaima.

Note to readers: The language used to describe places and persons in the region was based on the terminology used during the time frame of this study.

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1. INTRODUCTION

"Today, women who give birth have no idea what it is to have their babies with Inuit midwives. I do not approve of the way women are treated now. Although there really weren't that may deaths due to childbirth, now it seems women are treated like they're made of glass." Annie Okalik, elder, Pangnirtung, NWT (quoted in Bernal, 1990)

1.1 BACKGROUND

Throughout northern Canada, childbirth and indications for transfer for birth have undergone dramatic changes over the past 30 to 40 years (Paulette 1987; Kaufert and O'Neil 1988; Native Women's Association 1989). In fewer than two generations, women have gone from giving birth in igloos and tents to being transferred to large centers in southern Canada for childbirth.

Prior to 1950 northern Canada had no comprehensive health policy: pregnancy and childbirth were assisted by Inuit midwives. All prenatal care and births occurred on the land as dictated by the nomadic way of life. In this setting childbirth was an intimate event shared by both the family and the community (Paulette 1987). The practice of Inuit midwives was based on techniques and knowledge passed down for centuries from generation to generation. Inuit midwives who practiced at that time tell of situations where complications such as hemorrhage, breech presentation, shoulder dystocia or prolonged labour would arise and they would be fearful for the health of the mother and baby (Paulette 1987; Kaufert and O'Neil 1990). Yet, even in this primitive setting they managed these complications; interventions

including the manual removal of the placenta to control hemorrhage, turning a malpositioned infant or hastening a prolonged labour (Paulette 1987; Kaufert and O'Neil 1990). If labour was difficult an Inuit medicine man would sometimes be called to help with the birth (Paulette 1987). Women would periodically be alone to give birth, which was seen as a sign of courage (Kaufert and O'Neil nd).

With the establishment of a federal northern health network, nursing stations gradually appeared in most northern communities. With the arrival of this network in the 1950s and the implementation of health policy regarding the transfer of women for childbirth, the role of Inuit midwives in perinatal care was diminished. In nursing stations, built and staffed by the federal government, perinatal care became the responsibility of nurse-midwives brought over from Britain. Health policy permitted "low risk" births in the community. "High risk" women, such as primips and grand multips (women with greater than five births), were transferred to a tertiary treatment center to give birth (Kaufert 1990).

In the 1960s, a movement began in northern Canada towards a policy which recommended the evacuation of all women for birth. The medical and administrative reasons given for the evacuation policy were the greater safety of hospital births, the questionable legality of midwifery and the absence of Canadian trained midwives (Kaufert and O'Neil nd).

On the Hudson coast of Nunavik[1] prior to 1986, all pregnant women were transferred to Moose Factory, Ontario, to await birth in a fully equipped hospital. In 1980 responsibility for health services on the Hudson coast of Nunavik were transferred to the province of Quebec. In response to Inuit discontent over the evacuation policy of pregnant women, an effort was made to establish a birthing center in the region. In 1986, the Innuulisivik maternity was opened in Povungnituk, Quebec. The stated purpose of the maternity was to provide a local birthing center and to serve as a clinical teaching unit to train Inuit midwives for the region. With the birthing center open the 100% evacuation policy was ended and low risk women could again give birth in the region. Births are now attended by Inuit and non-Inuit midwives and Inuit maternity workers[2] with physician backup.

The Innuulisivik maternity in northern Quebec is the first center to bring childbirth back to the north at the request of Inuit women, and was the first established birthing center in a northern primary care facility. The birthing services offered by Inuit women at the Innuulisivik maternity have been described as a model of how childbirth can be returned to a native culture (Cournoyer nd; Voisey et al 1990; Webber and Wilson 1993; Pauktuutit 1991). The Innuulisivik maternity is unique in that it recognizes risk as both a medical and a cultural entity (Paulette 1987; Cournoyer nd). As Pauktuutit[3] representative Martha Greig has said of

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[1] Nunavik is the Inuit territory of Quebec. It constitutes the land located above the 55th parallel. See map Appendix A.

[2] Maternity workers are Inuit women who are hired to assist midwives. Their duties include assisting with basic pre and post partum supportive care of mothers and babies, as well as coaching during childbirth.

[3] National Inuit women's association, Ottawa, Ontario, Canada.

the maternity, "You have the back-up of a doctor and a touch of culture together" (quoted in Pauktuutit 1991). Thus by bringing together Inuit views, which see social support as a factor that contributes to overall birthing safety, and modern medical knowledge and techniques, they have developed a system which appears to satisfy all (Paulette 1987; Voisey 1990).

1.2 SETTING

The region served by the Innuulisivik maternity has an estimated population of 4,000, most of whom are Inuit. The population is distributed through seven communities[4] along the eastern coast of Hudson Bay, from the 55th to the 62nd parallel (Appendix A). These communities range in size from 250 to 1100 persons. Houses are provided by the Quebec government, and have electricity, heat and running water. The villages are governed by a municipality with an elected mayor and council. Each village has a nursing station, school, grocery and supply stores and gravel airstrip. The regional hospital is located in Povungnituk. There are no roads for travel between the communities, and transportation between villages is by air, boat, or overland by snowmobile.

Each village has daily air service, with connecting jet service to Montreal from either Kuujuarpik or Kuujjuak. However, due to the severe weather conditions encountered in the north, air service is sometimes interrupted. Planes are available for medical emergencies (med-evacs) when a patient needs to be urgently transferred from a nursing station, either to

[4]Kuujjuarapik, Umiujaq, Inukjuak, Povungnituk, Akulivik, Ivujivik and Salluit

the hospital in Povungnituk, or via Kuujuarapik or Kuujjuak to a tertiary center in Montreal. The decision to transfer is made by the nurse in a community in consultation with the midwife and physician in Povungnituk. The cost of a med-evac to Povungnituk averages approximately $4,000 and to Montreal $10,000. Costs are covered under the provincial health budget.

The Innuulisivik health center in Povungnituk is the administrative health center for the region. It has 25 in-patient beds, and services include general medicine, maternity care, and emergency care. There is a nursing station adjoining the hospital which provides out patient care. The hospital was created as an intermediate and long term facility so that patients with more complex health problems could be treated in Nunavik. However, the hospital does not have facilities for surgery, general anesthesia or ultrasound. Other than the maternity services, blood bank, lab services, and permanent presence of physicians, the hospital provides few advantages over the care available in nursing stations. Patients who require surgery or ultrasound are transferred south to Montreal, an 8 hour flight. Iqaluit in the Northwest Territories also has surgical services and is used in more urgent cases because it is only a 2 hour flight from Povungnituk.

The Innuulisivik maternity is a 4-bed unit within the Innuulisivik health center. Perinatal care is provided by midwives, midwives-in-training, maternity workers, nurses and physicians (Appendix B). The maternity serves as both a birthing center and a clinical teaching unit. The long term goal of the Innuulisivik maternity is to train Inuit midwives for all seven villages

on the coast. Currently, one midwife is Inuit[5] and all midwives in training are Inuit. The physicians and nurses are all Quallunak[6]. Approximately 20% of women who give birth at the center are women from Povugnituk; 80% have travelled in from surrounding communities for childbirth.

The Maternity also provides prenatal care to all pregnant women who live in Povungnituk. In other villages prenatal care is provided by the nurses in the community. The quality of prenatal care varies from village to village based on a nurse's experience in maternity care. The nurses consult by phone or fax with the midwives and physicians in Povungnituk when complications arise. Each woman on the coast is seen twice by a physician, once in the first trimester and once at the beginning of the third trimester. In outlying villages these assessments are done when the physician flies in for a community visit. A detailed schedule is provided in Appendix B.

1.3 PRENATAL SCREENING AT INNUULISIVIK

Since the establishment of the Innuulisivik maternity all pregnant women are subject to an assessment by a body called the perinatal committee. The perinatal committee, which meets weekly, is made up of midwives, midwives-in-training, physicians and a nurse based in Povungnituk. All pregnancies are reviewed at 31 to 34 weeks gestation, after a woman has

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[5] A second Inuit midwife graduated in January 1995.

[6] Quallunak is an Inuit term used to describe non-aboriginal persons from the south.

seen a physician for her third trimester visit, or sooner should a problem arise which requires the attention of the committee. For women who live outside of Povungnituk, prenatal information is faxed to the maternity for the perinatal committee to review. Women from outlying villages who give birth at the Innuulisivik maternity are transferred to Povungnituk at 38 weeks.

The committee develops a general care plan for each woman in the third trimester and her expected date of birth is selected based on estimates of her gestational age. When dates of last menstrual period are uncertain gestational age determination is fixed by the perinatal committee using clinical factors such as uterine size, date of first fetal movement and date of first fetal heart sound.

The perinatal committee also must determine, based on clinical and cultural factors, if it is safe for the pregnant woman to give birth at the Innuulisivik maternity, or if she should be transferred to a tertiary care center. The place of birth is chosen by reviewing risk factors and determining if childbirth can take place safely at the Innuulisivik maternity or if transfer south seems required. Recommendations about place of birth are made by the committee; no single individual is responsible for this decision. In complex cases, pregnant women are sometimes transferred to a tertiary center for a consultation with an obstetrician. This information is taken into account when making the final recommendation as to the place of birth.

During perinatal committee discussions, "risk factors" are identified for each woman. The

risk factors assigned are not necessarily indications for transfer, but are a summary of physiologic and psychosocial factors which appear to put either the woman and/or baby at risk, or to influence how the mother might be coping with the current pregnancy. After risk factors have been identified, a care plan to modify the identified risk factors, and thereby improve the health of the mother and baby, is developed.

When the maternity opened in 1986, a risk scoring scheme was used. Over time, the scoring form was phased out as it was not providing the best guidance for decisions regarding the evacuation of Inuit women. During the period of this study (1989-1991), no formal risk scoring form was in use.

1.4 OBJECTIVES

To date, there has been no study describing practice at the Innuulisivik maternity in terms of which women stay in the north for childbirth and which are transferred south. The Innuulisivik maternity provides a unique opportunity for the study of transfers from a primary care birthing unit that has been established by local people to address both cultural and biomedical needs. Thus the objectives of this study are to:

1. Describe the indications for transfer of expectant Inuit women served by the Innuulisivik maternity to secondary and tertiary (level II and III) obstetrical centers in Iqualuit or Montreal.

2. Explore the differences and similarities in complications in labour and childbirth between women who are and are not transferred.

It is hoped that the results of this study will provide a profile of women who can successfully give birth in a northern primary care facility as compared to those who require transfer. This information may be useful as a general guide for the orientation and education of midwives and physicians who work at Innuulisivik and those wishing to establish similar northern based birthing units.

2.0 LITERATURE REVIEW

In order to properly explore indications for the evacuation of pregnant women from a remote setting, a review of studies pertaining to the topic is indicated. What follows is a summary of the current standards of perinatal care as they apply to the delivery of services in northern Canada. The guidelines used to make transfer decisions and indications for transfer in northern regions are also described. Finally, risk in pregnancy is examined in terms of its impact on how transfer decisions are made. Medical, social and cultural perspectives of risk are considered.

2.1 PERINATAL CARE IN NORTHERN CANADA

There is a three tiered health care network in Canada (levels I to III). In broad terms, level I facilities include nursing stations and remote hospitals staffed by nurses and general practitioners. Level II centers provide surgical services, and level III centers are large urban teaching hospitals equipped for the most complex level of care.

The current National guidelines for family-centred maternity and newborn care were developed by a working group made up of various health organizations. They describe three levels of care for mother and infant within a perinatal care network (Minister of National Health and Welfare 1991)). Level I care include services for mothers with "no significant

identifiable risk," in addition to resources to deal with selected unpredicted complications which might arise with the mother and infant.

Nursing stations in northern Canada are part of the perinatal network and provide level I services. Nursing stations are staffed by nurses (and midwives in Labrador) who may or may not have additional training in obstetrics. They are not intended to provide perinatal care except in emergency situations, but are responsible for the prenatal care of residents of the community during the first 38 weeks of pregnancy. At term, women are transferred to a level I (with midwives and general practitioners) or level II facility, to await childbirth. The nursing stations in northern Quebec, as well as the Innuulisivik health center are both level I (or primary care) facilities.

While nursing stations do not have laboratory, blood or surgical facilities, there are level I centers in the north which do have laboratory services and blood available (although they, by definition, lack surgical facilities). At these centers, prenatal and perinatal care are provided by general practitioners (and midwives at Innuulisivik). Low risk births are attended at these centers.

Level II services are provided in a "major acute care center." (Minister of Health and Welfare 1991). These centers are expected to provide more than the basic services available at a level I center and to have the additional resources needed to deal with premature labour at 32 to 34 or more weeks gestation, as well as "other identifiable problems not requiring

care in a level III perinatal care unit." Level II facilities are either the primary birth center for the region, or they are the second level of service in a perinatal network in which level I facilities are the primary birth center (Minister of Health and Welfare 1991).

The national guideline statement that level II facilities must be equipped to deal with "other identifiable problems not requiring care in a level III perinatal care unit," as stated in the national guidelines, is open to interpretation and thus level II services in the north comprise varying resources. For example, some units may have medical specialists (e.g. pediatricians and/or surgeons [Baffin region]) which enable them to provide more advanced care than a level I center for problems not requiring transfer to a level III center. On the other hand, in Labrador, most births at the level II center are attended by midwives (Munday 1994).

According to the national guidelines, a level III center is expected to provide level I and level II services to its local population and to have the resources to deal with complex maternal complications that may arise. These include:

-premature labour(less than 32-34 weeks gestation)
-premature ruptured membranes (prior to 32-34 weeks gestation)
-severe pregnancy-induced hypertension
-severe antepartum bleeding, continuing or repeated prior to 32-34 weeks gestation
-severe fetal growth restriction ($< 10^{th}$ percentile)
-severe maternal renal disease with evident decompensation
-severe Rhesus immunization
-any maternal heart disease, symptomatic or otherwise
-any maternal life-threatening disease
-mothers whose fetus is known to have a serious malformation

Within the context of the northern perinatal network, level III centers tend to be large

teaching hospitals in the south. All "northern" births at level III centers represent either women routinely transferred at 38 weeks, those transferred earlier because of predetermined risk factors which warrant tertiary care, or those transferred as an emergency (medevac) because an unexpected problem arises. These centers are equipped with obstetricians and neonatologists trained to deal with the most serious perinatal complications. Table 2.1 summarizes the proportion of births occurring at the three levels of care for various northern regions.

Table 2.1 Births by level of care.

Region, year Author	level I (nursing station)	level I (with midwives and/or physicians)**	level II**	level III	other
Ungava Bay. PQ, 1979-1982 Meyer & Belanger (1991)	6 % nursing station	79 % Kuujjuac	-	15 % Montreal	
Ungava Bay, PQ 1983-1988 Meyer & Belanger (1991)	-	71 % Kuujjuac	-	25 % Montreal	3 %
Ungava Bay, PQ 1992-1993 Ungava Tulattavik Health Center(1994)	1 % nursing station	80 % Kuujjuac	-	19 % Montreal	-
Hudson Bay, PQ 1983 Bruneau, Meyer & Gange (1989)	9 % nursing station	-	74 % Moose Factory	6 % Montreal	11 %
Innuulisivik Hudson Bay, PQ 1987 Meyer & Belanger(1991)	6 % nursing station	69 % Povungnituk	-	24 % Montreal	1%
Innuulisivik Hudson Bay, PQ 1988 Meyer & Belanger (1991)	3 % nursing station	84 % Povungnituk	-	11 % Montreal & Iqualuit (level II)	1%
James Bay, PQ 1990-1992 Goyer, Farrugia & Brule (1993a)	n/a	56% (71%)* Chisasibi	16% (20%)* Val d'Or 11% (-)* Val d'Or choice		6% (8%)* 1% (1%)* miss-ing
Keewatin NWT 1975-79 Basket, Bradford & Hides (1981)	18.6 % nursing station	-	65.4% Churchill	15.6% Winnipeg	-
Keewatin NWT 1988 O'Neil, Kaufert & Postl (1990)	7% nursing station	-	54% Churchill	33% Winnipeg	-
Baffin, NWT 1987, Stubbing (1990)	5% nursing station	-	93.8% Iqaluit	1.2 % Montreal	-
Labrador, Nfld. 1984-1986 Stevenson (1988)	21% nursing station	-	79% Goose Bay level II & St.John's level III	stats combined with level II	-

* figure in parenthesis represents proportions excluding women who went to level II center by choice

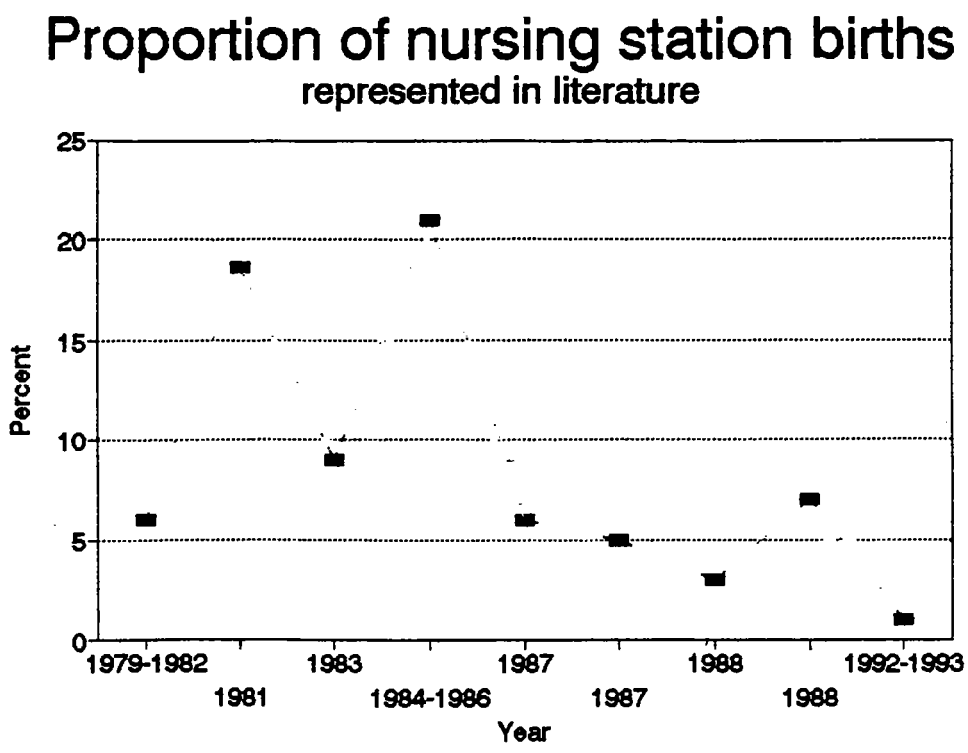
** blanks (-) represent regions where level of care not provided in perinatal network

Despite the national guidelines which state that no births are intended to occur in nursing stations, there continues to be a small proportion of births occurring at these (table 2.1). The observed proportion of these unintended births at nursing stations in the north ranged from 1% in the Ungava bay region to 21 % in Labrador in the studies listed in table 2.1. Nursing station births may occur because some women choose to stay in their home community and resist transfer by falsifying their date of last menstrual period or purposefully miss the plane (Stonier 1990). A proportion can also be attributed to premature labour (Kaufert and O'Neil nd). The higher frequency in Labrador may reflect the fact that many nursing stations in that region are still staffed with midwives, leading some women to choose[7] to stay in their home community for childbirth (Munday 1994b). Finally, poor weather conditions can interfere with the transfer of a woman in labour, and result in a nursing station birth.

It is of interest that the proportion of births in nursing stations (table 2.1) has likely decreased over time. This trend is evident both within regions and overall (fig 2.0). There are a number of possible explanations for this trend. Historically, midwives were employed in nursing stations and no strict evacuation policy was in place. Over time, midwives have been replaced by nurses with little or no training in obstetrics and obstetric policy was changed so that all women are evacuated to the regional birthing center for childbirth.

[7] Women make this choice despite the 100% evacuation policy to the level II center.

Figure 2.0


Proportion of nursing station births
represented in literature
25
20
15
10
5
0
Percent
1979-1982
1981
1983
1984-1986
1987
1987
1988
1988
1992-1993
Year

Low risk births which occur at a northern regional birth center (level 1 or level II) are comprised of those women who live in the community where the birth center is located, as well as those women in the region who are flown into this center at 38 weeks to await childbirth. The proportion of women giving birth at level I regional birthing centers ranges from 69% - 84%, and the proportion at level II when it is the primary center ranges from 54%- 93% (table 2.1).

As illustrated by table 2.1, the Hudson Bay region appears to have had an increase in level I births at the Innuulisivik maternity over its first years of operation (1987 & 1988) from 59% to 84%. This was at the expense of level III births which showed a parallel decrease. This shift may reflect changes in the criteria used to determine risk status that enabled more women to give birth in the north. However, elsewhere in northern Canada there has been an increase in level III births over the same period of time. This increase in level III births is likely a result of health policy and the limited obstetrical experience of level I and II health care workers. In some cases the level III center provides both level II and level III services. In these cases it is often not possible to separate out the two with the data available.

Thus the overall trend in northern obstetrical care has been a move away from level I births, with the exception of the region served by the Innuulisivik maternity, which has seen a corresponding increase in level I births.

2.2 GUIDELINES FOR TRANSFER

The recognition that the transfer of pregnant women from remote regions can be problematic has led to the development of guidelines for transfer by various professional bodies (e.g. the Society of Obstetricians and Gynaecologists of Canada [SOGC], and the College of Physicians and Surgeons of Ontario with the Ontario College of Midwives).

The SOGC guidelines for maternal transfer (SOGC 1992) suggest evacuation when remote facilities are not equipped to deal with complications which might arise. The most frequent complications listed by the SOGC are:

-preterm labour, preterm labour fetus < 2500g
-preterm rupture of membranes < 36 wks gest. or fetus est < 2500g
-severe pregnancy induced hypertension or other hypertensive complications
-antepartum hemorrhage
-medical complications of pregnancy, ie diabetes, renal disease, amnionitis, hepatitis
-multiple gestation
-IUGR[8] with evidence of chronic fetal distress
-trauma
-inadequate progress in labour
-malpresentation

The College of Physicians and Surgeons of Ontario, the College of Nurses of Ontario and the College of Midwives of Ontario, are also developing guidelines to aid midwives practicing in remote regions (College of Physicians and Surgeons of Ontario 1994). The working document describes the role of the midwife with respect to indications for consultation with a physician or transfer of care. The indications are specified according to the time of recognition of the

[8] Intrauterine growth retardation

problem (during the initial history and physical exam; during prenatal care, labour, or delivery; or post partum) and whether the problem is maternal or neonatal. The prenatal indications for transfer are those which likely require the woman to need the specialised care available only at a level II or level III institution. These indications are outlined in table 2.2.

Table 2.2 Indications for transfer to specialised care (CPSO 1994)

Time of assessment	Indications of transfer of care
Initial history and physical exam	-any serious medical conditions, eg: cardiac or renal disease with failure or insulin dependent diabetes mellitus -previous myomectomy, hysterotomy or cesarean section other than one previously documented low segment.
Prenatal care	-cardiac or renal disease with failure -insulin dependent diabetes -multiple pregnancy including twins -pre-eclampsia or eclampsia -placenta abruptio -placenta previa without bleeding -vaginal bleeding, continuing or repeated -documented inappropriate uterine growth -fetal anomaly -anticipated difficulty in vaginal delivery because of excessively large baby -persistent transverse lie at 3 weeks prior to due date.
Labour and childbirth	-abnormal presentation including breech presentation -prolonged active phase -prolonged second stage without adequate progressive descent -retained placenta -suspected or actual placenta abruption and/or previa -third or fourth degree tear -multiple pregnancy including twins -unengaged head in active labour in primipara -abnormal fetal heart patterns unresponsive to therapy -active genital herpes at time of labour -preterm labour (< 36 completed weeks) -prolapsed cord -pre-eclampsia or eclampsia -thick meconium

Finally, in the CPSO document it is noted that in a remote region, a woman with complications which arise during labour and delivery should only be evacuated if her condition is sufficiently stabilized for transport, delivery is not imminent and/or weather conditions are not too hazardous for travel.

2.21 INDICATIONS FOR TRANSFER IN NORTHERN REGIONS

Given the 100% evacuation policy to level II or III centers that exists in most regions of the north, there has been little attention paid to describing the actual indications which have occurred in practice for the transfer of pregnant women. There has been little reason to describe indications when all pregnant women are evacuated. However, a picture of the indications for transfer can be obtained from those regions where level I births are permitted.

Table 2.3 summarises the indications for transfer and/or medevac for childbirth from three northern regions with a level I primary birth center. If a factor was cited as an indication for transfer in a given study an X appears in the adjacent box (table 2.3). The data are derived from Stevenson's (1988) chart review of all women from the coastal communities of Labrador who gave birth in nursing stations or in Goose Bay over the years 1984-1986; from Goyer, Farrugia and Brule's (1993b) unpublished work describing the indications for transfer and medevacs for 220 births which occurred in the Chisasibi hospital region (1990-1992); and from Bruneau, Meyer and Gagne's (1989) report on the Innuulisivik maternity. Although it is

difficult to compare the three regions as small populations are represented in a small time frame, the data give a rough picture of indications for transfer.

It should be noted that even this overall picture is limited because often only one reason for transfer is given for each woman when several may be present. Thus the relative importance and number of risk factors (medical and cultural) involved in the decision to transfer are unknown. To obtain these details, the medical records of each individual woman would have to be reviewed to identify if other factors might have contributed to the decision to transfer. For example, was a woman said to be transferred because of "premature labour" also experiencing a 3rd trimester bleed? Furthermore, often influential social factors are not recorded, and are thus lost to the analysis. Nonetheless the information provides a broad picture of indications for transfer.

Table 2.3 Indications for transfer/medevac from level I to II/III center by region.

Primary diagnosis given as indication for transfer/medevac from level I center to level II/III.	**Labrador 1984-1986 Stevenson (1988)**	**James Bay Cree 1990-1991 Goyer, Farrugia & Brule (1993)**	**Innuulisivik maternity 1987/88 Bruneau, Meyer and Gange (1989)**
preterm labour fetus < 2500g	X		X
preterm rupture of membranes < 36 wks gest. or fetus est < 2500g		X	
Severe preg. ind. hypertension or other hyper. compl.	X	X	X
Antepartum haemorr.	X		X
Medical complications of pregnancy, ie diabetes, renal disease, amnionitis, hepatitis cardiac dis. herpes	X	X	X
Multiple gestation		X	
IUGR			X
Inadequate progress in labour		X	
Malpresentation unstable lie[66]	X	X	
mother's age 15yr			X
prev. c-section		X	X
ceph. pelvic dispr.		X	

'X' = indication for transfer present in study population.

An overview of table 2.3 demonstrates that there are only two indications listed that all three studies cited as a reason for transfer. This could be interpreted as representing a lack of consensus in determining indications for transfer or that the event did not occur in the time frame studied.

Some authors have attempted to evaluate the "quality" of transfer decisions made in various populations. Goyer et al. (1993) evaluated the validity of the transfer or medevac among James Bay Cree, by the presence or absence of a cesarean section and concluded that 75% of the transfers and 67% of the medevacs were justified by this outcome (i.e. 6/8 and 6/9 received cesarean sections respectively). This C-section based assessment is a common measure of medevacs, implying that the medical intervention at the receiving institution justifies the $10,000[9] cost of the medevac. However, it is a questionable standard as Goyer et al. (1993) note because the arrival of a woman by emergency aircraft may itself influence an obstetrician's decision to induce or perform a cesarean section. Moreover, if obstetricians' services are considered worthwhile only if a cesarean section and not a vaginal birth occurs, this may pressure physicians routinely to intervene in response to a labour viewed as complicated by the referring general practitioner.

Another limitation of using C-sections to assess evacuation arises from the bias which can be introduced when clinicians feel a need to make hasty assessments. For example, a labour may

[9] The figure $10,000 is used to illustrate the average cost of a medevac. Actual costs depend on many factors and can range from a few thousand to far more than $10,000.

be labelled "arrested" prematurely because of fear that waiting until it truly is arrested may not leave sufficient time or good weather for air transfer. Moreover, the psychological distress experienced by a woman medevaced while in labour may further hinder its progress and increase the likelihood of a C-section. Although Tew (1995) notes that the impact of moving a woman in labour is unknown, she has theorized that the hormonal response to perceived danger may slow labour.

Basket et al. (1981) analyzed the urgent consultations and referrals from general practitioners at a level II center in the Keewatin to obstetricians at a level III center over the years 1975-79. Their data allow one to examine the role of obstetricians beyond the performance of medical acts, as communication between general practitioners and obstetricians do not necessarily result in the physical transfer of the woman. They examined 869 births (65.4% at a level II center, 15.6% at level III; 18.6% in nursing stations; and 0.4% other). Of the consultations requested (n=287), 52.6% remained to give birth at the level II center, 37.3% were transferred and gave birth at the level III center and 10.1% were transferred to the level III center and then returned to the level II center for childbirth. The primary reasons for consultation were hypertension (17.4%), premature labour/PROM (16%), antepartum haemorrhage (15.3%), and prolonged pregnancy (12.2%). First trimester complications (abortion, ectopic pregnancy), malpresentation/twins and prolonged labour accounted for 9.4%, 6.6% and 6.0% of consults respectively with a sizeable group called "other" remaining (17.1%). During the study period, only 7/136 cases who were evacuated to the level III center required emergency evacuation by a chartered flight. All but one of these evacuations

resulted in a cesarean section.

Baskett et al. (1981) also compare the perinatal mortality rate for the consult/referral group to that for all deliveries(including the consult/referral group) and found it to be lower in the consults (24.3/1000 vs 33.3/1000). However, interpreting these numbers is difficult. Not only does including the consult group in the comparison group lead to an underestimation of the difference (the rate being 37.8/1000 without the consult group), but the small numbers preclude any definitive interpretation. Moreover, the different risk profiles among births in the two groups also impede comparisons.

In summary, there have been a number of studies which have described the indications for transfer of pregnant women from northern regions. An overview of these studies demonstrates a lack of consensus as to clear indications for transfer. This in part may result from the difficulty in analyzing data subject to clinical variability and to the unique logistical problems and cultural differences encountered in the north.

2.3 RISK IN PREGNANCY

Over the years, there has been a shift in how perinatal assessments are done, from attempts to identify existing pathology to a search for potential problems (Queniart 1992). With this shift, risk has become a concept increasingly associated with pregnancy, and thus has lead to the perception that pregnancy is a state of risk, and consequently a state of illness.

Currently, the medical definition of perinatal risk is based on weighting factors from a woman's current and past obstetrical, medical and social histories and combining them to give a mathematical probability of a poor outcome in the present pregnancy (Patterson 1993).

While the term "risk" may seem clear cut, it is, as Perkins (1994) states, a socially constructed concept made up, among other things, of professional goals, level of care, medical interventions, and socioeconomic conditions. Perkins ties the evolution of the concept of risk to the development of perinatal services over the past 20 years. Believing that the relationship between risk and the structure of the health care system is reciprocal, she notes how inflated estimates of risk have been used to promote policies which support a technological upgrade of perinatal services and the referral of a large proportion of women to higher level services. Thus one could argue that the evolution of concepts of risk have needlessly promoted and encouraged the upgrading of medical obstetrical services (Perkins 1994).

Handwerker (1989) agrees that risk is not "an unambiguous, objective fact" as it is often portrayed. Rather it is a cultural artifact, perceived within the context of one's personal values, medical knowledge and training, and institutional practice. She explains that while there is sometimes widespread agreement about certain factors which constitute risk, the interpretation of most factors is "more intuitive than scientific." Yet because of the scientific basis of risk scoring schemes, they are frequently perceived to represent a "true" picture of perinatal well being. As such, risk scoring schemes have the potential to be misleading.

Queinart (1992) has also questioned the presentation of risk in the lay literature and media. Often, risk factors are presented out of context, with relationships between factors overlooked and, instead, single factors presented as causing risk in pregnancy. Queinart (1992) has also noted that risk assessment in pregnancy is primarily focused on the outcome of the child. Although the author does not question the relationship between habits such as alcohol consumption or smoking and untoward effects on the fetus, she does question the labels assigned to women on the basis of their risk, feeling that these in themselves may have deleterious repercussions.

Risk has also been defined as it is subjectively experienced by individual pregnant women. As Handwerker (1994) states, risk for a pregnant woman is a shift from certainty to uncertainty: "certainty" being what is known to her based on past experiences of self and family, and "uncertainty" being a consequence of events not known. For example, a woman who has experienced hypertension in previous pregnancies and had healthy babies may not perceive hypertension as a risk factor. Handwerker (1994) states that for many women, risk is perceived within her "social reality" and not by statistical probabilities. So when a pregnancy is treated as a purely medical event it is difficult for a woman to relate to this perception. This has resulted in feelings of loss of control over pregnancy by persons alienated by the medicalization of pregnancy and childbirth.

In summary, while the concept of "risk" in pregnancy appears to be a clearly defined entity, in reality it remains murky, subject to various interpretations based on individual, cultural and

institutional forces, and not readily applied to individual women.

2.31 RISK SCORING FORMS

Central to defining risk in pregnancy has been the development of risk scoring forms. A risk scoring form comprises a list of factors from a woman's medical and obstetrical histories and her current pregnancy which might be associated with a given untoward outcome. The scoring form presents a numerical figure for each outcome, and these are summed to indicate the pregnant woman's overall risk status.

Risk scoring forms can be designed in an attempt to predict a specific outcome such as perinatal mortality, low birthweight, preterm birth or low apgar score. They can also be designed to predict more general events such as "poor outcome," need for transfer or need for specialized care.

The factors included on a form depend on the outcome one wishes to predict. Factors may be selected because of an established biological association (e.g., maternal nutrition and low birthweight), or because of a reported statistical association with an outcome of uncertain etiology (e.g., low educational status and poor infant outcomes). A given risk factor may be associated with various outcomes in different ways. Likewise, a combination of factors may be associated with a single outcome. Alexander and Keirse (1989) point out that there can be much overlap between factors used in scoring systems even though the outcomes being

evaluated are different. As a consequence, many scoring forms are similar regardless of the outcome being evaluated.

Risk scoring forms can have various objectives. Most frequently, they are used to predict adverse outcomes in individual women so that appropriate care may be planned in advance. Alexander and Keirse (1989) suggest, however, that this is not the most important use of scoring systems. They assert that risk scoring forms are a valuable educational tool for health care workers, helping them recognize important indicators of the prognosis of a pregnancy and providing less experienced health care workers with comprehensive guidelines for the supervision of the pregnancy. This has been demonstrated in northern populations (Pflaum et al. 1984). Risk scoring has also been used as a research tool to describe the health of populations in order to make comparisons between regions. For example, the World Health Organization (WHO) uses risk assessment strategically, collecting epidemiological data on individual women from risk assessment forms to plan and evaluate interventions to reduce certain reproductive health problems in a given community.

In Canada, the provinces and the territories each have their own risk scoring form, all of which follow a similar framework. Each form is a record summarizing all selected prenatal factors thought to have an impact on pregnancy outcome, and their main function is for the management of individual pregnancies (Health and Welfare Canada nd). All of the forms appear to be geared to general outcomes and are designed so that health care workers may easily record baseline information and any changes that occur during pregnancy. They serve

as a checklist of factors that might identify a pregnancy at risk of an "adverse outcome." The forms are carbon copied, with a pregnant woman retaining a copy to take with her to the place where she will give birth. (Health and Welfare Canada nd).

Despite this general similarity, however, when Hall (1994) reviewed the twelve risk scoring forms in use in Canada he found differences indicating a lack of agreement on what risk factors should be included and the relative importance of each. At present, one province reports only "sporadic" use of its form, while two provinces are considering discarding their forms entirely. Two other provinces have just revised their forms, three provinces are currently doing so, and three provinces are considering revisions (Hall 1994). This seems to indicate widespread dissatisfaction with existing risk scoring forms.

O'Neil et al. (1990) have documented how, in practice, risk scoring forms are often incomplete or not filled in at all. This may reflect the perception that forms have limited usefulness to the clinician in predicting risk or indication for transfer. Good clinical judgment is believed by many to perform as well as, if not better than, a risk scoring form in identifying risk for individual women (Sylvain 1984; Alexander and Keirse 1989; Rooks and Winikoff 1990).

While many risk scoring forms are designed to provide a numerical score that reflects the risk of a pregnant woman, not infrequently the numerical system is abandoned and the forms are used only in a qualitative manner. Other forms have been designed to provide a qualitative

picture of the clinical status of the pregnant woman with no attempt to quantitate her risk. This may reflect a perception that clinical judgement is superior to quantitative risk scoring in the delivery of effective care. And, as authors who work in remote regions have noted, a good working relationship between nurses, midwives, and physicians provides a firm base for decision making in the best interest of women (Lessard 1994; Stonier 1988).

2.32 EVALUATIONS OF RISK SCORING FORMS

Risk scoring in general serves as a screening method for distinguishing the members of a group who are more likely than others to develop a given condition. As such, their performance must be evaluated and the standard method for doing so is to assess their specificity, sensitivity, and positive and negative predictive values.

To date, the most comprehensive review of formal perinatal risk scoring has been done by Alexander and Keirse (1989). They examined the sensitivity and specificity of 33 different risk scoring systems as well as their positive and negative predictive values. They found that when the same tests were applied to different populations they showed very different results both in terms of predictive value (as expected), but also in terms of sensitivity and specificity. The authors feel these differences in sensitivity and specificity are accounted for by study-to-study variation of the time in pregnancy the scoring was done and if the scoring was repeated in the same pregnancy. Differences in the proportions of primips and multips and other factors in the population may also have an effect on the sensitivity and specificity,

especially since most scoring systems rely heavily on factors from a woman's past obstetrical history. Furthermore, markers with the highest positive predictive value may be more prevalent in one population, or alternatively the significance of a particular marker may vary among populations.

On an individual level, risk scoring systems tend to have poor predictive ability. Sylvain (1984) has identified three reasons for this. First, the data base is often inadequate to develop a useful tool: the large numbers required to determine the importance of a given risk factor are often not available. Secondly, biologic variation in pregnancy is not well understood, and outcome based on a given clinical situation is variable. Finally, intervention can influence predictive factors. In other words, an intervention may decrease the harmful effects attributed to the factor that has led to a high risk score.

Rooks and Winikoff (1990) point out that because perinatal risk assessment has generally proven to have a low positive predictive value, concern about missing women with an adverse outcome (false negatives) has led to a tendency to increase the sensitivity of risk scoring schemes. As a consequence, this may have resulted in more false positive diagnoses and an increased cost from overuse of medical resources.

DEFINITION OF INDICATORS

Risk scoring forms are also limited by problems in the definition or classification of illness in

perinatal care. The ranges of normal and abnormal clinical presentation overlap to such a degree that it is difficult to determine the risk presented by a given condition in isolation, without regard to the overall clinical picture. For example, a preterm vaginal bleed can be a normal variant, or it can be a harbinger of disaster. Therefore, affixing a given risk score to a vaginal bleed is of limited value without considering the overall clinical picture.

Poorly defined risk parameters may also interfere with the predictive value of the risk scoring form. In their review, Hutchison and Milner (1994) found only "modest" reliability with respect to clinicians' interpretations of descriptions of risk factors in the Ontario guide for the antenatal record. Clinician to clinician variation was found with respect to "significant tobacco, alcohol, drug intake," "premature rupture of the membranes 34 weeks or more," "mild toxemia," and "other significant illness." Hutchison and Milner (1994) recommend that descriptions of risk factors be made more clear and that health care providers be trained in the use of the guide.

Further variability in risk classification derives from local differences in the significance of certain indicators. For instance, while teenage pregnancy is an indicator of poor outcomes on some scoring forms, this "risk factor" does not seem to perform as a predictor in the north where there are more teen pregnancies (which are socially acceptable) with good outcomes (Lessard 1987; Stonier 1990). This type of variability also arises when factors such as race or socioeconomic status are used as risk markers out of context of women's lives. Because of variability between populations, risk assessment tools are limited to the population for which

they are designed and a tool's performance will vary according to the population to which it is applied. This makes the use of "standard" forms problematic and suggests it might be better to try to identify and evaluate population specific indicators of perinatal risk (Alexander and Keirse 1989; Murdock 1979).

DEFINITIONS OF OUTCOMES

Another difficulty common to the practice of perinatal risk scoring is the poor definition of outcomes to be predicted. Many outcomes, such as perinatal mortality, duration of gestation and birthweight, often lack clear definition (Alexander and Keirse 1989). For example low birthweight can result from different gestational problems such as intrauterine growth retardation (IUGR) or prematurity. Consequently, this outcome must be defined with respect to gestational age for it to reflect actual morbidity. As they currently stand, most definitions of low birthweight infants include preterm births, while others include only low birthweight term infants.

In remote regions, the "outcome" given attention often shifts from the wellbeing of the infant and mother postpartum to problems arising in labour. This is because in level I centers it is preferred to transfer women before complications of labour arise (i.e., arrested labour, dystocia, malpresentation, placenta previa). However, when used to determine such antepartum outcomes, risk scoring forms have been found to have low predictive abilities. Thus, with few reliable indicators of intrapartum problems, it is difficult to avoid the

logistical difficulties of obstetrical emergencies in a remote setting if one relies on antenatal risk scoring alone (Casson & Sennett 1984).

The need for transfer, or the need for level III (tertiary) medical care, is also an outcome which clinicians in remote regions often wish to predict. Alexander and Keirse (1989), note that scoring systems which screen for the need for transfer to a tertiary center or specialized care are often little more than tautologies: conditions such as insulin dependent diabetes, hypertension or multiple pregnancy included in the scoring system automatically lead to transfer. Therefore, the transfer is not an adverse outcome, but the necessary action stemming from the presence of the risk factor.

PERINATAL MORTALITY

Perinatal mortality is the most commonly used indicator in northern Canada to evaluate perinatal services. When a population's perinatal mortality rate is higher than expected, the safety of services is questioned. In northern Canada, concern about higher perinatal mortality rates has contributed to a move towards evacuation for childbirth. Although critical research has not been conducted on the subject, it has generally been accepted that the evacuation policy has contributed to decreased perinatal mortality. However, the measurement and interpretation of perinatal mortality in small northern populations often has been flawed. A closer look needs to be taken at the factors underlying these increased mortality rates and how they are interpreted.

A problem common to northern research is the small size of northern populations: the denominator of a given perinatal sample often ranges from 100 to 500 births per year. Thus, as Kaufert et al. (1990) state, rates are likely to be unstable, making comparisons between regions hazardous. Even wide fluctuations in rates from year to year in a small populations are more likely due to chance than to actual change and are dependent on the method of analysis used (Robinson, 1990). Lessard and Kinloch (1987) acknowledge these problems with perinatal mortality rates for the Inuit in the Northwest Territories, noting that changes in mortality rate over a ten year period are mainly explained by small numbers. Consequently, they suggest looking instead at the overall trend in rates.

Table 2.4 summarises perinatal mortality rates in five remote regions demonstrating the sizeable variations in rates when small populations are studied. The actual number of perinatal deaths in these populations ranges from 2 to 7, and the rates per 1000 births from 8.7 to 20.8.

Table 2.4 Examples of published rates of stillbirth, neonatal deaths and perinatal mortality.

Region (Source) Year Sample size	**Keewatin, NWT** (Binns 1990) 1979-1985 n=467	**Hudson Bay, PQ** (Meyer 1991) 1987-1988 n=271	**Ungava, PQ** (Meyer 1991) 1987-1988 n=229	**Yellowknife, NWT** (Stanton Hospital nd) (Inuit only) 1991 only n=180	**Queen Charlottes, BC** (Grzybowski 1991) n=286
Stillbirths per 1000 (n)	4.0 (2)	3.7 (1)	0 (0)	11.0 (2)	
Early neonatal deaths (0-7 days) per 1000 (n)	11.0 (5)	7.3 (2)	8.7 (2)	0 (0)	
Perinatal mortality rate	15.0 (7)*	11.0 (3)	8.7 (2)	11.0 (2)	20.8(6)

*rate of neonatal deaths (0-28 days) and stillbirths.

Another difficulty with comparing these perinatal mortality rates is that it is not always known how the deaths were defined. For example, Grzybowski et al. (1991) defined perinatal death as deaths of fetuses (weighing more than 500g) and neonates (weighing more than 500g and less than 8 days old). This definition allowed for the inclusion of three births which occurred before 28 weeks gestation, which would not have been allowed using a definition restricted to deaths occurring after 28 weeks. Kaufert et al. (1988) found the information about births and deaths depends on the source that is consulted and discovered variation in the recording of events such as miscarriage, still births and neonatal deaths.

While overall trends demonstrate that northern perinatal mortality rates have generally been decreasing over the past 20 years (Lessard and Kinloch 1987; Kaufert et al. 1990), they still remain markedly higher than national and provincial rates (Robinson, 1990). Kaufert et al. (1990) note that although changes in perinatal mortality have been attributed to evacuation

policy as opposed to local factors, there are no extensive data to support this assumption. In fact, Robinson (1990) found that regions in the north where the majority of births occur at level I centers fare no worse in terms of perinatal mortality rates than regions with a 100% evacuation policy to tertiary centers. This suggests that the evacuation policy has not contributed to the decreasing perinatal mortality rates. Edouard et al. (1991) hypothesize that the north-south difference is due to the inability of the health care system to address differences in standards of living and access to health care which influence post-neonatal deaths and stillbirths.

A study by Bouchard (1988) does not support the impression that perinatal mortality is decreasing in all regions. She conducted a retrospective study of all deliveries in the Ungava region of northern Quebec over the years 1979-1982 to investigate the impact of medical services on perinatal mortality rates. She calculated the perinatal mortality rate for the region (27/1000) and noted the proportion of births which were less than 2500 grams (75%). She found that the perinatal mortality rate for the region had remained unchanged since 1975 despite an increase in medical services in the region. To address poor pregnancy outcomes, she suggests that educational programs focused on smoking cessation and social support intervention would be more effective than increased medical services. Lessard and Kinloch (1987) also raise the problem of insufficient educational programs, suggesting that due to under staffing, nurses do not have adequate time for preventative health teaching. They cite a lack of preventative services and programs in the north as a factor given insufficient attention as a contributor to perinatal mortality.

In general, there is an underlying assumption that perinatal mortality rates equal to those in the south are an achievable and acceptable goal for the people of the north. Thus, Canadian or provincial rates are often used as a comparison in the evaluation of perinatal mortality in northern regions. However, little attention has been given to environmental, logistical and cultural differences which may make simple comparisons of northern and southern perinatal mortality rates invalid. For example, Lessard and Kinloch (1987) note that to attain the lower perinatal mortality rates found in the rest of Canada, environmental barriers (e.g., the isolation of villages), difficulties experienced in travelling long distances and problems of unpredictable weather would have to be controlled. An unfortunate circumstance in the north is that deaths sometimes occur because tertiary services are not accessible because of poor weather conditions.

Thus, based on the unique environmental, cultural and logistical problems encountered in the north and the statistical limitations of a small population a better measure of perinatal services in northern regions than mortality would be helpful.

ALTERNATIVES TO EVALUATE PERINATAL SERVICES

Kaufert et al. (1990) favour using alternatives to perinatal mortality rates as a guide for perinatal policy in remote regions. They suggest establishing a more detailed information base to guide obstetric policy, such as could be developed by considering the morbidity as well as the mortality associated with an entire series of premature births.

Edouard (1985) suggests that perinatal morbidity may be a more relevant indicator than mortality when perinatal services are being evaluated. Grzybowski et al. (1991) also suggest perinatal morbidity is a better indicator, but acknowledge it can be difficult to define. They review some operational definitions of morbidity (which all include mortality) used by various authors and evaluate their strengths and weaknesses (table 2.5). They state that although apgar scores can be useful indicators of perinatal morbidity, they are prone to low interrater reliability and high observer bias. By contrast, birthweight less than 2500g is easy to measure and reproduce. However, if the data are available, it is important to standardise the birthweight for gestational age so that various causes of low birthweight can be differentiated (e.g., intrauterine growth retardation, prematurity, etc.).

Table 2.5 Definitions of perinatal morbidity reviewed by Grzbowski et al. (1991)

Author (year of publication)	Definition of perinatal morbidity
Lefevre, Williamson and Hector (1989)	perinatal death, birthweight of less than 2500g, an Apgar score of less than 7 at 5 minutes or newborn transfer to a secondary or tertiary care nursery.
Franks and Eisenger (1987)	perinatal death, birthweight of less than 2500g, an Apgar score of less than 7 at 5 minutes or newborn transfer to a secondary or tertiary care nursery, significant birth injury
Lemelin (1986)	rate of antepartum or intrapartum referral to higher level facilities, rate of low birth weight infants delivered at the facility and rates of intervention

Clearly, there is much to be done to develop alternatives to the current use of perinatal mortality in the evaluation of northern obstetrical services. And the small sample sizes found in the north can be used to benefit research; instead of small populations being seen as a statistical hinderance to the evaluation of services, they can be used as the basis for individual qualitative evaluation of cases using clinical knowledge within the cultural context to draw inferences about the best way to deliver services in the north.

CONSEQUENCES OF RISK SCORING

The consequences of perinatal risk scoring have not been given much attention in the medical literature. This is unfortunate as they may include such serious matters as invasion into a woman's personal affairs, unnecessary treatment and intervention, the creation of ill-founded

stress and anxiety, and the overuse of scarce medical resources.

Alexander and Keirse (1989) warn appropriately of the danger when a "potential but highly imprecise" risk of adverse outcome is replaced by the "certain risk of dubious treatments and interventions," the benefits of which have not been shown and the adverse affects not known. Indeed, data from centers where risk scoring is a routine part of antenatal care show numerous interventions are applied at a higher frequency than elsewhere. Consequently, Alexander and Keirse (1989) suggest randomized comparisons be conducted to determine if the same or better "success" can be attained with fewer procedures, interventions and interferences in the daily lives of pregnant women. When women refuse the intervention recommended following risk scoring they are often seen as being "misguided." Unfortunately, there has been little attention paid to women's feelings about risk assignment and its impact on women's perception of pregnancy and childbirth (Alexander and Kierse 1989).

2.33 RISK SCORING IN NORTHERN POPULATIONS

Risk scoring was introduced in the north in the 1960s as a means to help health care workers identify women requiring referral to a higher level of care, because they were considered likely to have an adverse pregnancy outcome. Perinatal risk forms were developed in response to the problems encountered in managing pregnancy and childbirth in remote locations. It appears that most risk forms were developed locally by adapting southern risk

scoring forms already in use; it was not possible to ascertain the original authors of the early risk scoring forms.

Given the now universal evacuation policy, research studying risk status as a guide to policies about place of birth has not been a priority recently. Nonetheless, a number of authors investigated the role of perinatal risk scoring in remote northern regions and a review of the original research done 10 to 15 years ago is of value.

Murdock (1979) evaluated three risk scoring systems as described by Coopland et al., (1977); Goodwin et al. (1969) and Nesbitt and Aubry (1969). He scored each pregnancy as being low, moderate or high risk and categorized the outcome of each pregnancy as either no problems, problems with either mother or infant, or problems with mother and infant. He compared the proportions of women considered at risk using each scoring system to the proportions having the various adverse outcomes. He also looked at the significance of the difference between groups who had complications using a chi-square test to determine if each scoring system distributed the groups differently. He found none of the scoring systems to have optimal performance in its ability to predict problems which might arise in the mother and/or baby. This is not surprising given the systems were modeled on southern populations and were designed to predict problems in the infant only. He concluded that only scoring systems developed specifically for northern populations could be useful in these regions.

To this end, Murdock (1979) examined 414 pregnancies in the Keewatin and Baffin regions to determine which prenatal factors had correlations of statistical significance with designated maternal or infant outcomes. He analyzed a number of antenatal factors (which were not described) for their ability to predict problems in three areas: the mother and/or infant, infant alone and mother alone, and found several of statistical significance. Interpreting this study is difficult, however. The outcomes used by Murdock were so broadly defined that discrete indicators were difficult to isolate. As well, he used medical procedures as outcomes and identifies antenatal conditions which inevitably lead to these procedures as predictors. For example he concludes that "long interval between rupture of membranes and delivery" is a significant factor in predicting "induction of labour." Regrettably, all this does is restate what is clinically obvious.

Pflaum et al. (1984) evaluated a perinatal risk scoring form used by the Alaska Area Native Health Service (AANHS). Using a single form, they collected data retrospectively for the year 1979 and prospectively for the years 1982 and 1983. They combined and compared the frequency of women identified as being at risk by the scoring system and for selected outcomes (birthweight and Cesarean section rate) for the two data sets. They found that the number of women at pre-natal risk increased from 51% in 1979 to 62.1% in 1982 and 73.5% in 1983. Assuming there had been no changes in the women giving birth during these years, they attributed this increase to an improved data collection system. Interestingly, accompanying this increase in clients "at risk" was an increase in primary[10] cesarean section

[10] Women who have not had a previous cesarian section.

rate (from 4.0% in 1979 to 5.6 % in both 1982/1983). This may have resulted from the "revised" high risk allocation. The incidence of low birthweight decreased from 6.8% to 6.5% over the study period, but with the small study population it is not possible to say if this is significant.

Casson and Sennet (1984) examined the perinatal risk scoring guidelines for the province of Newfoundland via a retrospective chart review of 266 pregnancies at a rural hospital. They applied the recommended guidelines for risk assessment to this population and then looked at the decisions made regarding consultations and transfers. They found consults to obstetricians and transfers were conducted less often than the recommendations would have indicated in this population. According to recommendations, 60% of the women should have been transferred for childbirth, but only 14% actually were. In the study population, the most common reasons for prenatal consultation to an obstetrician were hypertension, controlled antepartum hemorrhage, suspected intrauterine growth retardation (IUGR) and postdate pregnancy. The most common reason for the transfers for childbirth were prematurity and pre-eclampsia.

Black and Gick (1979) evaluated a perinatal risk scoring system designed by Goodwin et al. for its ability to identify pregnant women in a population in rural Labrador who would develop complications or require operative intervention. They compared various risk groups for the occurrence of maternal or fetal complications and found a relationship between a high risk score and the presence of fetal complications. For maternal complications the relationship

was poor: 50% of the cesarean sections were in women identified as low risk, and the majority of women requiring manual removal of the placenta and blood transfusions were in the low risk group.

To address the poor relationship for maternal complications, Black and Gick (1979) attempted to identify which maternal factors indicated the need for an emergency cesarean section (defined here as a cesarean section for which it was believed a two hour delay would mean additional risk to the fetus or the mother). They compared the frequency of risk factors in the emergency cesarean section subgroup (n=17) with those in the remaining population which included the "non-urgent" cesarean sections. Predictors more common in the emergency cesarean section group included nulliparity, postmaturity, grand multiparity[11], previous stillbirth, previous premature birth and previous neonatal death. Unfortunately, Black and Gick's study identifies only broad indications of perinatal risk at best and, as such, does little to resolve the problem of which specific women require transfer for childbirth.

Thus, the above studies (Murdock 1979; Casson and Sennet 1984; Black and Gick 1979) demonstrate that to date risk scoring forms have tended to be of limited use in remote regions for identifying women and fetuses who might develop complications. Regrettably, this inability to identify women at high risk has led many regions to require the evacuation of all women from their home communities to level II or III centers so resources will be available should complications arise.

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[11] Defined in this study as a woman who has given birth to six or more children

At the birthing center pilot project in Rankin Inlet in the Northwest Territories (NWT), although there is a perinatal committee modeled after that in use at the Innuulisivik maternity, a risk scoring form is the sole basis for determining which women can stay in the north for childbirth. Only women identified as "no risk" by a numerical score may remain in Rankin Inlet for childbirth (Keewatin Regional Health Board 1994); no room is left for individual clinical interpretation even though the perinatal committee in Rankin Inlet has called the risk scoring form "rigid and restrictive" (Keewatin regional health board 1994). By contrast, while numerical risk scoring forms were also originally used at the Innuulisivik maternity they have been discarded in favour of a qualitative form.

Further research is required to describe risk profiles particular to Inuit women and how they relate to transfer decisions. Kaufert et al. (1988) did examine the possibility that the increasing number of Inuit women being transferred from the Keewatin region to tertiary centers was a function of increasing risk factors in the population. To assess this they looked at changes over time in low birthweight and extremes of maternal age and found that babies were getting heavier while fewer mothers were below 16 or above 35 years of age. They inferred then, that the changes in risk factors do not explain the increase in evacuations for childbirth and question the obstetric policies leading to these.

Although Kaufert et al.'s hypothesis is interesting, the indicators selected are unfortunately poor choices. While they do acknowledge that measures of birthweight and maternal age are "coarse indicators of maternal risk," birthweight is, in fact, not a risk factor but an outcome

measurement. As such, it cannot be employed as an indicator for transfer. Rather, estimates of birthweight, whether clinical or, made by ultrasound, would be a more appropriate risk factor to employ. In addition age is a poor indicator: young maternal age has not been demonstrated to be a risk factor in Inuit populations (Lessard and Kinloch 1987; Stonier 1990). This further underscores the need for more detailed analyses of obstetrical risk in relation to place of birth, to help determine how "risk" is experienced in northern indigenous populations.

2.34 CULTURAL VALUES AND PERCEPTIONS OF RISK

"We don't understand what the doctor is saying"
Anonymous, (quoted in Native Women's Association 1989)

Despite the best intentions of medical policies, they have the potential to disrupt an individual's health when relevant cultural values are not taken into account. By excluding the impact of cultural factors from a medical decision, harm can be done to the patient. Thus, medical policies can themselves become risk factors for health.

In determining risk in pregnancy in the north, the biomedical model has prevailed. Little consideration has been given to how northern women perceive risk in pregnancy. With childbirth seen as a private matter between a woman and her physician, maternity as a social, collective process is losing ground (Queinart 1992). When women are removed from their

community for childbirth the biomedical approach is magnified at the expense of the psychosocial aspects of childbirth.

Kaufert and O'Neil describe how risk can take on different meanings depending on whether the language being used is epidemiological, clinical or lay (Lock and Bibeau, 1993). For example Cournoyer (nd) found that while medical personnel often see transfer for childbirth as a way of overcoming complications, Cree women often see it as a cause of problems. Given the different ways in which risk is perceived, Kaufert and O'Neil ask "who has the power to define risk and to insist that their view should prevail over others?" (Lock and Bibeau, 1993). In other words, does the right to define risk fall to the care giver or to the patient?

The risks entailed in childbirth in the north must be balanced against the risks (broadly defined) associated with travelling south and giving birth in an environment far from home. Leaving one's community had detrimental effects on women, their families and their culture, with many authors identifying evacuation as a hardship throughout northern Canada (Paulette 1990; Cournoyer nd; Voisey et al. 1990; Grieg 1990; Kaufert 1990; Native Women's Association 1989; Webber & Wilson 1993; Minister of Supply & Services 1993; Stevenson 1988).

Inuit women who are evacuated for childbirth spend the final weeks of their pregnancy isolated in an unfamiliar environment where the food is foreign and people often do not speak

their language (Grieg 1990). They miss their families and worry for the welfare of the children left behind. Women tend to eat poorly because of unfamiliar food, some increase their smoking, and easy access to drugs and alcohol in the south may lead to drinking and drug abuse. By removing childbirth from a woman's home environment, it has become an isolated event for Inuit women. Traditions which were once passed from Inuit midwives and mothers are being forgotten. As a woman in the community of Ivujivik states with regard to changes in childbirth, "We no longer see the abilities of our women" (quoted in Native Women's Association 1989). These are "risks" not assessed by formal scoring procedures.

Other "risks" of evacuation stem from the effects on family life when the mother is absent (Voisey 1990). Not able to accompany their wives south, husbands have been removed from their role in assisting in the childbirth process. If other family members do not help with childcare during a mother's absence, men's hunting and other work is disrupted with some husbands coming to resent women for going away. The bonding of the father to the new baby may also be adversely affected, and should this have a detrimental effect on family relationships, it may be related to an increase in family violence (Gagnon 1989) . "Nowadays the men do not participate in the family and are not involved in the childbirth, so [men's involvement] should be renewed" (quoted. in Native Women's Association POV 1989).

Although Inuit women see birth as a natural event, they do recognize that complications arise which may be best handled by specialized treatment in the south (Grieg 1990; Gagnon 1985). In fact, some Inuit women prefer to give birth in tertiary treatment centers for this reason

(Gagnon 1985). Ideally, then, a combination of modern and traditional birthing practices would best serve the Inuit women of northern Canada. As advocated by Pauktuutit, the national Inuit Women's Association, "Inuit women are definitely not advocating a simple return to the old ways. Rather we are seeking a combination of traditional Inuit midwifery and western medicine" (Royal Commission on Aboriginal Peoples 1993).

When the risk of losing a baby or mother is compared with the risks of day-to-day life in the north, it is often not comprehensible to an Inuit woman why birth has been singled out and taken from their control. They have seen people die in their communities from the unforgiving nature of the environment. Attempts to manipulate natural events such as birth seem foreign to a people who have survived by adapting to their environment. To alter the Inuit approach to the environment from one of adaptation to one of confrontation and manipulation will have a detrimental effect on their culture.

"By living in an isolated community, where we put ourselves at risk from any number of life threatening situations...we live here, this is our choice to live here, if anybody feels that they can't live with that risk then they probably (should) move elsewhere. The possibility of losing a child simply because of the place that we live is a sobering thought, and it's a terrible thing, but it's still our choice to live here." Woman living in Whale cove, NWT (quoted in Kaufert 1990).

Thus as Kaufert and O'Neil point out, the Inuit perception of risk is influenced by a life-style where self-reliance and individual competence are highly valued, and where death is no stranger (Lock and Bibeau 1993). To remove childbirth entirely from the Inuit community would be to give no consideration to the importance of birthing to the culture, or to the individual experiences which shape the Inuit perception of risk. Of comparable impact

culturally would be removing the hunting role from men; just as hunting is central to the lives of men, so the birthing process is integral to the lives of women (Paulette 1990).

The evacuation of women for childbirth does not always proceed unopposed. Some women refuse to be evacuated: they feel the risks of leaving the community outweigh the risks of birthing in the community. Avoiding evacuation is done by purposefully missing the plane, not presenting for prenatal care, falsifying one's date of last menstrual period, or simply refusing to leave.

In response to the concerns of Inuit women surrounding the evacuation policy, medical personnel and Inuit people have begun a movement to return childbirth to northern communities (Paulette1987; Cournoyer nd). With current endeavours throughout the north to revive traditional beliefs and return control over community health care to local people, childbirth has become a charged "political issue and evacuation the latest round of colonial politics" (Kaufert and O'Neil qtd. in Lock and Bibeau, 1993).

3. METHODS

3.1 THE POPULATION

The study population includes Inuit women who received care from the Povungnituk maternity over the years 1989 -1991 (n=411). Ethical approval for the project was obtained from the human subjects committee of the Department of Epidemiology and Biostatistics (Appendix H). Excluded were the Inuit women who left the region by choice to give birth (n=11), often because they chose to give birth in the home community of their partner who was non-aboriginal from elsewhere in Quebec. Also excluded were 9 non-aboriginal women who gave birth at the maternity.

3.2 SOURCE OF DATA

A "pregnancy and delivery in Nunavik" (PDN) form is completed by a midwife after the live or stillbirth of each infant at the Innuulisivik maternity (Appendix C). This form contains information about the woman's medical history, events in prior pregnancies, events in the current pregnancy, and events in labour and delivery. The information on medical history, prior pregnancy and events during the current pregnancy is abstracted from the woman's prenatal record. If the birth occurred outside the Innuulisivik maternity , the forms are completed by the midwife after the maternity receives information from the hospital or

nursing station where the birth occurred. This information is supposed to be sent after the baby's discharge from the place of birth.

The initial data for the three year period 1989 -1991 were derived from the PDN forms reported to the community health department for the region. Information on the forms had been recorded on diskette in coded format and contained 328 Inuit births for the region.

To insure a complete data set and to locate births that might have been missing from the diskette, the "declaration of pregnancy" list in Povungnituk was consulted. A declaration of pregnancy form is completed after the first prenatal visit by the nurse or midwife who is providing prenatal care to register the pregnancy at the Innuulisivik maternity. This list contains the woman's name, her village and, sometimes, her birthdate. To maintain confidentiality for this study, each woman on this list was identified only by her Nunavik health number and this was used in matching individuals with those listed on the original data set on diskette.

The final data set (a combination of women from the PDN and declaration of pregnancy lists) was then compared to the Quebec birth and stillbirth registry for the Innuulisivik maternity and referring hospitals to determine if it was complete. The number of births and stillbirths were compared by year and location.

The final list of women contained 411 individuals; 328 came from the original data on diskette, while a further 83 were identified from the declaration of pregnancy list. Seven individuals on the declaration of pregnancy list were excluded due to insufficient data.

After each birth (still or live), a declaration of the event is sent to the provincial birth registry in Quebec City. As it was not possible to match each individual because of differences in recording variables between the two sources, the data were compared by year (table 3.1 and 3.3) and location (table 3.2 and 3.4) of live and still births. Thus the Quebec birth registry was used to determine how representative the data were.

Table 3.1 Number of live births by year

Year	Final data set n (%)	Quebec Birth Registry n(%)	Proprotion (%) of final data set present
1989	131 (32.2)	125 (30.2)	105
1990	125 (30.7)	132 (31.9)	95
1991	149 (36.5)	157 (37.9)	95
missing year	2 (0.5)	0 (0)	
Total	407 (100)	414 (100)	98

Table 3.2 Number of live births by location

Location of live birth	Final data set n(%)	Quebec Birth Registry n(%)	Iqualuit Hosp. Registry	Dept.Comm. Health Mtl.
Povungnituk	347 (85.3)	365 (88.2)	-	-
Montreal	38 (9.3)	36 (8.7)	-	46
Nursing station	16 (3.9)	8 (2.0)	-	-
Iqualuit	4 (1.0)	-	5	-
Other	2 (0.5)	5 (1.2)	-	-
Total	407 (100)	414 (100)	-	-

For the year 1989, more births were found than the Quebec registry had recorded. To preclude duplicate recordings of individuals, birth dates and birth weights were verified for repeats. When a repeat did occur, other variables such as mother's birth date and village of residence were checked to ensure it was a different birth. No duplications were found in the data set, thus it is assumed the Quebec Registry had fewer births recorded because the declaration of live birth form was either not completed or lost. Table 3.2 demonstrates that the missing individuals on the Quebec registry tend to be births which occurred outside Povungnituk, either in Montreal or at nursing stations.

Table 3.3 Still births by year 1989-1991

Year	Final data set	Quebec stillbirth registry
1989	1	1
1990	2	1
1991	1	1
Total	4	3

Table 3.4 Still births by location

Location of still birth	Final data set	Quebec stillbirth registry
Povungnituk	2	1
Montreal	1	1
Nursing station	1	1
Total	4	3

Initially six still births were recorded in the data. This number seemed high when only three had been reported to Quebec. The six still births were therefore checked with a midwife who was working during that time period. She was able to identify two cases which were, in fact, live. The data were corrected accordingly. Of the four remaining cases only one was not reported to the Quebec registry.

3.21 DATA COLLECTION

When a birth was identified from the declaration of pregnancy list for which no data existed, information was collected retrospectively from the patient's chart. The information was obtained from the same sources in the woman's chart as it would have been after a birth and recorded on the standard PDN form. When information was not available in the Povungnituk hospital archives, the nursing station charts or patient transfer records at the Department of Community Health for the Montreal General Hospital in Montreal were consulted. If it was not possible to obtain a record after consulting these three sources, it was considered missing.

3.3 VARIABLES FOR ANALYSIS

In order to provide an overview of pregnancy related indicators present in women who gave birth at the Innuulisivik maternity as compared to women who are transferred, factors from the PDN form (Appendix C) were condensed into variables according to clinical category (Tables 3.5, 3.6, 3.7 and 3.8). In each pregnancy the condensed variable was considered to be present if any of the factors from the PDN form which make up the category were present. If there were data missing the decision was based on the factors for which there was data. If all factors were missing for a given category the condensed variable was considered missing for that individual.

Table 3.5 Condensed variables for medical and obstetrical history

Condensed variables	Factors from PDN form (Appendix A)
hypertensive problems	hypertension in pregnancy pre-eclampsia eclampsia
third trimester bleeds	third trimester bleed praevia or abruptio placenta
poor outcome for baby	prematurity < 27 weeks prematurity 27-36 weeks birthweight < 2500 g congenital anomalies still birth neonatal death (within 27 days) neonatal infection (within 27 days)
previous cesarean section	previous cesarean section
large baby	birthweight > 4500g dystocy
medical problems	hypertension heart disease respiratory disease anemia coombs +'ve with sig. antibodies uterine surgery (other than c-section)
psychosocial problems	sexual abuse family violence psychiatric problems
mother's age	≤ 16 years 40+ years

Table 3.6 Condensed variables for current pregnancy

Condensed Variables	Factors from PDN form
3rd trimester bleed/ pre-labour anemia	placenta previa abruptio placenta 3rd trimester hemorrhage haemoglobin < 7 before delivery
Hypertensive problems	hypertension pre-eclampsia
Medical problems	diabetes immunological problem coombs positive STD infection (resp, genital, urinary and other)
Substance abuse*	alcohol consumption other drug (abuse)
twins	twins
psychosocial problems	physical violence in current preg. stress in current pregnancy
Premature labour	premature rupture of membranes tocolytics prescribed preterm labour < 37 weeks estimation of prelabour gestational age < 37 weeks
Post term labour	post term labour > 42 weeks estimation of pre labour gestational age > 42 weeks
Presentation	breech transverse dystocy

*87% of the women stated they smoked. The variable was not included as there was no further data to determine if they quit during pregnancy or the quantity smoked.

Table 3.7 Condensed variables for labour and childbirth

Condensed variables	Factors from PDN form
Signs of fetal distress	amnio fluid meconium amnio fluid other fetal distress tight cord loops prolapse cord
Hemorrhage	marginal placenta hemorrhage before placental expulsion blood loss > 1000
Post partum complication	hemorrhage after placental expulsion,uterine atonia hemorrhage > 3 hours post partum transfusion uterine prolapse endometritis

Table 3.8 Condensed variables for baby outcome

Condensed variable	Factors from PDN form
Baby outcome	5 minute apgar <7 weight < 2500g stillbirth neonatal death

3.4 MISSING DATA

The data used for the analysis (the condensed variables) were 96.2% complete. The 3.8% of missing data are made up in part by seven women transferred south whose prenatal care documents were missing in whole. In general, there were higher proportions of data missing for measures pertaining to labour and birth and psychosocial issues, mainly within the transfer group (Appendix D). This will preclude any comparisons between transfers and the Povungnituk group for these variables.

To determine if there were differences between women who had missing data and women who did not, these groups were compared with respect to selected markers: parity, apgar score, extremes of age for the mother, place of birth and time of first visit using a t-test and also by evaluating the clinical meaningfulness of the observed differences. No significant clinical or statistical differences were noted in the proportions of the mother's parity, apgars, and the age of the mother between missing and non-missing groups. However as expected, there were significant clinical and statistical differences in the proportion of transfers in the missing data group.

Two options were explored as to how to best deal with the missing data. First, all mis ·ıg variables were scored as zero with the underlying assumption that if the event was not recorded it was not present. Second, the women with missing data were removed, with the underlying assumption that the data were in fact missing. The proportions of each variable were compared for the two data sets and are tabulated in Table 3.9.

Table 3.9 Proportions for variables to be used in analysis using data with missing omitted and data with missing as zero.

VARIABLE (*multips only)	PROPORTION (DATA SET WITH MISSING OMITTED)	PROPORTION (DATA SET WITH MISSING AS ZERO)
Hypertensive problems*	14.9	14.5
History of third trimester bleed*	17.2	16.9
History of complication for baby*	21.9	21.6
History of Cesarean Section*	3.8	3.7
History of large baby*	3.1	3.0
Medical problem	40.9	39.9
history of Psychosocial problems	15.9	13.1
Maternal age	6.8	6.6
3rd trimester bleed/ pre-labour anemia	3.2	3.2
Hypertensive problems	9.6	9.2
Medical problems	59.5	58.9
Substance abuse	11.5	11.2
Twins	1.2	1.2
Psychosocial problems in pregnancy	15.5	13.4
Premature labour	20.6	20.4
Post term labour	3.9	3.9
Malpresentation	4.5	4.4
Signs of fetal distress	16.7	15.8
Hemorrhage	13.7	12.9
Post partum complication	19.4	18.5
Complication for baby	8.2	8.0

The differences between the two data sets were minimal with the largest difference being 2.8% for history of psychosocial problems. On the basis of the minimal difference it was felt it was not necessary to conduct further analysis with both data sets and the decision was made to use the data set with the missing condensed variables represented by a zero. For virtually all variables, this would be similar to filling the data by using a "best-guess" imputation.

3.5 DATA ANALYSIS

The data derived from the information on the PDN forms was divided into four groups: information pertaining to medical and obstetrical history, to current pregnancy, to labour and childbirth and to outcomes for the baby (table 3.5, 3.6, 3.7, and 3.8). Within these four groups the condensed variables were identified as outlined above and each condensed variable was assigned a weight of one. The distribution of these variables was then determined and compared across groups to meet the following objectives.

Objective 1. Describe indications for transfer of Inuit women served by the Povungnituk maternity (level I) to Iqualuit or Montreal (level II or III).

The analysis to meet this objective was conducted in three sections. First prenatal condensed variables (i.e. medical and obstetrical history and current pregnancy) were compared between women who gave birth at the Innuulisivik maternity (level I) and those who were transferred to a level II or III facility. The distribution of each condensed variable was calculated and the

observed differences between the birthplace groups were examined. Ninety-five percent confidence intervals were calculated to demonstrate what the data say strongly, versus year to year random fluctuations. To further explore the distribution of the prenatal condensed variables according to birth location, Innuulisivik (level I) or transfers (level II and III), the number of variables present in a woman's medical and obstetrical history and current pregnancy were tabulated. This was done by summing the number of condensed variables present for each woman. Overall the possible scores ranged from 0 to 17, with a range of 0 to 8 for multips and 0 to 3 for primips for medical and obstetrical history variables and a range of 0 to 9 for primips and multips for current pregnancy variables. The proportions of women with a given score were then calculated and the distributions of the scores were compared according to the location of the birth (Innuulisivik or transfer).

Secondly, the analysis was repeated separately for parity by dividing the data into two groups, primips and multips. First multips and primips were portrayed according to the individual condensed variables by birth location. Primips and multips were then compared by the proportions of the prenatal variables between the two groups overall (confidence intervals were done for all proportions). This was felt to be important as primips are unique in that they do not have an obstetrical history and consequently can present with problems that may be predictable in multips. Furthermore, primips are often designated as a risk group in their own right in the literature.

Finally, births which occurred at nursing stations were analyzed descriptively: it was not possible to make meaningful comparisons between the nursing station births and those occurring at Innuulisivik (level I) and level II and III facilities because of the small number of births. Instead, the distribution of the condensed variables for the nursing station births was analysed separately.

Objective 2. Explore differences and similarities in complications in labour and childbirth between women who are and are not transferred.

The analysis pertaining to objective two parallels that of objective one, but with a focus on birth outcome. First the distribution of variables (and their confidence intervals) pertaining to baby outcomes was compared for women who gave birth at Innuulisivik and those who were transferred. However, it was not possible to compare complications which arose during labour at Innuulsivik with those in the transfer group because of missing data, as records from Montreal are often not returned to Povungnituk. Thus condensed variables pertaining to labour and childbirth were analysed for the Innuulisivik group alone by calculating the proportions of each variable. Complications which arose for the baby were compared between Innuulisivik (level 1) and the transfers (level II and III). This was done by examining the distribution of each variable pertaining to an adverse outcome for the baby.

Secondly, differences between primips and multips were explored. Comparisons between primips and multips by birthplace were possible for baby outcomes using the analysis

conducted above. Furthermore, analysis of primips and multips regardless of birth location was done by comparing the distribution of variables of labour and childbirth and baby outcome between the two groups.

Finally, the complications of labour and childbirth and baby outcomes were described for nursing station births. This was done by calculating the proportions and confidence intervals of the variables pertaining to labour and childbirth and baby outcome for the nursing station group. Again the small number of nursing station births preclude meaningful comparison with other groups.

More sophisticated analyses, such as multiple or logistic regression, was not done for several reasons. First the population was too small for a definitive analysis. Secondly, there would be "channelling bias" in that more serious cases will be sent south, so one would not expect similar rates of complications, even after adjusting for other factors, which may not adequately capture all the real risks. Finally, there were factors that affect transfer decisions, such as weather conditions and cultural variables, which did not have data available.

4.0 RESULTS

4.1 THE POPULATION

During the study period there were a total of 418 pregnancies, 133 in 1989, 130 in 1990 and 152 in 1991 (for 3 births the year was not identified). No data were available for 7 women. Of the 411 women who had data available, 349(84.9%) of the births occurred at the Povungnituk maternity and one in Kuujjuac (0.2%) which was included with the Povungnituk births as the level of care is the same in Kuujjuac. 44 (10.7%) women were transferred to either to Montreal, Iqualuit or Val D'Or and 17(4.1%) of the births were in nursing stations (fig 4.1).

One hundred and fifteen women were primips with the remaining 296 women being multips. The parity of the women ranged from 0 to 10 (fig 4.2). Of the 115 primips, 99 (86.1%)gave birth in Povungnituk and 13 (11.3%) were transferred to Montreal or Iqualuit. Of the 296 multips, 251 (84.8%) gave birth in Povungnituk and 31 (10.5%) gave birth in Montreal or Iqualuit. Within the data set women who gave birth twice (n=50) or three times (n=1) over the three year period are included in the 411. Since the analysis is descriptive, the repetition of some variables for an individual would not have an impact on the analysis. There were 4 sets of twins.

The age distribution of the women was as follows: 26(7%) $\leq$16 years; 88(22%) 17-19 years; 261(66%) 20-34 years; 13(3%) 35-39 years, and 2(0.5%) 40+. Seven(2%) had no age identified (fig 4.3).

Seventy seven (19.5%) of the women were residents of Povungnituk so, those that were not transferred south, did not have to travel from their home community for childbirth. Three hundred and eighteen (72.2%) of the women had to leave their home community at 38 weeks gestation for childbirth, 17(7.8%) gave birth in the nursing station and 2(0.5%) were missing. There are no statistics on the number of women who were transferred from their home community to Povungnituk before 38 weeks for medical or social reasons.

Figure 4.1

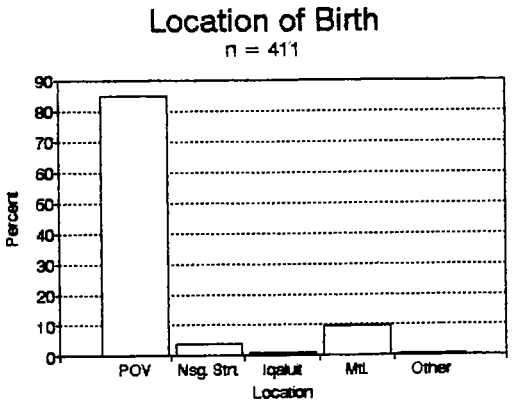


Figure 4.2

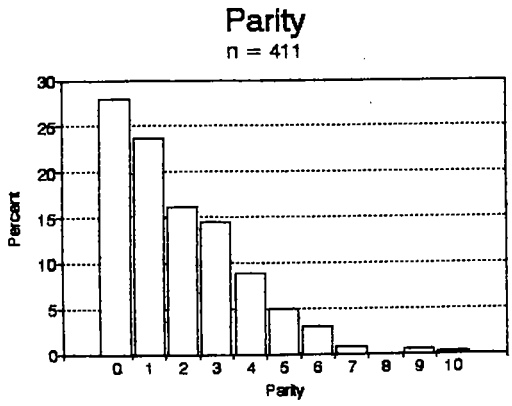
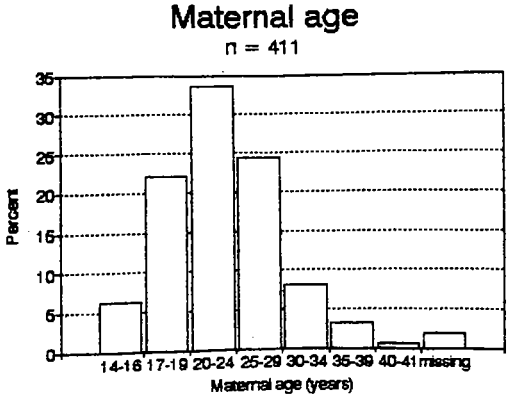


Figure 4.3



4.2 Objective 1

INDICATIONS FOR TRANSFER

Figure 4.4 shows the distribution of condensed variables for medical and obstetrical histories by place of birth. History of hypertension in pregnancy, third trimester bleed, complications for the baby, Cesarian section and large baby only pertain to multips, whereas, history of medical problems, psychosocial problems and extremes of age pertain to multips and primips alike. The detailed data for objective 1 are tabulated in Appendix E.

As can be seen, all medical and obstetrical history condensed variables were more common in the transfer than the Innuulisivik group. However 95% confidence intervals all had overlap in the two groups (except for Hx of C-section). Incomplete data about psychosocial history preclude comparisons. None of the condensed medical and obstetrical variables exclusively indicated transfer, with the exception of history of cesarian section. It should be noted that a small proportion of women giving birth at Innuulisivik had a history of cesarian section. This is explained by the fact that subsequent to their cesarian section they had a successful vaginal birth after cesarian section (VBAC) in the south. VBACs were not attempted at the Innuulisivik maternity. On the whole it can be said the transfer group tended to have more problems in their medical and obstetrical history, than the Innuulisivik group. However given the overlap in confidence intervals it possible the difference is random year to year variation. Because of the small number of nursing station births (n=17), it is difficult to make comparisons for this group.

Figure 4.5 shows the distribution of condensed variables pertaining to a women's present pregnancy by place of birth. The data with 95% confidence intervals is tabulated in appendix E. For all variables except post term labour (inductions are done at the Innuulisivik maternity,) factors were more common in the transfer group.

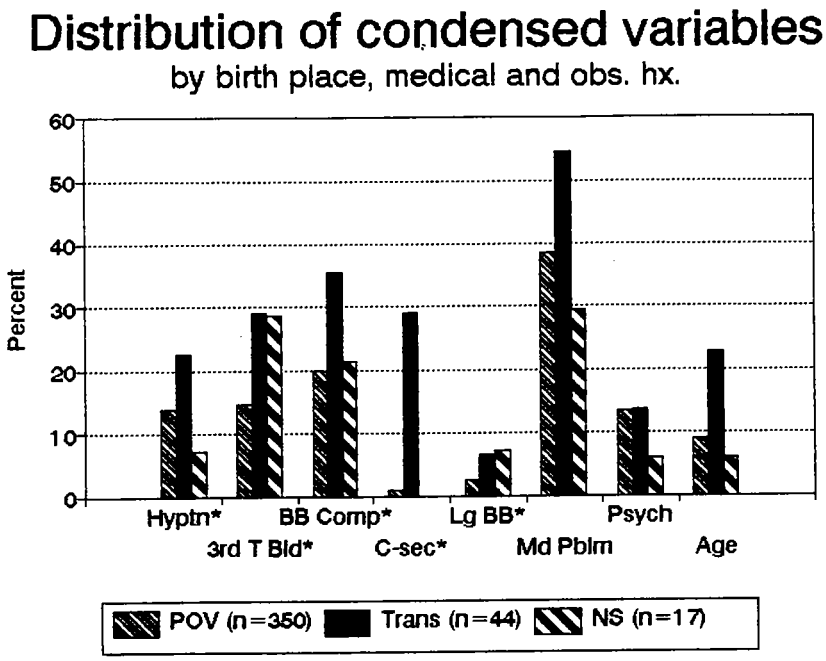
The largest differences between the transfer group and those who stayed in the north were third trimester bleed (11.4% vs 1.7%), twin pregnancies (4.6% vs 0.9%), malpresentation (15.9% vs 3.1%) and premature labour(61.4% vs 21.4%). This is not surprising as 3 of these factors (all but third trimester bleed) in themselves almost always warrant a transfer. Because these three variables generally have little overlap, they alone likely account for 4 of 5 transfers south. Hypertension was also markedly increased in the transfer group (18.2 vs 8.6%). The 95% confidence intervals support the differences for premature labour and malpresentation. However a priori knowledge regarding clinical decision making on transfer decisions for twins allows one to say the proportion is higher in the transfer group, even though the confidence intervals do not support the difference (Appendix E).

Premature labour was the current pregnancy variable most frequent in the transfer group, with 61.4% of all transferred women experiencing early labour. Although medical problems were also common in the transfer group (59.1%), the same was true for Innuulisivik births (58.6%). It should be recalled that this condensed variable included a broad range of conditions (table 3.6), including infectious diseases (ie. vaginal infections). The high

prevalence of this problem among pregnant women in the north dilutes the prognostic meaning of this observation.

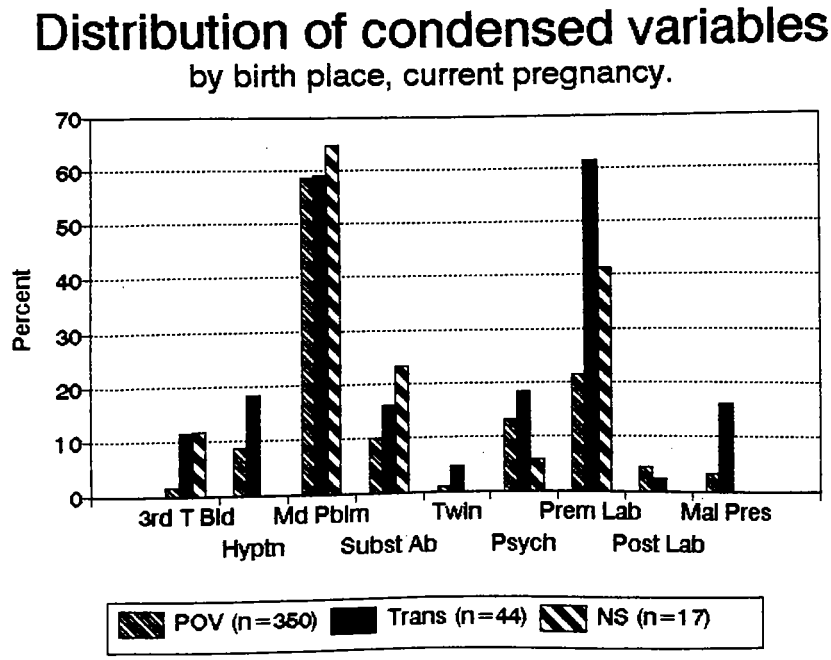
Women giving birth at a nursing station (n=17) had a higher proportion of substance abuse (especially hash smoking) compared to the Innuulisivik and transfer groups (23.5% vs 10% and 15.9% respectively). As expected a high proportion of the nursing station births were premature labours (41.2%) and third trimester bleeds (11.8%).

Figure 4.4



*multips only

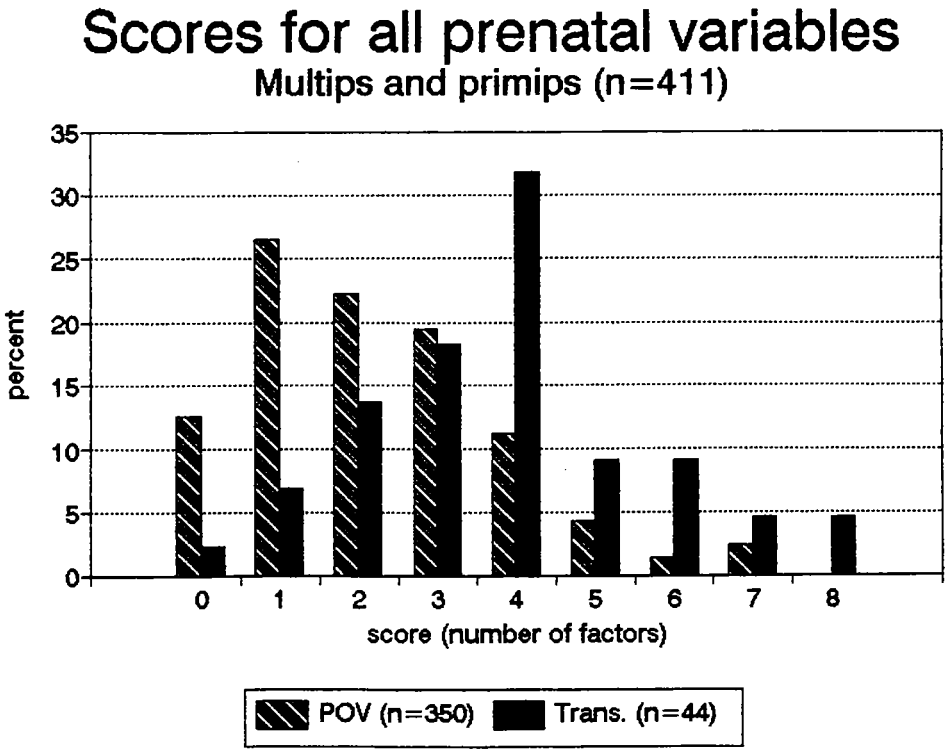
Figure 4.5



Abbreviated variables as per tables 3.5 - 3.8

To determine if there was a relationship between clinical signs of poor perinatal outcome and transfers south, the number of condensed variables for medical and obstetrical history present per pregnant woman were summed to give a score (range 0 to 8). The results were then compared by place of birth (figure 4.6). Overall, women who were transferred south had higher scores than those who gave birth at the Innuulisivik maternity. One woman who was transferred had a score of zero but this was due to missing data. The relationship between transfers south and an increased number of condensed variables was maintained when the data were separated and analysed separately for multips and primips (Appendix F)

Figure 4.6


Scores for all prenatal variables
Multips and primips (n=411)
percent
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7
8
score (number of factors)
POV (n=350)
Trans. (n=44)

Figures 4.7 to 4.9 show the distribution of condensed variables for primips versus multips regardless of place of birth. The specific data is tabulated in Appendix F. As expected, there was a significant difference in age, mostly accounted for by the high proportion of teenaged primips. Other notable differences were found with respect to history of medical problems, hypertension, posterm labour, malpresentation and psychosocial problems. Taking these comparison a step further and examining the distribution of primips and multips by birth location, it was found that primips transferred south were six times more likely to be hypertensive than evacuated multips (Appendix G). Otherwise there were few important differences between these groups.

figure 4.7

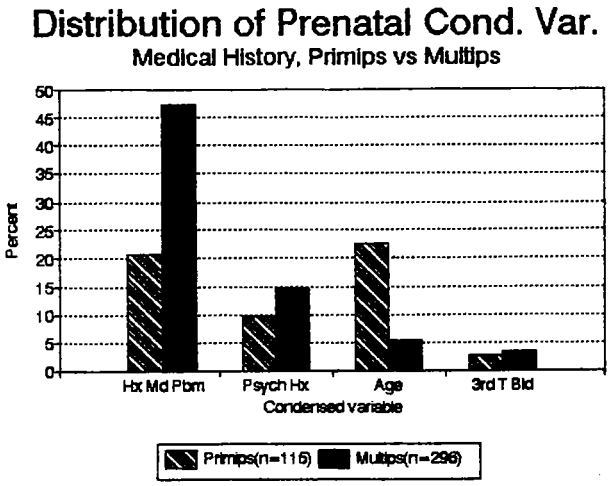


figure 4.8

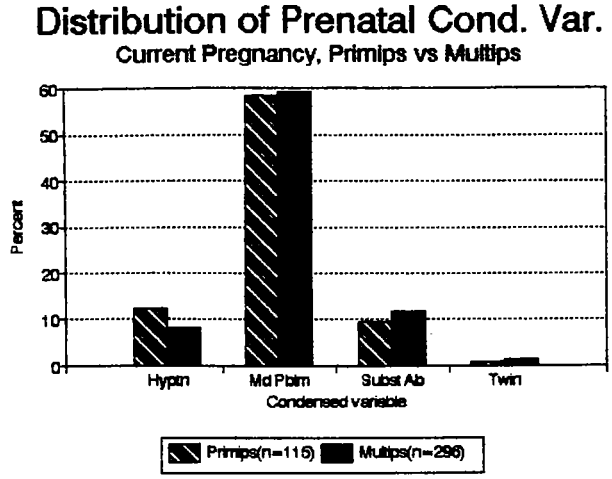
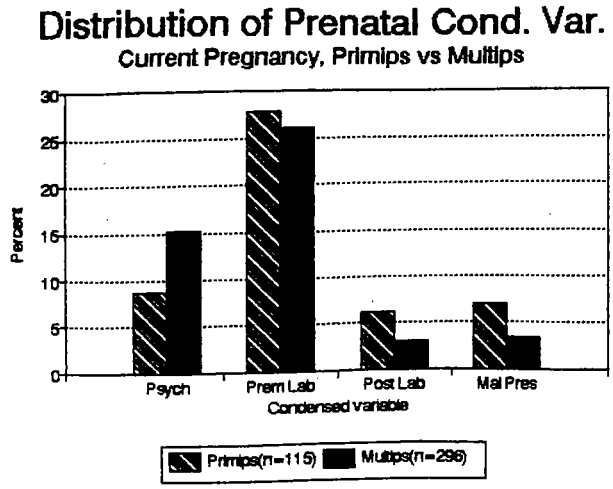


figure 4.9



4.3 Objective 2

The distribution of condensed variables pertaining to labour and childbirth were calculated for women who gave birth at the Innuulisivik maternity and at nursing stations and are presented in table 4.1. There were insufficient data to include the transfer group.

Among women who gave birth at the Innuulisivik maternity 16.6% showed signs of fetal distress, 14.9% hemorrhage and 20.6% post-partum complications. Among nursing station births there was one case of fetal distress (5.9%) and two with post partum complications (11.8%).

Table 4.1 Condensed Variables for Labour and Childbirth, Innuulisivik and nursing station

Condensed variable	Innuulisivik (95% CI)	transfers* (95% CI)	Nursing stations (95% CI)
Signs of fetal distress	16.6 (12.7, 20.5)	-	5.9 (0, 17.4)
Hemorrhage	14.9 (11.1, 18.6)	-	0
Post partum complication	20.6 (16.3, 24.8)	-	11.8 (0, 27.5)

* data not available

Table 4.2 shows the distribution of the condensed variables pertaining to complications for the baby (table 3.8) according to birth location. Complications were notably higher in the transfer group compared to the Innuulisivik group (27.3% vs 7.7%).

Table 4.2 Condensed variable for baby outcome

	Innuulisivik n=350 (95% CI)	Transfers n=44 (95% CI)	Nursing station n=17 (95% CI)
Complication for baby	7.7 (4.4, 11.0)	27.3 (12.5, 42.0)	23.5 (0, 50.3)

Table 4.3 further breaks down the adverse outcomes and presents specific complications according to birth location. The high frequency of adverse outcomes in the transfer group is accounted for mainly by the prevalence of low birth weight in this population. This is expected given the high proportion of women transferred for premature labour. And because there will be overlap between low birthweight and 5 minute apgar scores of less than 7, the higher frequency of this outcome is also not unexpected.

It is of interest that all births resulting in neonatal deaths (n=4) occurred at the Innuulisivik maternity. Specific information was only available for 2 of these deaths, and both infants were transferred to Montreal prior to their death. One had thrombocytopenia and liver damage and the other had a major heart defect. No information was available for the other two neonatal deaths.

Table 4.3 Baby Outcomes, proportions by place of birth and overall rates.

	5min Apgar < 7 (%) (95% CI)	Birth weight < 2500g(%) (95% CI)	Stillbirth(%) (95% CI)	Neonatal death (%) (95% CI)
Povungnituk (n=350)	3.1 (1.3, 5.0)	2.9 (1.1, 4.6)	0.6 (0, 1.4)	1.1 (0.03, 2.3)
Transfers (n=44)	6.8 (0, 14.4)	18.18 (6.7, 29.8)	2.3 (0, 6.7)	0
Nursing Stn. (n=17)	11.8 (0, 27.5)	5.9 (0, 17.4)	5.9 (0, 17.4)	0
Overall rate	3.9 (2.0, 5.8)	4.6 (2.6, 6.7)	1.0 (0.02, 1.9)	1.0 (0.02, 1.9)

The condensed variables pertaining to Labour and Childbirth regardless of place of birth were assessed for primips and multips separately (figure 4.10). Primips tended to have more distress in labour (20.2% vs 14.2%) while multips had more complications related to hemorrhage (16.7 vs 10.1%). However, these differences could be to random variation as the confidence intervals do overlap (Appendix F).

The condensed variables pertaining to complications for the baby were also compared between multips and primips (figure 4.11). No notable differences were demonstrated except for the neonatal deaths which were all in the multip group. The specific data pertaining to labour and childbirth for primips and multips are tabulated in Appendix F.

Figure 4.10

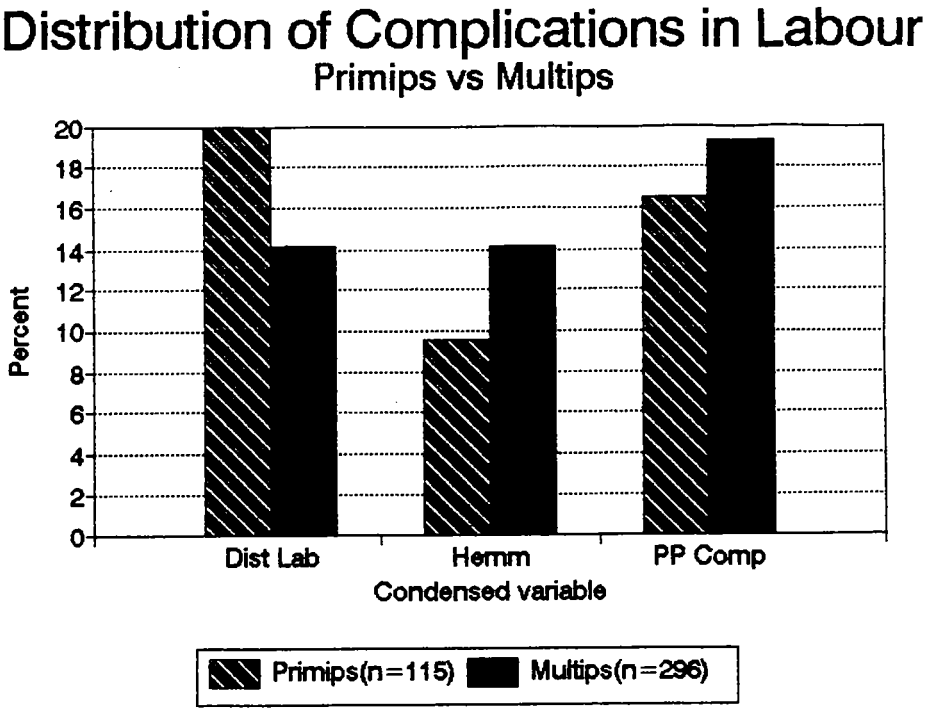
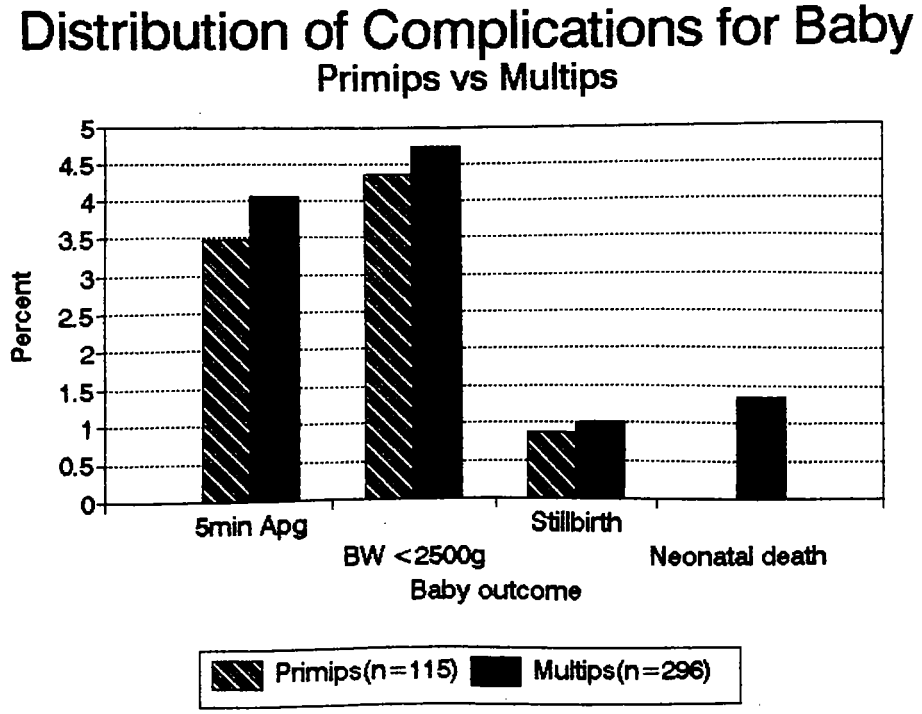


Figure 4.11



5.0 DISCUSSION

A descriptive study aims to provide an overview of a topic. As a descriptive study, this research was not intended to give a definitive analysis of the clinical conditions which necessitate the transfer of Inuit women from a level I center to a level II or III center. Rather, the findings enable one to make preliminary observations about the biomedical factors which tended to occur in the women who were transferred, and thereby make inferences about the overall functioning of the Innuulisivik maternity. Innuulisivik, unlike other birthing centers, has made decisions on place of birth by consensus. The data will allow us to explore how well this consensual decision making process functions.

For the years studied (1989-1991), almost 90% of births in the study population occurred in the north, either at the Innuulisivik maternity (84.9%) or nursing stations (4.1%), while only 11.3% of women were transferred to Montreal for childbirth[12]. These proportions were similar to as those found in 1988 (Meyer and Belanger 1991). When compared to other level I centers, this represents the highest reported proportion of primary care births in a northern region (table 2.1). Based on this high rate, and assuming that the women of the Hudson coast are presumably no healthier than Inuit women in other regions, one could argue either that

[12] One must remember that although the Innuulisivik maternity has returned maternity care to Nunavik, it still remains that the majority of women (72.2%), had to travel from their home community at 38 weeks to await childbirth. However, this problem is being addressed as one of the long term goals of the Innuulisivik maternity is the education of Inuit midwives and the provision of services in outlying communities.

the Innuulisivik maternity program judges more situations as low risk births or they are attending more complicated births than other primary care facilities in the north. The results appear to support the former; fewer neonatal complications were found overall in women who gave birth at Innuulisivik than those transferred south.

It would be gratifying to infer, further, that the higher rate of neonatal complications among transfers demonstrates how the perinatal committee was successful in selecting women requiring evacuation, and thereby had an effective method for evaluating perinatal risk. However, this cannot be said as no information was available from any hospital source on whether a given transfer was a scheduled event or a medevac (ie. did a woman present in labour with a breech presentation requiring immediate medevac, or was the breech lie detected earlier and the woman transferred south for childbirth only after an unsuccessful attempt at external version). Moreover, the data from women who were medevaced does not reflect the decision of the perinatal committee, but rather the clinical judgment of staff working at the time of the emergency: the only group in the study population known for certain to have been medevaced were births which occurred in Iqualuit, a location used exclusively for transfers of the most emergent nature. Therefore, as scheduled and emergent transfers could not be differentiated, it is impossible to decipher the functioning of the perinatal committee with respect to its ability to predict the need for transfer. However, the higher rate of neonatal complications in the transfer group can be said to reflect the overall functioning of the maternity staff with respect to both emergent and preplanned decision making.

It is interesting to note that in many cases, the decision to transfer is not difficult to make on clinical grounds alone: four fifths of all transfers in the study population were women with clinical conditions which in themselves usually require transfer (e.g. malpresentation, twins and premature labour.) Thus, the challenge in assessing a woman for transfer often arises when a given clinical problem presents unexpectedly in a woman in labour, in which case time and logistical constraints become limiting factors. For example, if a woman presents in labour with a breech presentation the decision must be made whether there is adequate time to medevac her to Montreal or Iqaluit, or if the risk is too great that she will give birth in transit. Deliveries on the plane are avoided at all cost, as complications in this inhospitable environment are difficult to manage. Thus, if it is felt that the likelihood is too great that the birth will occur in transit, the birth is managed at Innuulisivik and the mother and child transferred post partum as indicated.

This suggests how a clinical condition alone may not complicate the decision to medevac a woman, but that the clinical condition in the face of logistical constraints often presents the greatest challenge. For example, a storm precluding transfer is a major perinatal risk factor for a woman with a post partum hemorrhage who has given birth in a nursing station without access to a blood bank. Because information on such factors as weather conditions and plane availability are not recorded for each woman who was transferred emergently, assessments and inferences of these events are precluded. Future northern research should include logistical conditions in the data collected so that they can be factored in with other perinatal complications to provide a more accurate picture of the risk status of a birth.

SPECIFIC FINDINGS

With respect to specific complications as represented by condensed variables, premature labour[13] was found to be a significant problem in the transfer group (61.4% of evacuated women.) In fact, the rate was surprisingly high for the entire study population with 26.5% of all women experiencing premature labour. There is "mounting evidence"[14] that up to one third of cases of preterm births are associated with chorioamniotic membrane infection (Cunningham et al. 1993). As there is a high rate of genitourinary infections during pregnancy in this population (24 %), it could be argued that this is a basis for the greater incidence of premature labour. Consequently to address the problem of premature labour, attempts to reduce the incidence of early labour through the screening and treatment of genitourinary infections warrant consideration. Furthermore, ensuring well trained staff able to administer tocolytics and a good transportation system will enable the proper management of premature labour that does arise.

Hemorrhage was also found to be a frequent occurrence both intrapartum and post-partum in this population (table 4.1). It is of interest that Innuulisivik introduced a policy to give

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[13] Premature labour here is represented by the condensed variable (table 3.2) consisting of either premature rupture of membranes, tocolytics prescribed, preterm labour < 37 weeks, estimation of prelabour gestational age < 37 weeks.

[14] Some authorities feel that the link between preterm labour and genitourinary infections is circumstantial and question this relationship (Cunningham et al., 1993)

prophylactic oxytocic drugs (Syntocinon[15]) to women who had bled after a previous birth in the years following these included in this study.

The differences in post partum complications between the Innuulisivik group and those who were transferred were mainly associated with low birth weight and 5 min Apgar scores < 7 (table 4.3). This is likely explained by the greater proportion of premature labour in the transfer population.

Stillbirths were also higher in the transfer group. These may reflect intrauterine deaths in women who were transferred south with prenatal complications. Currently, the staff at the Innuulisivik maternity attend the births of women known to have had previous intrauterine fetal deaths. All four infants who died in the neonatal period were all born at the Innuulisivik maternity. A specific analysis of the events surrounding each of these deaths would be required to make any inferences about the relationship between place of birth and neonatal deaths.

In total there were 8 perinatal deaths giving a perinatal mortality rate of 19.5 per 1000 (95% CI 6.1 per 1000, 32.8 per 1000). However this rate does not hold much meaning because of the small study population.

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[15] Syntocinon is a drug used to increase contractions, and decrease uterine bleeding

Primips and multips were equally frequent in the transfer group (10.5% and 11.3%, respectively.) In addition, there did not appear to be any notable differences in the relative frequency of prenatal risk factors and postnatal complications between multips and primips, with the exception of hypertension. (Among transfers, hypertension was six times more likely in primips than in multips. This reflects the known predominance of hypertensive problems [influenced mostly by a high rate of preeclampsia] in primips[16]). This observation seems to refute claims by some authors that primips constitute a risk factor in their own right, other than for hypertensive problems, at least in this population.

It is interesting that primips and multips were transferred south at a comparable rate despite the fact that primips did not have a prenatal history on which to base a birth plan. It could be that this is a reflection of the greater transfer by medevac of primips than multips as fewer difficulties could be foreseen due to a lack of history (of the five medevacs to Iqaluit, three were primips). However, an alternative interpretation is that prenatal history is of relatively limited predictive value in the face of a comprehensive evaluation of the clinical status of the current pregnancy. In other words, if there is a full clinical evaluation of the current pregnancy, the additional information offered by an obstetrical history could be of minimal predictive value.

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[16] Hypertension as an indication for transfer has undergone changes since the time frame of the study (1989-1991). The staff of the maternity have become more comfortable with their ability to handle pre-eclampsia which now more often than not is managed at Innuulisivik. (Corriveau, 1993)

Overall trends in the condensed variables for the nursing station births are difficult to interpret because of the small number of total births (n=17). However, and as expected. premature labour predominated at nursing stations and accounted for a significant proportion of nursing station births (40%). Interestingly, 23.5% (vs 10% for Innuulisivik and 15.9% for transfers) of women who gave birth at nursing stations had documented substance abuse, a condition which tends to be poorly reported. Possibly substance abuse (which consists mostly of hash smoking) is a marker for other social conditions which could make it difficult for the woman to leave her home community, or substance abuse could be related to premature labour. However, there exists overlap in the confidence intervals (Appendix E), so the differences could be due to random variation.

6.0 CONCLUSION

This study has explored the biomedical factors which surround the issue of childbirth in the north and indications for transfer. These markers are not intended to be universally accepted as indicators of risk. Rather, they reflect factors used by the Innuulisivik maternity in the clinical assessment of perinatal risk in its population.

The data presented did not demonstrate any strong evidence for large differences between poor baby outcomes for Innuulisisvik's qualitative risk scoring system and historical data from other sites who use quantitative risk scoring schemes (or strict evacuation policies). Furthermore, despite the fact that Innuulisivik manages a greater proportion of births than other level one northern birthing units, still no evidence of large differences in baby outcomes were found. Thus, perinatal assessment by consensus as occurs at Innuulisivik appears to present a viable option on which to model other birthing units.

Unfortunately, there was no effective method for measuring the impact cultural factors had on transfer decisions with the present data. As cultural parameters are often difficult to measure and define, Innuulisivik has taken a logical approach to achieve its goal. Rather than instituting a "culturally sensitive" program by indoctrinating Quallunak health care managers in the perceived ways of the Inuit, Innuulisivik has aimed to achieve this end by putting local people in charge, or at least implicating them in all decisions. Fundamental to this method of

functioning has been the acceptance on the part of Quallunak workers of modifications to their practice to suit the needs of Inuit women. The hope is that through the forum of the perinatal committee, and the training of Inuit midwives and maternity workers, the Inuit perception of risk will be integrated with the southern biomedical perception to form a culturally appropriate and effective perinatal health service.

There are some limitations of this study that can be addressed in future research in this area. For example of data about the urgency of a transfer, and an expanded definition of risk in northern settings to include logistical parameters, would be useful to collect. With knowledge of which transfers were medevacs, and what weather and transportation conditions existed at the time of transfer, a more complete assessment of the birth management of the perinatal committee would be possible.

Nonetheless, the clear mandate of the Innuulisivik maternity remains the provision of culturally appropriate and low risk maternity care. In trying to provide low risk care one is confronted with the problem of defining risk in the northern setting. Despite many attempts to establish indications for perinatal risk requiring evacuation, there remain no clear guidelines for the transfer of pregnant women from remote northern regions. Given the great clinical variability in pregnancy and the logistical problems which present in the north, it is unlikely that clear guidelines are a realizable goal. The biomedical risk model alone is perhaps not the best approach to take for effective northern perinatal care. Rather, decision making by clinical consensus with an emphasis on local staff training and cooperation seems a more

satisfactory approach. In this way, the concept of risk in the northern context becomes a broad entity expanded to combine logistical and cultural considerations with biomedical parameters, and an awareness that medical policy itself may be a conduit of risk.

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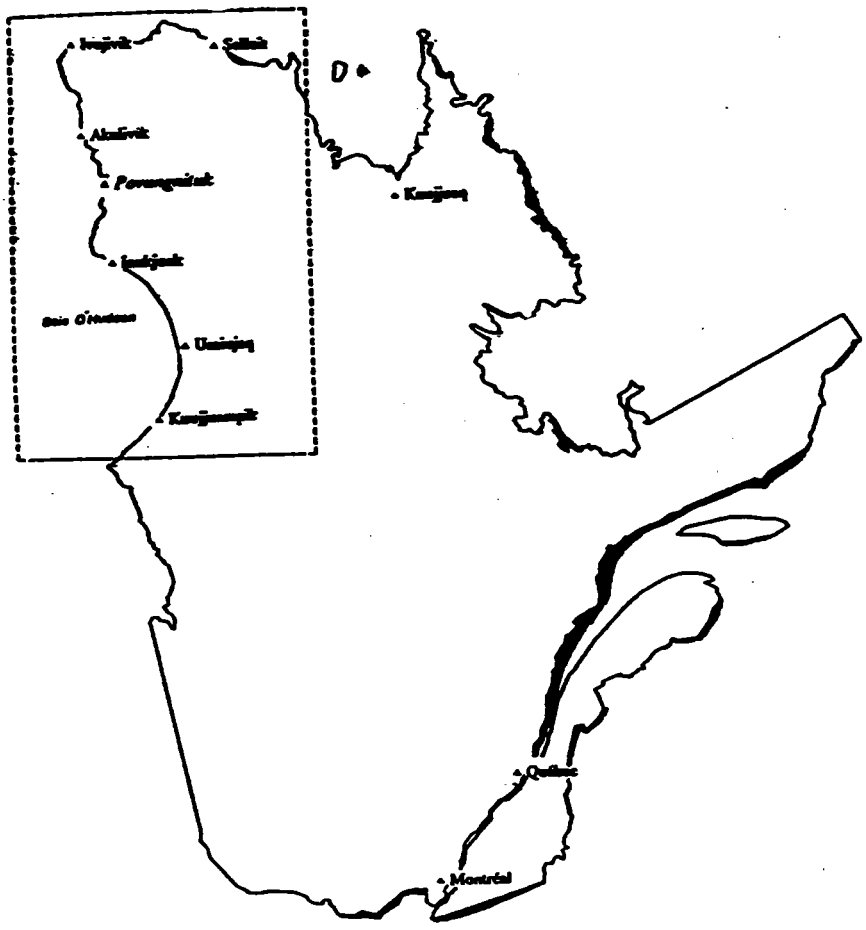
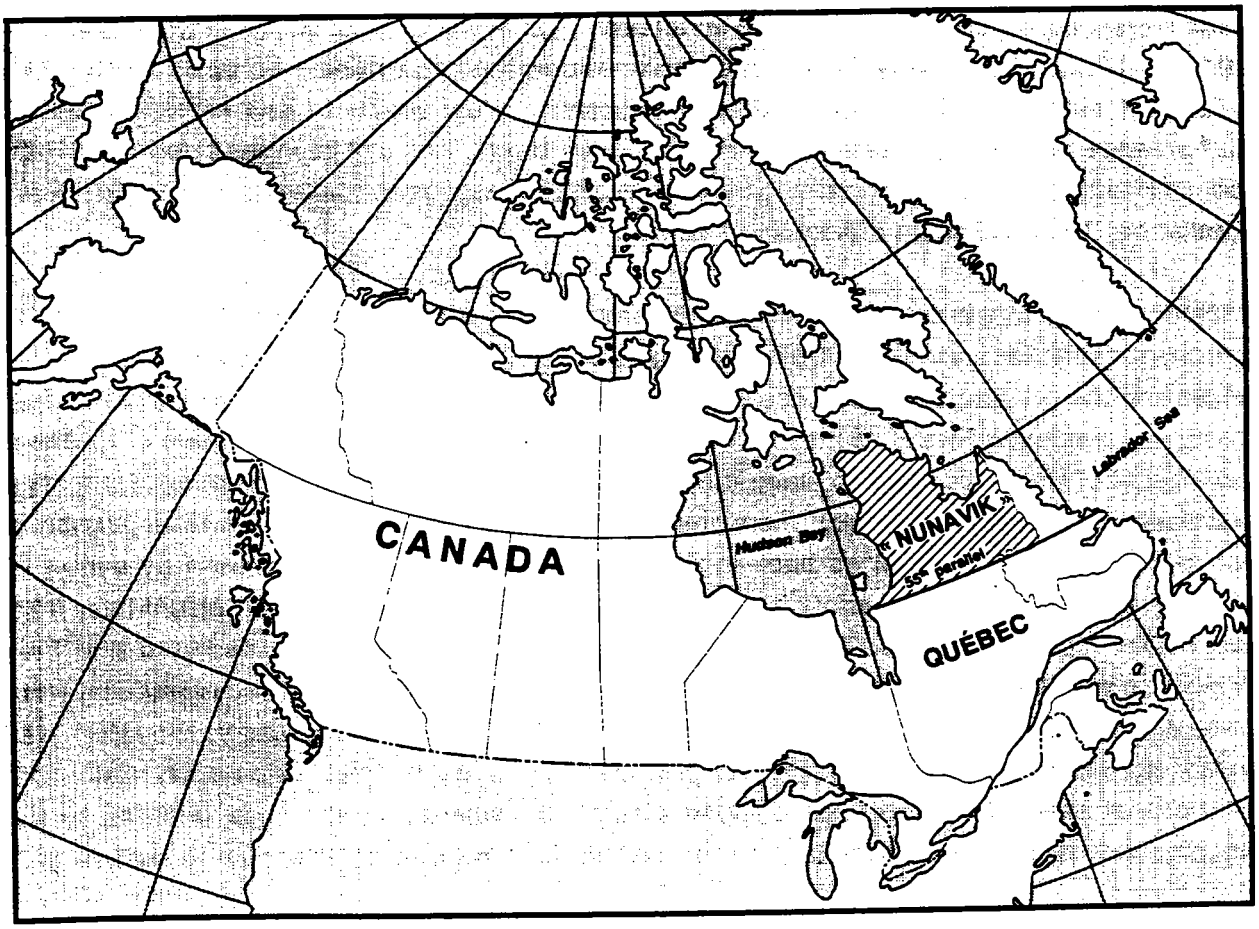
APPENDIXES

A Map of Nunavik (Northern Quebec)



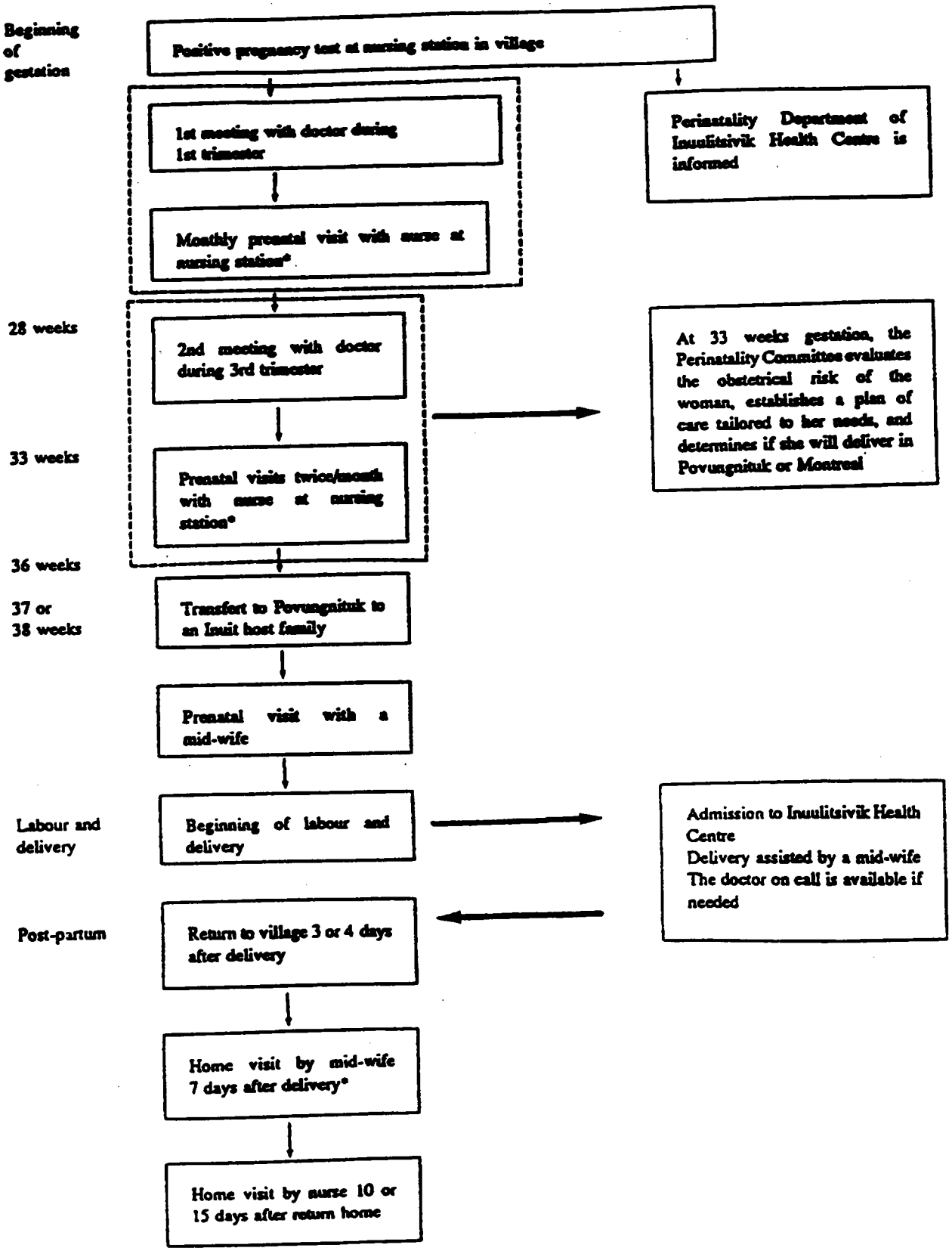


Source : Santé Québec (1994), Santé Québec Health Survey Among the Inuit of Nunavik, 1992.

B Prenatal care at the Innuulisivik Maternity

ANNEX 3

PROCESS OF PERINATAL CARE IN HUDSON BAY



The woman meets a mid-wife rather than a nurse if she lives in Povungnituk.

from Carignan (1993).

C Pregnancy and Delivery in Nunavik (PDN) form

PREGNANCY AND DELIVERY IN NUNAVIK

GENERAL INFORMATION

Nunavik health record |__|__|__|__|__|__|

Date of birth of mother year |__|__| month |__|__| day |__|__|

Date of last menstrual period |__|__| |__|__| |__|__|

Date of delivery |__|__| |__|__| |__|__|

Date of transfer for delivery |__|__| |__|__| |__|__|

Place of delivery |__| Povungnituk |__| Kuujjuak |__| Nursing station
|__| Iqualuit |__| Montréal |__| Other

Hospital of delivery record |__|__|__|__|__|__|

Residence

|__| Kuujjuarapik |__| Kangiqsujuaq
|__| Umiujaq |__| Quaqtaq
|__| Inukjuak |__| Kangiqsuk
|__| Povungnituk |__| Aupaluk
|__| Akulivik |__| Tasiujaq
|__| Ivujivik |__| Kuujjuaq
|__| Salluit |__| Kangiqsualujuaq |__| other

Race |__| Inuit |__| Cree |__| White
Marital status |__| single |__| married |__| common law |__| other

Schooling |__|__| years

Occupation of mother _____ of father _____

FOLLOW-UP DURING PREGNANCY

Gravida |__|__| Para |__|__| Aborta |__|__|

Children given in adoption |__|__| Adopted |__|

Ultrasound exam performed |__| no |__| yes

Evaluation of term based on |__| LMP |__| clinic |__| ultrasound

Prelabour estimation of gestationnal age |__|__|.|__| weeks

Prenatal visits |__|__| total |__|__| nurse |__|__| midwife |__|__| MD

Time of first visit |__|__| weeks

Hemoglobin: at first visit |__|__|.|__| lowest |__|__|.|__| at|__|__| weeks

Hematocrit: at first visit |__|__| % lowest |__|__| % at|__|__| weeks

Weight before pregnancy |__|__|.|__| kg before labour |__|__|.|__| kg

Gravidogramme percentile |__|__|

evolution |__| |__| |__|

PRIOR PREGNANCIES |__| no |__| yes ---> last delivery year |__|__| month |__|__|

no	yes	
|__|	miscarriage
|__|	therapeutic abortion
|__|	curettage
|__|	hypertension in pregnancy
|__|	pre-eclampsy
|__|	eclampsy
|__|	diabetes in pregnancy
|__|	praevia or abruptio placenta
|__|	prematurity < 27 weeks
|__|	prematurity 27 - 36 weeks
|__|	twins
|__|	dystocy (size or position)
|__|	cesarean section
|__|	post partum hemorrhage
|__|	birthweight < 2500 g
|__|	birthweight > 4500 g
|__|	stillbirth
|__|	congenital anomalies
|__|	neonatal death (within 27 days)
|__|	neonatal infection (within 27 days)

MEDICAL HISTORY

no	yes	
|__|	hypertension
|__|	heart disease
|__|	respiratory disease
|__|	anemia
|__|	transfusion
|__|	Coombs positif with significant antibodies
|__|	uterine surgery other than C section
|__|	sexual abuse
|__|	family violence
|__|	psychiatric or severe emotional problems

EVENTS DURING THIS PREGNANCY

no yes

|__| |__| placenta praevia
|__| |__| abruptio placenta
|__| |__| other hemorrhage
specify trimester |__| 1 |__| 2 |__| 3

|__| |__| anemia
|__| |__| iron supplements prescribed
|__| |__| vitamin supplements prescribed

|__| |__| pre-eclampsy
|__| |__| hypertension
|__| |__| diabetes
|__| |__| immunological problem
|__| |__| Coombs positif with significant antibodies

|__| |__| sexually transmitted disease specify _____

|__| |__| other infectious diseases specify _____
site of infection: |__| urinary |__| respiratory
|__| genital |__| other

|__| |__| antibiotics prescribed
number of treatments prescribed |__|__|

|__| |__| smoking
number of cigarettes per day |__|__|__|

|__| |__| alcool consumption
|__| |__| other drug (abuse)
|__| |__| stress
|__| |__| physical violence

|__| |__| low weight gain
|__| |__| twins
|__| |__| leak of amniotic fluid before rupture of membrane
|__| |__| premature rupture of membrane
|__| |__| tocolytics prescribed

|__| |__| death in utero
|__| |__| breech exercises
|__| |__| external cephalic version at |__|__| weeks
|__| |__| ripening of cervix with herbs

|__| |__| preterm labour < 37 weeks
|__| |__| post term labour > 42 weeks

presentation at 35 weeks |__| occiput |__| breech |__| transverse

LABOUR AND DELIVERY

person who did the delivery _____

father attendance |__| no |__| yes

Labour |__| spontaneous
|__| induced - -> |__| syntocinon |__| herbs
|__| stimulated - -> |__| syntocinon |__| herbs

Presentation* |__| occiput |__| breech |__| transverse
(* If twin pregnancy report information for second baby on last page)

Rupture of membrane |__| < 12 hours |__| 12 - 24 |__| > 24
Amniotic fluid |__| clear |__| meconium |__| other

Duration of labour 1 stage |__|__| hours |__|__| minutes

2 stage |__|__| |__|__|

3 stage |__|__| |__|__|

total |__|__| |__|__|

Analgesia |__| none |__| narcotic |__| entonnox |__| herbs
Anesthesia |__| none |__| general |__| epidural |__| pudental
|__| local

Delivery |__| spontaneous |__| vacuum extractor |__| forceps
|__| cesarean section

Perineum |__| intact
|__| episiotomy
|__| tear 1 degree |__| 2 |__| 3 |__| 4

Labial tear |__| no |__| yes
Vaginal tear |__| no |__| yes

Placental expulsion |__| spontaneous |__| artificial |__| revision

Substance used to fasten placental expulsion
|__| none
|__| syntocinon
|__| herbs

Blood loss |__|__|__|__| ml

Hemoglobin before labour |__|__|.|__| after delivery |__|__|.|__|

Hematocrit before labour |__|__| % after delivery |__|__| %

no	yes	
|__|	prolapse of cord
|__|	tight cord loops
|__|	fetal distress
|__|	dystocy
|__|	marginal placenta
|__|	hemorrhage before placental expulsion
|__|	hemorrhage after placental expulsion, uterine atonia

POST PARTUM

no	yes	
__	__	hemorrhage (> 3 hours post partum)
__	__	transfusion
__	__	syntocinon
__	__	uterine prolapse
__	__	fever
__	__	endometritis
__	__	antibiotics prescribed.
__	__	other treatment on discharge

specify _____

Systolic blood presssure |__|__|__| mm Hg

Diatolic blood pressure |__|__|__| mm Hg

Days in hospital for delivery: mother |__|__| baby |__|

Days away from home for delivery: mother |__|__| baby |__|

OTHER HOSPITALISATIONS AND TRANSFERS

	1	2	3	4
Place of origin				
Medivac				
Hospital				
Weeks of pregancy				
Days in hospital				
Days away from home				
Reason				

SINGLE OR FIRST BABY

Record |__|__|__|__|__|__|

Sex |__| male |__| female

Apgar |__|__| 1 minute |__|__| 5 minutes |__|__| 10 minutes

Weight |__|__|__|__| g weight percentile |__|__|

Height |__|__| cm head circumference |__|__| cm

no	yes	
|__| |__| healthy term baby
|__| |__| intra uterine growth retardation
|__| |__| deep succion
|__| |__| oxygen
|__| |__| bagging
|__| |__| tracheal intubation
|__| |__| congenital anomalies
		specify _____
|__| |__| cardiac murmure
|__| |__| respiratory distress syndrome
|__| |__| stillbirth
|__| |__| neonatal death
		specify when |__|__| days |__|__| hours
|__| |__| infection
		specify _____

Hemoglobin |__|__|.|__|

Hematocrit |__|__| %

|__| |__| breast feeding

|__| |__| baby given in adoption

adoptive parents |__| grand-parents |__| other relatives |__| non-relatives

|__| |__| adoptive parents living in same community as mother

SECOND BABY

Presentation |__| occiput |__| breech |__| transverse

Delay between first and second birth |__|__| minutes

Delivery |__| spontaneous |__| vacuum extractor |__| forceps
|__| cesarean section

no	yes	
|__| |__|	prolapse of cord
|__| |__|	tight cord loops
|__| |__|	fetal distress
|__| |__|	dystocy

Record |__|__|__|__|__|__|

Sex |__| male |__| female

Apgar |__|__| 1 minute |__|__| 5 minutes |__|__| 10 minutes

Weight |__|__|__|__| g weight percentile |__|__|

Height |__|__| cm head circumference |__|__| cm

no	yes	
|__| |__|	healthy term baby
|__| |__|	intra uterine growth retardation
|__| |__|	deep succion
|__| |__|	oxygen
|__| |__|	bagging
|__| |__|	tracheal intubation
|__| |__|	congenital anomalies
		specify _____
|__| |__|	cardiac murmure
|__| |__|	respiratory distress syndrome
|__| |__|	stillbirth
|__| |__|	neonatal death
		specify when |__|__| days |__|__| hours
|__| |__|	infection
		specify _____

Hemoglobin |__|__|.|__|

Hematocrit |__|__| %

|__| |__|	breast feeding
|__| |__|	baby given in adoption
		adoptive parents: |__| grand-parents |__| other relatives
		|__| non-relatives
|__| |__|	adoptive parents living in same community as mother

D Proportions of missing data per condensed variable

Table 1 Proportion of data not missing and missing by variables for multips only

variable	not missing n (%)	missing n(%)
history of eclampsia	288 (97.3)	8(2.7)
history of hemorrhage	291(98.3)	5(1.7)
history of poor outcome for baby	292 (98.6)	4 (1.4)
previous c-section	288 (97.3)	8 (2.7)
previous large baby	288 (97.3)	8 (2.7)

Table 2 Proportion of data not missing and missing by variables for multips and primips

variable	not missing n (%)	missing n(%)
medical history	401 (95.9)	17 (4.1)
psych history	339 (81.1)	79 (18.9)
3 rd trimester hemm	405 (96.9)	13 (3.1)
medical prob. in preg.	407 (97.4)	11 (2.6)
subst. abuse	401 (95.9)	17 (4.1)
age < 15 or > 35 years	410 (98.1)	8 (1.9)
twins in current preg	418	0 (0)
psych. prob in preg.	354 (84.7)	64 (15.3)
pre-term labour	408 (97.6)	10 (2.4)
posterm labour	407 (97.4)	11 (2.6)
presentation	399 (95.5)	19 (4.5)
hypertensive disorder	395 (95.5)	23 (5.5)
malpresentation	396 (94.7)	22 (5.2)

Table 3 Proportions of data not missing and missing for outcome measures

variable	not missing n (%)	missing n (%)
Distress during labour	389 (93.1)	29 (6.9)
Hemmorhage	387 (92.6)	31 (7.4)
Post partum complication	383 (91.6)	35 (8.3)
Baby Outcome	409 (97.9)	9 (2.1)

E Proportions of factors present by birth place

Medical and obstetric history (as per figure 4.4)

FACTOR (*multips only)	Innuulisivik n=350 (95% CI) *multips n=251	Transfer n=44 (95% CI) (multips n=31)	Nursing stn. n=17 (95% CI) (multips n=14)
Hypertensive problems*	13.9 (9.7, 18.2)	22.6 (7.6, 37.5)	7.1 (0, 21.1)
Third trimester bleed*	14.7 (10.4, 19.1)	29.0 (12.8, 45.2)	28.6 (4.0, 53.1)
Complication for baby*	19.9 (15.0, 24.8)	35.5 (18.3, 52.6)	21.4 (0, 43.7)
Hx of C-section*	0.8 (0, 1.9)	29.0 (12.8, 45.2)	0
Large baby*	2.4 (0.5, 4.3)	6.5 (0, 15.3)	7.1 (0, 21.1)
Medical problem	38.6 (28.1, 49.0)	54.5 (39.7, 69.4)	29.4 (7.1, 51.7)
Psychosocial problems	13.4 (9.8, 17.0)	13.6 (3.4, 23.9)	5.9 (0, 17.4)
Maternal age	8.9 (5.9, 11.8)	22.7 (10.2, 35.2)	5.9 (0, 17.4)

Current pregnancy (as per figure 4.5)

3rd trimester bleed	1.7 (0.4, 3.1)	11.4 (1.9, 20.8)	11.8 (0, 27.5)
Hypertensive problems	8.6 (5.6, 11.5)	18.2 (6.7, 29.7)	0
Medical problems	58.6 (53.5, 63.7)	59.1 (44.4, 73.8)	64.7 (41.3, 88.1)
Substance abuse	10.0 (6.9, 13.1)	15.9 (5.0, 26.8)	23.5 (2.7, 44.3)
Twins	0.86 (0, 1.8)	4.5 (0, 10.8)	0
Psychosocial problems	13.1 (9.6, 16.7)	18.2 (6.7, 29.7)	5.9 (0, 17.4)
Premature labour	21.4 (17.1, 25.7)	61.4 (46.8, 75.9)	41.2 (17.1, 65.3)
Post term labour	4.3 (2.2, 6.4)	2.3 (0, 6.7)	0
Malpresentation	3.1 (1.3, 5.0)	15.9 (5.0, 26.8)	0

F Condensed variables, primips and multips

Medical and Obstetric History (as per figures 4.7 - 4.9)

Condensed variable	Primips n=115 (95% CI)	Multips n=296 (95% CI)
Medical problem	20.9 (13.4, 28.3)	47.3 (41.6, 53.0)
Psychosocial problems	9.6 (4.2, 15.0)	14.5 (10.5, 18.6)
Maternal age	22.6 (14.9, 30.3)	5.4 (2.8, 8.0)
3rd trimester bleed	2.6 (0, 5.5)	3.4 (1.3, 5.4)
Hypertensive problems	12.2 (6.2, 18.2)	8.1 (5.0, 11.2)
Medical problems	58.3 (48.7, 67.3)	59.1 (53.5, 64.7)
Substance abuse	9.6 (4.2, 15.0)	11.8 (8.1, 15.5)
Twins	0.9 (0, 2.6)	1.4 (0.03, 2.7)
Psychosocial problems	8.7 (3.5, 13.9)	15.2 (11.1, 19.3)
Premature labour	27.8 (19.6, 36.1)	26.0 (21.0, 31.0)
Post term labour	6.1 (1.7, 10.5)	3.0 (1.1, 5.0)
Malpresentation	7.0 (2.3, 11.6)	3.4 (1.3, 5.4)

Labour and childbirth (as per figure 4.10)

Condensed variable	Primips	Multips
Signs of fetal distress	20 (12.7, 27.3)	14.2 (10.2, 18.2)
Hemorrhage	9.6 (4.2, 15.0)	14.2 (10.2, 18.2)
Post partum complication	16.5 (9.7, 23.3)	19.3 (14.8, 23.8)

Baby outcome (as per figure 4.11)

Condensed variable	Primips	Multips
Baby outcome	11.3 (5.5, 17.1)	12.2 (8.4, 15.9)
5 min apgar < 7	3.5 (0.1, 6.8)	4.1 (1.8, 6.3)
Birthweight < 2500g	4.3 (0.6, 8.1)	4.7 (2.3, 7.2)
Stillbirth	0.9 (0, 2.6)	1.0 (0, 2.2)
Neonatal death	0	1.4 (0.03, 2.7)

G Proportion of factors present by birth place. Multips and Primips separately

Medical and Obstetric History, primips

FACTOR	Innuulisivik (95% CI) n=99	Transfer (95% CI) n=13	Nursing Stn. (95% CI) n=3
Hypertensive problems	0	0	0
Third trimester bleed	1.0*	0	0
Complication for baby	0	0	0
Hx of C-section	0	0	0
Large baby	0	0	0
Medical problem	17.1 (9.7, 24.6)	53.8 (25.6, 82.0)	66.7 (1.3, 100)
Psychosocial problems	9.1 (3.4, 14.8)	7.7 (0, 22.8)	33.3 (0, 98.7)
Maternal age	21.2 (13.1, 29.3)	30.8 (4.7, 56.9)	33.3 (0, 98.7)

* one woman who was a primips had a third trimester bleed recorded

Current Pregnancy, primips

	Innuulisivik (95% CI) n=99	Transfers (95% CI) n=13	NS (95% CI) n=3
3rd trimester bleed	1.0 (0, 3.0)	15.4 (0, 35.8)	0
Hypertensive problems	8.1 (2.7, 13.5)	46.2 (17.9, 74.4)	0
Medical problems	58.6 (48.8, 68.3)	53.9 (25.6, 82.1)	66.7 (1.3, 132.0)
Substance abuse	10.1 (4.1, 16.1)	7.7 (0, 22.8)	0
Twins	0	7.7 (0, 22.8)	0
Psychosocial problems	10.1 (4.1, 16.1)	0	0
Premature labour	23.2 (14.9, 31.6)	61.5 (34.0, 89.1)	33.3 (0, 98.7)
Post term labour	7.1 (2.0, 12.1)	0	0
Malpresentation	5.1 (0.7, 9.4)	23.1 (0, 46.9)	0

Labour and Childbirth, primips

Condensed variable	Innuulisivik, n=99 (95% CI)	Transfers n=13 (95% CI)	Nursing Stn. (n=3)
Distress during labour	20.2 (12.2, 28.2)	23.1 (0, 46.9)	0
Hemmorhage	10.1 (4.1, 16.1)	7.7 (0, 22.8)	0
Post partum complication	17.1 (9.7, 24.6)	7.7 (0, 22.8)	33.3 (0, 98.7)

Baby outcome, primips

Condensed variable	Innuulisivik, n=99 (95% CI)	Transfers n=13 (95% CI)	Nursing Stn. (n=3)
Baby outcome	8.1 (2.7, 13.5)	30.8 (4.7, 56.9)	33.3 (0, 98.7)
5 min apgar< 7	3.0 (0, 6.4)	7.7 (0, 22.8)	0
Birthweight < 2500g	1.0 (0, 3.0)	23.1 (0, 46.9)	33.3 (0, 98.7)
Stillbirth	1.0 (0, 3.0)	0	0
Neonatal death	0	0	0

Proportion of factors present by birth place
Medical and Obstetric History, Multips

FACTOR (*multips only)	Innuulisivik n=350 (multips n=251)	Transfer n=44 (multips n=31)	Nursing stn. n=17 (multips n=14)
Hypertensive problems*	13.9 (9.7, 18.2)	22.6 (7.6, 37.5)	7.1 (0, 21.1)
Third trimester bleed*	14.7 (10.4, 19.1)	29.0 (12.8, 45.2)	28.6 (4.0, 53.1)
Complication for baby*	19.9 (15.0, 24.8)	35.5 (18.3, 52.6)	21.4 (0, 43.7)
Hx of C-section*	0.8 (0, 1.9)	29.0 (12.8, 45.2)	0
Large baby*	2.4 (0.5, 4.3)	6.5 (0, 15.3)	7.1 (0, 21.1)
Medical problem	47.0 (40.8, 53.2)	54.8 (37.0, 72.6)	35.7 (9.7, 61.8)
Psychosocial problems	15.1 (10.7, 19.6)	16.1 (3.0, 29.3)	0
Maternal age	4.0 (1.5, 6.4)	19.4 (5.2, 33.5)	0

Current Pregnancy, multips

	Innuulisivik n=251 (95% CI)	Transfers n=31 (95% CI)	Nursing stn n=14 (95% CI)
3rd trimester bleed	2.0 (0.3, 3.7)	9.7 (0, 20.3)	14.3 (0, 33.3)
Hypertensive problems	8.8 (5.3, 12.3)	6.5 (0, 15.2)	0
Medical problems	58.6 (52.5, 64.7)	61.29 (43.9, 78.7)	64.3 (38.2, 90.3)
Substance abuse	10.0 (6.2, 13.7)	19.4 (5.2, 33.5)	28.6 (4.0, 53.1)
Twins	1.2 (0, 2.5)	3.2 (0, 9.5)	0
Psychosocial problems	14.3 (10.0, 18.7)	25.8 (10.2, 41.5)	7.1 (0, 21.1)
Premature labour	20.7 (15.7, 25.7)	61.3 (43.9, 78.7)	42.9 (16.0, 29.8)
Post term labour	3.2 (1.0, 5.4)	3.2 (0, 9.5)	0
Malpresentation	2.4 (0.5, 4.3)	12.9 (0.9, 24.9)	0

Labour and childbirth, multips

Condensed variable	POV, n=251 (95% CI)	Transfers, n=31 (95% CI)	NS, n=14 (95% CI)
Distress during labour	15.1 (10.7, 19.6)	9.7 (0, 20.3)	7.1 (0, 21.1)
Hemmorhage	16.7 (12.1, 21.4)	0	0
Post partum complication	21.9 (16.8, 27.0)	3.2 (0, 9.5)	7.1 (0, 21.1)

Baby outcome, multips

Condensed variable	POV, n=251 (95% CI)	Transfers, n=31 (95% CI)	NS, n=14 (95% CI)
Baby outcome	10.3 (6.5, 14.1)	22.6 (7.6, 37.5)	21.4 (0, 43.7)
5 min apgar< 7	3.2 (1.0, 5.4)	6.5 (0, 15.2)	14.3 (0, 33.3)
Birthweight < 2500g	3.6 (1.3, 5.9)	16.1 (3.0, 29.3)	0
Stillbirth	0.4 (0, 1.2)	3.2 (0, 9.5)	7.1 (0, 21.1)
Neonatal death	1.6 (0.04, 3.1)	0	0

Appendix H Ethical Approval

McGill

Department of Epidemiology
and Biostatistics
McGill University

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Fax: (514) 398-4503

November 28, 1994

Susan Chatwood
General Delivery
Rainy River, ON
P0W 1L0

Dear Susan,

I am pleased to inform you that, at its meeting of November 16, 1994, the Human Subjects Committee of the Department of Epidemiology and Biostatistics FULLY APPROVED your proposal entitled "Indications for transfer for childbirth in Inuit women served by the Povungnituk maternity". However, some concern was expressed that there would be sufficient variables and outcomes for the project to yield useful data. Furthermore, this is a descriptive study. It should not be used to develop guidelines.

The voting members were:

J. McCusker
E. Robinson
J. Pickering
I. Kon
E. Tsakonas (in absentia)

Yours sincerely,

Gisèle de Lauga for :

Jane McCusker, M.D. Dr.P.H.
Chair, Human Subjects Committee

cc: Dr. A. Lippman, Thesis Supervisor

JM:gd